Tong Seok May Joanne *v* Yau Hok Man Gordon
[2012] SGHC 252

Case Number : Suit No 885 of 2009

Decision Date : 19 December 2012

Tribunal/Court : High Court

Coram : Andrew Ang J

Counsel Name(s) : Melanie Ho, Chang Man Phing, Yuwen Teo-Mcdonnell (Wong Partnership LLP) for the plaintiff; Lek Siang Pheng, Mar Seow Hwei, Lim Xiu Zhen (Rodyk & Davidson LLP) for the defendant.

Parties : Tong Seok May Joanne — Yau Hok Man Gordon

Tort – Negligence

19 December 2012 Judgment reserved.

Andrew Ang J:

I. INTRODUCTION

1 This action arose out of the general anaesthetic ("GA") procedure during the plaintiff's (Tong Seok May Joanne) lower segment caesarean section ("LSCS") surgery. The plaintiff alleged that the defendant (anaesthetist Dr Yau Hok Man Gordon, who had carried out the GA procedure) was negligent in three aspects:

(a) failing to obtain her informed consent for the GA procedure;

(b) failing to take proper care when manipulating her neck during the GA procedure; and

(c) failing to provide reasonable post-surgery care.

2 The plaintiff claimed that the defendant's negligence had caused her to suffer from an injury to the anterior longitudinal ligament ("ALL") of the cervical spine (*ie*, the first seven vertebrae of the spine starting from the neck to the upper back) which had worsened over time and developed into a whole constellation of further symptoms and complications. She sought damages in the region of about $3m for physical, emotional and psychological harm allegedly suffered.

3 What caused the plaintiff to withhold legal proceedings until just before the action would have been time-barred? On the plaintiff's own evidence, she was initially not minded to pursue an action against the defendant because her husband and her father are also doctors. Since the medical profession is, according to her, a well-guarded one where they do not attack their own, she felt that the decision to bring an action would adversely affect her family. The plaintiff also explained that she consulted many different doctors over the years because she wanted to try everything she could first before resorting to legal action. This was disputed by the defendant who alleged that the delay arose only because the plaintiff was shopping around for a favourable opinion before commencing action. Although a litigant's motivation for instituting an action may not be strictly relevant, I thought it might be useful to place some context as to why this action was only brought three years after the incident.

4 I should also mention at the outset that this trial spanned a lengthy 39 days and involved 25 witnesses of fact and nine expert witnesses. I have duly applied my mind to the contents of the parties' lengthy submissions, but I do not intend to chronicle the voluminous contents of evidence so as not to risk the reader missing the wood for the trees. The contents of this judgment are therefore confined only to facts and issues that are truly relevant to the determination of liability. To facilitate understanding, the key medical terms will be explained where necessary when first mentioned.

II. THE FACTUAL BACKGROUND

The parties

5 The plaintiff graduated with a law degree from the National University of Singapore in 1995 but did not practice as a lawyer, having foregone a legal career in favour of devoting time to her family. She provided tuition in Mathematics and English in premises above her husband's clinic and generally led an active lifestyle with no history of neck pains. At the material time in 2006, the plaintiff was 35 years old and pregnant with her sixth child. She had had no problems with her five other pregnancies, all of which resulted in delivery by vaginal birth.

6 The defendant is a medical practitioner in private practice and a specialist in anaesthesiology of 25 years' standing at the material time. His sub-speciality is obstetric anaesthesia.

The events surrounding the LSCS

7 On 25 October 2006, when she was 35 weeks and four days pregnant with her sixth child, the plaintiff had some vaginal bleeding and abdominal cramps. Together with her husband, she consulted her obstetrician, Dr Tham Kok Fun ("Dr Tham"), at his clinic in Gleneagles Medical Centre. Dr Tham was the plaintiff's family friend and had also delivered her previous child. The plaintiff was admitted to Gleneagles Hospital at about 6pm that same day on Dr Tham's advice. At about 8pm, Dr Tham went to the labour ward to discuss his concerns about the cause of the plaintiff's bleeding (which had stopped by then) with the plaintiff and her husband. Since the baby was not engaged and was in a transverse lie (*ie*, at an angle relative to the axis of the mother's womb), it was not possible to induce labour. Dr Tham suggested LSCS as an alternative. After some discussion (the contents of which were disputed), the plaintiff decided to undergo the LSCS surgery. Dr Tham then made arrangements for the defendant to be the anaesthetist for the plaintiff's LSCS surgery and confirmed with the plaintiff that the LSCS would start at 10am the next day. The plaintiff's husband was present with her throughout the discussions that evening. He also stayed with her in the ward until she went for the LSCS the next day.

8 Since the precise timing of the events on the day of the LSCS on 26 October 2006 is disputed, the times given in this factual background are only estimates. The plaintiff was brought down to the Operating Theatre Reception Room at about 9.40am and was wheeled into the Operating Theatre ("OT") at about 9.50am. The defendant was engaged at another appointment at Mount Elizabeth Hospital at 9am that same morning. [note: 1] When he was making his way from that earlier 9am appointment to the plaintiff's appointment (which was scheduled for 10am), his car was blocked by another car at the Mount Elizabeth Hospital car-park. His departure was therefore delayed. The defendant estimated that he arrived at Gleneagles Hospital between 9.45am and 9.50am. It was not disputed that he saw the plaintiff for the first time when she was already in the OT.

9 The GA procedure commenced at around 10am and the LSCS soon thereafter. The baby was delivered successfully and the entire procedure ended at around 11.25am. The defendant, together with Honrado Laurence Magsano ("Nurse Honrado") and a Circulating Nurse, escorted the plaintiff from

the OT to the OT Recovery Room at about 11.30am. [note: 2] After handing the plaintiff over to the OT Recovery Room nurses and checking that she was responsive and that her vital signs were stable, the defendant left to attend to another surgery in the same hospital. [note: 3] He did not return to review the plaintiff when she was in the OT Recovery Room nor when she was in the ward.

10 At around 11.35am, Dr Tham saw the plaintiff in the OT Recovery Room. She complained of pain to him but did not indicate the site of the pain. Dr Tham instructed the nurses to administer Pethidine (a pain-killer) to the plaintiff through the intravenous drip. The plaintiff was discharged to the ward at around 12.30pm. The plaintiff stayed in the hospital for another two days before she was discharged on the afternoon of 28 October 2006. The plaintiff claimed to have told the ward nurses that she experienced neck and upper back pains during her hospital stay but this complaint was not reflected in any of the medical records.

Post-discharge

11 The next day, on 29 October 2006, the defendant received a telephone call from Dr Tham. Dr Tham informed the defendant that the plaintiff's husband had called him (Dr Tham), claiming that the plaintiff had complained of neck pain since the LSCS and that her husband wanted to speak to the defendant. At or about the same time, the plaintiff's husband used the Gleneagles Hospital's answering service to contact the defendant. In response to Dr Tham's call, the defendant telephoned the plaintiff's husband. The plaintiff's husband asked the defendant if the plaintiff's neck pain was related to the intubation process during the GA procedure. The defendant replied in the negative. The plaintiff's husband then asked the defendant what the reason for the plaintiff's neck pain could be. The defendant replied that it could be muscle ache due to the use of Succinylcholine, the muscle relaxant used for the intubation. The plaintiff's husband did not accept this explanation and the conversation ended shortly thereafter. The defendant did not speak to the plaintiff and/or her husband thereafter.

12 On 30 October 2006, two days after discharge from the hospital, the plaintiff consulted Dr Chang Wei Chun ("Dr Chang"), an orthopaedic surgeon at Orthopaedic & Traumatic Surgery Pte Ltd, Gleneagles Medical Centre. The plaintiff was in a wheelchair and complained of: (a) severe pain in the neck that radiated to the occiput (the back of the skull) and the upper back; and (b) dysaesthesia (an altered sensation that can manifest itself as discomfort or a burning sensation) in both hands, with the right hand worse than the left. She told Dr Chang that she woke up from the LSCS with "severe pain in the neck and upper back and over the abdominal wound site". [note: 4] Dr Chang examined the plaintiff and found that:

(a) the cervical spine was generally tender with spasm of the trapezius muscles on both sides;

(b) the range of movements of her cervical spine was about one-third of the normal range, and the plaintiff felt pain when she turned her neck beyond this range;

(c) there were no neurological deficits in the limbs referable to the cervical spine; and

(d) her power, sensation and tendon reflexes were all intact. [note: 5]

Dr Chang also ordered an X-ray of the plaintiff's neck ("the 2006 X-ray"). From his review of the X-ray, Dr Chang noted that the normal curvature of her neck was absent but that there was no radiological evidence of cervical spondylosis (degeneration of the cervical spine). He made a provisional clinical diagnosis of acute cervical disc herniation from ligamentous neck strain. The

plaintiff was advised to rest and to take analgesics. [note: 6]

13 On 2 November 2006, the plaintiff, together with her husband, went to Dr Tham's clinic for a follow-up consultation in relation to her LSCS wound. She was in a neck collar. The plaintiff told Dr Tham about her husband's telephone conversation with the defendant on 29 October 2006. Dr Tham testified that he might have contacted the defendant again after this consultation with the plaintiff but he could not remember for sure. [note: 7] The defendant denied receiving any other phone call from Dr Tham relating to the plaintiff other than the phone call on 29 October 2006. [note: 8]

14 According to the plaintiff, her symptoms subsequently worsened. On 8 November 2006, she obtained a referral from Dr Chang for physiotherapy. [note: 9] On 10 November 2006, she went to see Dr Chang again, complaining of persistent neck pain with tingling spasms down her upper back muscles and recurrent parathesiae ("pins and needles" feeling) down to her left index, middle and ring fingers and, to a lesser extent, her right hand. Her neck was also stiff. Dr Chang diagnosed her as having likely sustained a traumatic cervical disc herniation from accidental strain. Dr Chang recommended physiotherapy and rest. [note: 10] However, as the plaintiff was busy with the care of her sickly newborn child amongst other matters, she did not go for physiotherapy at all in 2006. Instead, she had massages at home. [note: 11]

15 As at the end of 2006, the plaintiff was taking six different kinds of medication daily, including Panadol (for pain relief), Ponstan (for pain relief), Papase (for anti-inflammation), Leftose (for anti-inflammation), Neuroforte (vitamins) and Zimor (for gastritis). [note: 12]

The plaintiff's condition in 2007

16 The salient points of the plaintiff's account of her condition in 2007 are as follows:

(a) her symptoms worsened and she would feel pain shooting down her neck and upper back whenever she flexed or extended her neck;

(b) she could not sit upright in a car for long periods due to the pain;

(c) she started to experience a cold patch and a thick sensation over the left upper arm; and

(d) she had "pins and needles" whenever she had to grip anything.

17 In March 2007, the plaintiff consulted Dr Wong Hee Kit ("Dr Wong"), an orthopaedic surgeon at the National University Hospital. Dr Wong's initial clinical finding was that the plaintiff had bilateral carpal tunnel syndrome. [note: 13] He ordered a Needle Electromyography and a Nerve Conduction Study with reference to bilateral carpal tunnel syndrome. [note: 14] The plaintiff did not go for the appointment that Dr Wong had fixed but instead went for a Needle Electromyography test arranged by her husband on 30 April 2007 with reference to cervical radiculopathy (*ie*, compression of nerves). [note: 15] The results of the Needle Electromyography showed that:

(a) there was electrophysiological evidence of a mild right-sided carpal tunnel syndrome; and

(b) there was no clear electrophysiological evidence of cervical radiculopathy, although clinically the plaintiff most likely had a mild, "sensory-only" C5/C6 radiculopathy which was below the detection threshold of the study. [note: 16]

The plaintiff was advised in the Needle Electromyography report to bring the results contained therein back to Dr Wong to be reviewed or to be correlated to an MRI. The plaintiff did not do so as she claimed that Dr Wong's diagnosis did not address the symptoms in her neck or back. Neither did the plaintiff bring the results of the electromyography back to Dr Chang. [note: 17]

18 On 1 March 2007, the plaintiff went for an MRI scan ("the 2007 MRI"). In the MRI report, the radiologist noted that mild degenerative disc changes were seen at multiple levels of the cervical spine from the C3/C4 to the C7/T1 region. The radiologist also noted that there was a mild reversal of the normal curvature of the cervical spine. [note: 18] On 9 March 2007, the plaintiff brought the MRI scan and accompanying report to Dr Chang. Dr Chang recommended that she undergo physiotherapy and give herself time to recover. [note: 19] The plaintiff started physiotherapy on 16 March 2007 and eventually settled on attending physiotherapy at Core Concepts Physiotherapy Centre about twice a week. [note: 20]

19 On 19 November 2007, the plaintiff consulted Dr Lim Lee Leng ("Dr Lim"), a neurologist at the Singapore Neurology & Sleep Centre at Gleneagles Medical Centre. The plaintiff did not go back for follow-up sessions with Dr Lim as she claimed that Dr Lim did not explain how her neck and back pain could have been caused by the conditions that she (Dr Lim) suggested. [note: 21]

20 Throughout most of 2007, the plaintiff was taking nine different kinds of medication daily. This included the medication that she had been taking in 2006 (see above at [15]), as well as Actal (for gastric), Tanakan (gingko extracts) and Voltaren Emulgel (a topical pain relief and anti-inflammatory drug). [note: 22] In December 2007, the plaintiff stopped taking Panadol, Ponstan and Actal, and instead took Anarex (a muscle relaxant), Mobic (for anti-inflammation) and Valium (for sleep). [note: 23]

The plaintiff's condition in 2008

21 In 2008, the plaintiff reduced her tuition commitments by about a third. [note: 24] This trend of reduction continued in 2009 by a further one-third, and in 2010 when the plaintiff stopped giving tuition altogether. In addition to the symptoms described above at [16], she started to experience a "whooshing" sound in her right ear. [note: 25]

22 On 14 July 2008, the plaintiff consulted another orthopaedic surgeon at the Singapore General Hospital ("SGH"), Dr Tay Boon Keng ("Dr Tay"). [note: 26] Dr Tay ordered an MRI scan and blood tests, but the plaintiff's husband arranged for her to take the MRI scan and blood tests privately so as to avoid a long wait. [note: 27] The blood tests were only done on 29 July 2008 and they were negative for any rheumatoid and/or auto-immune diseases. [note: 28] The MRI scan was eventually taken on 2 August 2008 ("the 2008 MRI"). In the accompanying MRI report, the radiologist noted, *inter alia*, that there were multiple mild diffuse disc bulges in the cervical spine from the C3/C4 levels to the C6/C7 levels but no cord compression. [note: 29]

23 Dr Tay then referred the plaintiff to Associate Professor Lo Yew Long ("Assoc Prof Lo"), a neurologist at SGH and National Neuroscience Institute. On 20 August 2008, Assoc Prof Lo carried out the following neurophysiological tests on the plaintiff [note: 30] without carrying out a clinical examination of the plaintiff beforehand: [note: 31]

(a) transcranial magnetic stimulation ("TMS") study, a test for motor responses by examining a patient's muscle twitch response to electromagnetic stimulation;

(b) nerve conduction study to assess if there was any nerve injury;

(c) autonomic nerve function test; and

(d) somatosensory evoked potential study.

24 The results of these tests were as follows:

(a) TMS study: The TMS study showed that the plaintiff's left upper limb and left lower limb motor evoked potential ("MEP") amplitudes were reduced to 3.1mv (instead of the usual 3.5mv) and 0.2mv (instead of the usual 0.4mv) respectively. [note: 32] However, the central motor conduction times for all four limbs were within the normal range. [note: 33] Assoc Prof Lo nonetheless concluded that the plaintiff had corticospinal tract cervical cord dysfunction (an abnormal functioning of the spinal cord in the neck region). [note: 34]

(b) Nerve conduction study: The test results of the nerve conduction study were mixed. [note: 35] The first part of the nerve conduction study showed responses within the normal range (*ie*, uninterrupted nerve conduction of electrical impulses in the body). [note: 36] However, this was not conclusive of absence of nerve injury as the machines may not be sensitive enough to detect all abnormal responses. [note: 37] The second part of the nerve conduction study which tested the plaintiff's response to a needle prick, showed "minimal electrophysiological evidence of chronic left C7 C8 radiculopathy". [note: 38] This meant that the plaintiff had numbness on her left arm and left hand due to "longstanding and not acute root compression in the neck". [note: 39]

(c) The automatic nerve function test and somatosensory evoked potential study both showed results within the normal range. [note: 40] That said, those tests might not have been sensitive enough to pick up all abnormal readings. [note: 41]

25 Assoc Prof Lo also reviewed the plaintiff's 2008 MRI and found the scans to be consistent with the TMS study results showing cord dysfunction. [note: 42] He concluded that the plaintiff had cervical spondylosis and cord dysfunction, although he could not ascertain how and when the latter was sustained. [note: 43] The plaintiff did not return to see Assoc Prof Lo until 12 October 2009.

26 According to the plaintiff, her symptoms continued to worsen in severity. In December 2008, the plaintiff consulted one Dr Christopher E Furneaux ("Dr Furneaux"), a neurosurgeon at Mercy Specialist Centre in Auckland, in New Zealand, while she was there on holiday with her family. [note: 44] Dr Furneaux told her there were no neurological interventions that would help her condition and recommended that she continue with physiotherapy. [note: 45] By late 2008, the plaintiff began to feel depressed because of the pain in her neck and back, and the effect it was having on her private, family and social life. [note: 46]

27 Throughout 2008, the plaintiff continued to take almost the same medication as those she took in December 2007 (see above at [20]), except that Valium (for sleep) was replaced with Imovane (for sleep), and Lexapro (an anti-depressant) was added to the list. [note: 47]

The plaintiff's condition in 2009

28 In 2009, the plaintiff further reduced her tuition classes by another one-third. [note: 48] In early to mid 2009, the plaintiff started to develop problems with her balance and gait, as well as difficulty in co-ordinating her movements. [note: 49] She stumbled down the stairs at her home twice but fortunately was caught by someone on both occasions. [note: 50]

29 The plaintiff consulted three neurologists over the course of the year:

(a) On 31 March 2009, the plaintiff consulted Dr Chong Pang Ngiok ("Dr Chong"), a neurologist at PN Chong Neurology Clinic at Mount Elizabeth Medical Centre. [note: 51] She did not return to consult Dr Chong subsequently as she was not comfortable with taking the types of drugs prescribed by him. [note: 52]

(b) On 29 July 2009, the plaintiff consulted Dr Goh Khean Jin ("Dr Goh K J"), a neurologist at the UMSC UM Specialist Centre Sdn Bhd in the University Malaya Medical Centre in Kuala Lumpur ("KL"), Malaysia. [note: 53]

(c) On 12 October 2009, the plaintiff returned to see Assoc Prof Lo. [note: 54]

Both Dr Goh K J and Assoc Prof Lo recommended that she see a pain specialist. [note: 55] On both occasions, the plaintiff took no further action as she was afraid of pain specialists who were usually also anaesthetists. [note: 56]

30 At around that time, the plaintiff developed twitching in her left eyelid. [note: 57] On 30 October 2009, she consulted Dr Prem Pillay ("Dr Pillay"), a neurosurgeon at Singapore Brain Spine Nerves Centre. [note: 58] Dr Pillay recommended that she continue physiotherapy and referred her for aqua-physiotherapy. [note: 59] The plaintiff obtained an aqua-physiotherapy evaluation on 24 November 2009 [note: 60] and decided against aqua-physiotherapy as she had financial constraints and was uncomfortable with being assigned a male physiotherapist. [note: 61]

31 On 12 November 2009, the plaintiff went to KL to have a flexion-extension MRI done ("the 2009 MRI"). [note: 62] In the accompanying MRI report, the radiologist noted that there was kyphosis (reversal of the normal curvature) of the cervical spine. [note: 63] The radiologist further noted that mild cervical spondylosis with disc bulges was apparent at all levels between C3 and C7, the most prominent being at C5/C6. [note: 64] A loss of T2 signal was also seen. [note: 65]

32 On 18 November 2009, the plaintiff saw another orthopaedic surgeon at SGH Specialist Practice, Dr Yue Wai Mun ("Dr Yue"). [note: 66] Dr Yue conducted a physical examination on the plaintiff and found that the range of motion of her neck was reduced and there was decreased sensation in her left upper limb globally. [note: 67] In addition, she had mild weakness when extending her elbows bilaterally. [note: 68] According to Dr Yue, those symptoms showed that there might be a nerve root problem, most likely on the left side. [note: 69] Dr Yue also found that there was no evidence of myelopathy (*ie*, spinal cord injury) as there did not appear to be a lack of co-ordination or

balance. [note: 70] Dr Yue also reviewed the plaintiff's X-rays and past MRI scans and made the following further observations:

(a) 2006 X-ray: Dr Yue noted that it showed a loss of the normal curvature of the cervical spine and spondylosis (degeneration) particularly at the C5/C6 levels, contrary to Dr Chang's original observations (see [12] above); [note: 71]

(b) 2007 MRI: Dr Yue noted that there were osteophytes (*ie*, bone spurs caused by degeneration that do not necessarily cause any symptoms as they are merely touching, and not pressing on or compressing, the spinal cord) indenting the spinal cord at C4/C5, C5/C6 and C6/C7; [note: 72] and

(c) 2008 MRI: Dr Yue noted that the 2008 MRI revealed similar changes as the 2007 MRI, although the 2008 MRI additionally showed a mild disc bulge at the C3/C4 level. [note: 73]

33 In late 2009, the plaintiff broke down during one of the parent review sessions at one of her children's counselling sessions. The counsellor suggested she seek professional counselling for herself. [note: 74] The plaintiff decided to do so and saw Dr Rasaiah Munidasa Winslow ("Dr Winslow"), a psychiatrist at Promises Healthcare Pte Ltd, on 28 November 2009. [note: 75] Dr Winslow assessed the plaintiff together with a psychologist, Dr Lam Chun Yin Julia ("Dr Lam"), over a few sessions from 28 November 2009 to 19 January 2010. [note: 76] Dr Winslow diagnosed the plaintiff with post traumatic stress disorder ("PTSD") and a major depressive disorder on 19 January 2010. [note: 77]

34 On 7 December 2009, the plaintiff consulted Dr Chang again. [note: 78] Dr Chang conducted a physical examination and found that the plaintiff had a stiff and irritable neck with the range of neck movements reduced by a quarter. [note: 79] Dr Chang also reviewed the plaintiff's 2008 and 2009 MRIs, and the neurological tests ordered by Assoc Prof Lo (see [23] above). Dr Chang noted that both MRIs showed similar degenerative changes between the C3 and C7 levels [note: 80] and the plaintiff's curvature of the cervical spine had worsened from 2008 and gone into a state of kyphosis (reversal of the direction of the cervical curve) in 2009. [note: 81] Dr Chang diagnosed the plaintiff's symptoms to be due to a combination of neck strain and cervical spondylosis, with the former likely to have been caused during the GA procedure conducted by the defendant and the latter likely to have been aggravated by the initial neck strain. [note: 82] Dr Chang was also of the view that the neurological tests ordered by Assoc Prof Lo on 20 August 2008 (see [23]–[24] above) supported his finding of nerve injury. [note: 83]

35 Throughout 2009, the plaintiff took a total of 12 different kinds of medication daily. This list included the medication that she had been taking in 2008 (see [27] above), as well as Lyrica (for nerve pain) and Xanax (anti-anxiety). [note: 84]

The plaintiff's condition in 2010

36 In 2010, the plaintiff stopped working as a tutor. [note: 85] On 19 April 2010, she stumbled down the stairs again but this time there was nobody around to catch her. [note: 86] Her symptoms continued to worsen after the fall. [note: 87] On 27 May 2010, the plaintiff consulted Dr Pillay again. [note: 88] Dr Pillay discussed with the plaintiff the surgical options she could consider and again

recommended aqua-physiotherapy. [note: 89]

37 On 2 June 2010, the plaintiff went for her fourth MRI ("the 2010 MRI"). In the accompanying MRI report, the radiologist noted that there were disc protrusions from C3/C4 all the way to T1/T2 levels (*ie*, from the cervical spine to the first and second levels of the thoracic spine). [note: 90] The radiologist also noted that there was a loss of normal T2 signal, which was consistent with cervical spondylosis. [note: 91] There was no significant change compared to the 2009 MRI. [note: 92]

38 On 14 July 2010, following Dr Pillay's recommendation, the plaintiff signed up for aqua-physiotherapy at Aqua Physio Rehab Center. [note: 93] The plaintiff found it helpful and has continued going there once a week on average. [note: 94]

39 In June 2010, when the plaintiff was in KL for a short trip, she went to Gleneagles Intan Medical Centre for physiotherapy as she was in pain without her usual physiotherapy. [note: 95] The physiotherapist there was of the view that the plaintiff could have a vestibular disorder and recommended that she go for vestibular physiotherapy to help with her balance and co-ordination problems. [note: 96] Since she returned to Singapore in July 2010, the plaintiff has also been going for vestibular physiotherapy about once every three to four weeks at Tan Tock Seng Hospital to help with her balancing problem. [note: 97]

40 On 18 August 2010, the plaintiff fell again and injured her foot. [note: 98] She consulted Dr Benjamin Tow Phak Boon ("Dr Tow"), an orthopaedic surgeon at SGH. Dr Tow recommended surgery but the plaintiff was hesitant about such an option. [note: 99] He also recommended that the plaintiff wear a neck collar, but she did not do so on the advice of her physiotherapist. [note: 100] Dr Tow further recommended that the plaintiff see a chiropractor but she did not do so as she was already going for physiotherapy and was concerned about the risk of injury in chiropractic treatment. [note: 101]

41 On 14 September 2010, the plaintiff consulted Dr Ho Kok Yuen ("Dr Ho"), a pain specialist at Pain Management Service, Raffles Pain Management Centre. [note: 102] Dr Ho performed a physical examination and found that the plaintiff had reduced motor strength to 4+/5 and dysaesthesia (*ie*, "pins and needles" feeling) in the left upper limb. [note: 103] Her reflexes were normal. [note: 104] Dr Ho suggested several invasive procedures for the plaintiff to consider. [note: 105] Pending her decision, the plaintiff has been going back to see Dr Ho for review about once a month since then. [note: 106] On 14 October 2010 and 23 December 2010 respectively, the plaintiff consulted two other pain specialists – Dr Bernard Lee Mun Kam (at Singapore Paincare Center) [note: 107] and Dr Nicholas Chua Hai Liang (at Tan Tock Seng Hospital) [note: 108] – for further opinions.

42 Throughout 2010, the plaintiff continued to undergo treatment for her PTSD and depressive disorder with Dr Winslow and Dr Lam. The plaintiff also took a total of 14 different kinds of medication daily, including those that she was taking in 2009 (see above at [35]), [note: 109] as well as Micardis (hypertension) and Neurobion (in place of Neuroforte).

The plaintiff's condition as at 2011

43 According to the plaintiff, as at 2011 she was suffering from:

(a) headaches from the base of her head to the whole back of her head, which sometimes worsened to migraine-like intense pain causing nausea;

(b) chronic and persistent pain in her neck, shoulders and upper back, which was worse on bending her neck or turning her head right or left;

(c) shooting pain and muscle spasms down the neck into the upper back, especially when flexing her neck up and down;

(d) left arm parasthesia, a constant thick sensation on the outer part of her upper left arm, with reduced sensation and persistent, abnormal coldness;

(e) sensation of pins and needles in both hands, extending up to the wrists, when gripping onto any object for a while;

(f) permanent numbness of all her fingertips, especially her right thumb;

(g) "pins and needles" in both feet and toes, which worsened on sitting;

(h) vestibular imbalance with nausea when in a moving vehicle;

(i) tripping and problems with co-ordination since 2009, which caused her to fall;

(j) twitching in both eyelids, especially the left;

(k) "whooshing" sound in her right ear, which worsened or instantly came on when her neck was in certain positions;

(l) sleep apnoea and snoring;

(m) poor concentration and memory and inability to think clearly;

(n) depression;

(o) anxiety; and

(p) anger. [note: 110]

44 The plaintiff further claimed that her life had been affected in the following major aspects:

(a) having to go for various physiotherapies on a regular basis so as to function daily; [note: 111]

(b) inability to function as a wife, mother and homemaker; [note: 112]

(c) loss of independence and self-esteem; [note: 113] and

(d) loss of income as a tutor. [note: 114]

45 Throughout 2011, the plaintiff reportedly took a total of 14 different kinds of medication daily,

including those that she took in 2010 (see above at [42], as well as Ultracet (for pain relief), Stugeron (for giddiness) and Seroquel (for sleep and depression).

III. THE PLAINTIFF'S CASE

46 The pertinent points of the plaintiff's case were as follows:

(a) Informed consent: the defendant did not discharge his duty of care to explain to her the nature, risks of and alternatives to GA, including the risk of neck injury.

(b) The intubation:

(i) The plaintiff was considered a potentially difficult patient to intubate;

(ii) The defendant was in a rush and did not carry out a pre-anaesthetic assessment at all to ascertain her suitability for GA before commencing the GA procedure. He therefore did not realise that she would be a potentially difficult patient to intubate.

(iii) The defendant did not adequately pre-oxygenate the plaintiff before intubating her since he was in a rush;

(iv) The defendant had not previously prescribed pre-medication for the plaintiff;

(v) The defendant did not realise that the plaintiff was actually a difficult patient to intubate until he tried to intubate her;

(vi) By this time, the plaintiff was unconscious and her muscles were paralysed. As she was not able to breathe on her own, there would have been a need to intubate her as soon as possible before her oxygen saturation levels dipped dangerously low;

(vii) The defendant's failure to anticipate difficulty in intubation meant that he did not ensure that adjuncts such as the stylet or bougie (adjuncts used to assist with difficult intubations) were brought into the OT;

(viii) Against the background of these countervailing pressures and faced with possible hypoxia from the plaintiff, the defendant had to intubate the plaintiff without the use of assisting adjuncts;

(ix) This resulted in his having to use excessive force and hyperextending the plaintiff's neck, thus causing injury to the C4/C5 level of the ALL that runs along the cervical spine;

(x) She complained of neck and upper back pains upon waking up in the OT Recovery Room and subsequently in the ward, which proved her claim that an injury had been caused by the defendant during the administration of GA; and

(xi) The X-ray and the four MRIs taken over the years also proved that the degeneration of her cervical spine was caused by a traumatic injury, which must have been caused by the defendant.

(c) Post-operative care:

(i) The defendant's post-operative orders were incomplete;

(ii) The defendant signed off on her discharge from the OT Recovery Room without certifying that she was fit for discharge;

(iii) The defendant did not review her condition when she was in the ward; and

(iv) The defendant did not review the plaintiff even after hearing about her condition via telephone call on 29 October 2006.

IV. THE DEFENDANT'S DEFENCE

47 The pertinent points of the defendant's defence were as follows:

(a) Informed consent:

(i) The defendant had explained the risks of GA to the plaintiff. He did not explain to the plaintiff the risk of neck injury because that was not a commonly known risk of GA; and

(ii) The defendant did not have to explain to the plaintiff the alternatives to GA because it was the usual practice between Dr Tham and him for Dr Tham to discuss the alternatives with the patient.

(b) The intubation:

(i) The plaintiff was not considered a potentially difficult patient to intubate;

(ii) The defendant had carried out a proper pre-anaesthetic assessment of the plaintiff and confirmed her suitability for GA;

(iii) He carried out adequate pre-oxygenation on the plaintiff before intubating her;

(iv) He did not encounter any difficulty in carrying out the GA procedure;

(v) He had the stylet and the bougie ready (adjuncts used to assist with difficult intubations) in the OT if he needed them and in fact he had no need to use them;

(vi) He did not use excessive force nor did he hyperextend the plaintiff's neck;

(vii) The plaintiff did not complain of neck and upper back pain upon waking up in the OT Recovery Room or at any time during her hospital stay; and

(viii) The X-ray and the four MRIs taken over the years proved that the degeneration of the plaintiff's cervical spine was caused by natural wear and tear and not a traumatic injury to the C4/C5 level of the ALL.

(c) Post-operative care:

(i) The post-operative orders were sufficient as those orders not documented were already given verbally to the OT Recovery Room nurses;

(ii) The plaintiff was fit for discharge from the OT Recovery Room as the nurses did not inform him of any change in the plaintiff's condition;

(iii) There was no duty to pay ward calls to the plaintiff as there was no reason for him to think that her condition required it; and

(iv) There was no duty to review the plaintiff's condition after talking to the plaintiff's husband on 29 October 2006 as there was nothing that he could do as an anaesthetist.

V. THE WITNESSES

48 Other than herself, the plaintiff called 15 other witnesses of fact to give evidence. A table of the plaintiff's witnesses is compiled below for ease of reference:

	Name	**Relationship with plaintiff**	**Background**
1	Dr Goh Soon Guan Frederick ("the plaintiff's husband")	Husband	General Practitioner at Carrington Medical Centre.
2	Dr Tham Kok Fun ("Dr Tham")	Obstetrician	Senior Consultant Obstetrician and Gynaecologist with the O&G Centre at Gleneagles Hospital.
3	Shoo Sook San Fay ("Nurse Fay")	Dr Tham's staff nurse	Staff nurse at Gleneagles Hospital.
4	Dr Chang Wei Chun ("Dr Chang")	First orthopaedic doctor	Orthopaedic surgeon at the Orthopaedic & Traumatic Surgery Pte Ltd at Gleneagles Medical Centre.
5	Dr Yue Wai Mun ("Dr Yue")	Subsequent orthopaedic surgeon	Spine Service Senior Consultant in the Department of Orthopaedic Surgery, SGH Specialist Practice, Gleneagles Hospital.
6	Dr Ho Kok Yuen ("Dr Ho")	Pain specialist	Clinical Director of the Pain Management Service, Raffles Pain Management Centre and a Consultant Anaesthesiologist.
7	Associate Professor Lo Yew Long ("Assoc Prof Lo")	Neurologist	Head of the Department of Neurology at the Singapore General Hospital ("SGH") and the Senior Consultant at both SGH and National Neuroscience Institute.
8	Ng Gek Hong ("Ms Ng")	Land physiotherapist	Associate Principal Physiotherapist with Core Concepts Physiotherapy Centre.
9	Nurhafizah bte Abu Sujad ("Ms Nurhafizah")	Aqua physiotherapist	Physiotherapist with the Aqua Physio Rehab Center.
10	Dr Rasaiah Munidasa Winslow ("Dr Winslow")	Psychiatrist	Executive Medical Director and Senior Consultant Psychiatrist with Promises Healthcare, and also a Visiting Consultant at Raffles Hospital, Changi General Hospital and the National University Hospital Services.

11	Dr Lam Chun Yin Julia ("Dr Lam")	Psychologist	Forensic Psychologist with Promises Healthcare Pte Ltd.
12	Pang Peck Hia Elizabeth ("Ms Pang")	Psychologist	Clinical psychologist and associate with Promises Healthcare Pte Ltd.
13	Lim Kim Seng ("Mdm Lim")	Friend	—
14	Corinne Mok Kah Ling ("Ms Corinne")	Friend	—
15	Sheila Charlotte Thangavelu ("Ms Sheila")	Friend	Also once an LSCS patient at Gleneagles Hospital.

49 The defendant also gave evidence and called eight other witnesses of fact to give evidence:

	Name	**Relationship with defendant**
1	Honrado Laurence M ("Nurse Honrado")	Assisting anaesthetic nurse
2	Khor Sia Liew ("Nurse Khor")	Operating Theatre ("OT") Recovery Room Nurse
3	Jamilah bte Ramat ("Nurse Jamilah")	Ward nurse
4	Chua Khar Liang Doris ("Nurse Chua")	Ward nurse
5	Lai Ah Moi ("Nurse Lai")	Ward nurse
6	Low Boh Tee ("Nurse Low")	Ward nurse
7	Lim Liok Teck ("Nurse Lim")	Ward nurse
8	Tan Tien Hwee ("Mr Tan")	Private investigator

50 As for the expert witnesses, the: (a) anaesthetic experts; (b) obstetrics and gynaecology ("O&G") experts; and (c) orthopaedic experts, gave concurrent evidence during the trial:

Field of speciality	**Plaintiff's expert**	**Defendant's expert**
Anaesthesia	Professor Alexius Ernald Delilkan ("Prof Delilkan") Background: Professor Emeritus of the Anaesthesiology and Critical Care department of the University of Malaya, Kuala Lumpur.	Professor Sia Tiong Heng ("Prof Sia") Background: Senior Consultant and the Head of the Department of Women's Anaesthesia in KK Women's and Children's Hospital.

O&G	Dr Lai Fon-Min ("Dr Lai") Background: Visiting Consultant and Head of Antenatal Risk Assessment Unit in the Department of Maternal Fetal Medicine, Division of Obstetrics & Gynaecology in KK Women's and Children's Hospital.	Dr Rauff How Jing Mary ("Dr Rauff") Background: Senior Consultant and Associate Professor in the Department of O&G at the National University Hospital and an Associate Professor in the Yong Loo Lin School of Medicine at the National University of Singapore.
Orthopaedic	Dr Harwant Singh ("Dr Singh") Background: Consultant Orthopaedic Surgeon with Pantai Medical Centre in Kuala Lumpur.	Dr Li Yung Hua ("Dr Li") Background: Consultant Orthopaedic Specialist in private practice in Mount Elizabeth Medical Centre.

51 In addition to the expert witnesses who gave concurrent evidence, the defendant also called the following two expert witnesses to testify:

(a) Dr Umapathi Thirugnanam ("Dr Umapathi"), a Neurologist and Senior Consultant in the Department of Neurology at the National Neuroscience Institute; and

(b) Dr Lishya Liauw ("Dr Liauw"), a Senior Consultant Radiologist at the Department of Neuroradiology at the National Neuroscience Institute.

52 Lastly, Dr Tsou Yu Yan Ian ("Dr Tsou"), a specialist in diagnostic radiology with Medi-Rad Associates Radiology Clinic at Mount Elizabeth Hospital, was called by agreement between both parties during the course of the trial as a court expert.

VI. THE GENERAL LEGAL FRAMEWORK

53 The applicable law on medical negligence is set out in *Khoo James v Gunapathy d/o Muniandy* [2002] 1 SLR(R) 1024 ("*Gunapathy*"). The Court of Appeal in *Gunapathy* adopted the test in *Bolam v Friern Hospital Management Committee* [1957] 1 WLR 582 ("*Bolam*") as supplemented by *Bolitho v City and Hackney Health Authority* [1998] AC 232 ("*Bolitho*"). The *Bolam* test (McNair J at 587), quoted with approval in *Gunapathy* at [54], is as follows:

> ... [A doctor] is not guilty of negligence if he has acted in accordance with a practice accepted as proper by a responsible body of medical men skilled in that particular art. ... Putting it the other way round, a man is not negligent, if he is acting in accordance with such a practice, merely because there is a body of opinion who would take a contrary view. ...

54 The House of Lords in *Bolitho* clarified that "the practice accepted as proper by a responsible body of medical men" must have a "logical basis", particularly in cases involving the weighing of risks against benefits. This would require the experts to "have directed their minds to the question of comparative risks and benefits and have reached a defensible conclusion on the matter" (at [241]–[242]). This was interpreted by the Court of Appeal (at [64]–[65]) in *Gunapathy* to be a two-stage inquiry:

(a) whether the expert directed his mind to the comparative risks and benefits relating to the matter, considering and weighing all the countervailing factors relevant to the issue and rejecting bare and unsupported assertions; and

(b) whether the medical expert had reached a "defensible conclusion" as a result of the balancing process. The test of a "defensible conclusion" was distinguished from the test of reasonableness at [65]:

> ... Interpreted liberally, *Bolitho* could unwittingly herald invasive inquiry into the merits of medical opinion. For if "defensible" were to be given a meaning akin to "reasonable", the *Bolam* test would only be honoured in lip service. A doctor would then be liable when his view, as represented by the defence experts, was found by the courts to be unreasonable. We do not think this was the intention of House of Lords in *Bolitho*. To our minds, a "defensible conclusion" connotes the satisfaction of two concepts. First, the medical opinion must be ***internally consistent on its face*** . It must make cogent sense as a whole, such that no part of the opinion contradicts with another. A doctor cannot say, for example, that he supports a certain approach and attest that in that very situation, he would nevertheless have done quite the opposite. Second, the opinion ***should not fly in the face of proven extrinsic facts relevant to the matter*** . It should not ignore or controvert known medical facts or advances in medical knowledge. [emphasis added in bold italics]

55 The Court of Appeal further found (at [70]) that the *Bolam* test should be applied *after* the trial judge has made a finding of fact as "it is a well-settled principle that a question of fact, as opposed to a question of the standards of medical practice, does not fall within the province of the *Bolam* test". However, "judges and lawyers should not play at being doctors" and should not enter the arena of divided medical opinion because the "lawyer-judge, while eminently equipped to follow such arguments, finds himself quite out of his depth when called upon to adjudicate over them" (at [3]).

56 With the applicable legal framework in mind, I turn now to address the first issue of informed consent.

VII. INFORMED CONSENT

Overview of the law on giving of advice

57 There has been some debate about whether the general test for medical negligence in *Bolam* should apply to the giving of medical advice. The argument against the *Bolam* test was articulated by Lord Scarman in *Sidaway v Board of Governors of the Bethlem Royal Hospital and the Maudsley Hospital and others* [1985] AC 871 ("*Sidaway*") (at 882):

> ... The implications of this view of the law are disturbing. It leaves the determination of a legal duty to the judgment of doctors. ...

58 This objection subsequently found fuller articulation in *Pearce v United Bristol Healthcare NHS Trust* [1999] PIQR P53 ("*Pearce*") and in *Chester v Afshar* [2005] 1 AC 134 ("*Chester*"). Lord Woolf MR in *Pearce* (at P59) opined:

> In a case where it is being alleged that a plaintiff has been deprived of the opportunity to make a proper decision as to what course he or she should take in relation to treatment, it seems to me to be the law, as indicated in the cases to which I have just referred, that *if there is a significant risk which would affect the judgment of a reasonable patient, then in the normal course it is the responsibility of a doctor to inform the patient of that significant risk, if the information is needed so that the patient can determine for him or herself as to what course he or she should adopt*. [emphasis added]

59 The "reasonable patient" test has been adopted in Australia (see *Rogers v Whitaker* (1992) 175 CLR 479; *Rosenberg v Percival* (2001) 205 CLR 434); Canada (see *Reibl v Hughes* (1980) 114 DLR (3d) 1); and Malaysia (see *Foo Fio Na v Dr Soo Fook Mun and Anor* [2007] 1 MLJ 593). On this approach, a doctor's duty to warn his patient of all material risks would cover every situation where: (a) a reasonable person in the patient's position, if warned of the risk, will be likely to attach significance to it; or (b) if the medical practitioner is or should be reasonably aware that the particular patient, if warned of the risk, will be likely to attach significance to it.

60 Nevertheless, I find that the law in Singapore is clear. The Court of Appeal in *Gunapathy* had considered and approved the *Bolam* test in the context of giving advice *after* having discussed *Sidaway* and Lord Scarman's objections to the *Bolam* test. It concluded (at [142]–[143]):

> 142 We ... feel compelled to address the judge's inexplicable assumption that *Bolam* had been unceremoniously evicted from the issue of medical advice, and to make the observation that were this argument ever to arise in our jurisdiction, it would find *Sidaway* ... to be somewhat shaky ground on which to stand.
>
> 143 Accordingly, ***in affirming that the Bolam test applied to the issue of advice*** in the present appeal, we found that the defendant doctors' disclosure of the relevant percentage risks of radiosurgery was supported by a respectable body of medical opinion. They had not given negligent advice to Gunapathy.
>
> [emphasis added in bold italics]

61 Tay Yong Kwang J in *D'Conceicao Jeanie Doris (Administratrix of the estate of Milakov Steven, deceased) v Tong Ming Chuan* [2011] SGHC 193 ("*D'Conceicao*") usefully summarised the Court of Appeal's interpretation of *Sidaway* in *Gunapathy* (at [114]–[115]):

> 114 In *Gunapathy*, the Court's interpretation of *Sidaway* was as follows. Yong CJ noted the dissenting view of Lord Scarman that *Bolam* only applied to diagnosis and treatment and not advice. Yong CJ then pointed out that the majority of the House in *Sidaway* parted company with Lord Scarman on this issue. Lord Diplock, in the majority, stated (at 893) that the doctor's duty of care was "not subject to dissection into a number of component parts to which different criteria of what satisfy the duty of care apply, such as diagnosis, treatment and advice". A doctor's decision as to what risks a patient should be warned of was stated to be "as much an exercise of professional skill and judgment as any other part of the doctor's comprehensive duty of care" (at 895). Therefore, Lord Diplock opined that "no convincing reason has … been advanced … that would justify treating the Bolam test as doing anything less than laying down a principle of English law that is comprehensive and applicable to every aspect of the duty of care" (at 893). In *Gunapathy* (at [137]), the court noted that Lord Diplock had "entrenched the application of *Bolam* to advice in no uncertain terms". Lord Templeman was stated to have "effectively supported the *Bolam* test" even though he did not make specific reference to the test (*Gunapathy* at [138]). Yong CJ went on to state (at [141]) that "it was clear that Lord Bridge [with whom Lord Keith agreed] did not agree with Lord Scarman's dissenting view that it was for the court to determine what material risks a prudent patient was entitled to receive".
>
> 115 However, Yong CJ noted that Lord Bridge did carve a qualification into the *Bolam* test. The question of advice and risk disclosure should not be abdicated entirely to the medical profession. Yong CJ observed (at [141]) that Lord Bridge took the view that:
>
> > ... if a risk was substantial and there was no cogent clinical reason why disclosure should not

be made, the judge was at liberty to conclude that no respectable medical expert would have failed to make it. ...

This was seen by the Court of Appeal to be "a forerunner to the more general qualification made by *Bolitho*" (*Gunapathy* at [141]).

62 Although the Court of Appeal in *Gunapathy* clarified (at [142]) that it was not providing a conclusive ruling on the doctrine of informed consent as it did not have the benefit of full submissions on the issue, full submissions were given in *D'Conceicao* and duly rejected by Tay J.

63 There were three aspects to Tay J's analysis, all of which I am in full agreement with. First, Tay J found that the authorities from other jurisdictions advocating the "reasonable patient" test (see [59] above) had already been considered and expressly rejected by the Singapore High Court in *Surender Singh s/o Jagdish Singh and another (administrators of the estate of Narindar Kaur d/o Sarwan Singh, deceased) v Li Man Kay* [2010] 1 SLR 428 ("*Surender*") on the basis that it was bound by the Court of Appeal in *Gunapathy* (*Surender* at [152]–[153]). I am also bound by *Gunapathy*. I note Hri Kumar and Terry Kaan Sheung-Hung's observations on *Gunapathy* in "*Developments in Singapore Law between 2001 and 2005*" (Singapore Academy of Law, 2006) at p 702:

[Gunapathy] reaffirms and re-establishes ***beyond doubt*** that the *Bolam* principle applies in full force to diagnosis, treatment *and* advice – and not just the first two – which are the three aspects of the single global duty of care of the physician as defined by the majority in *Sidaway*. [emphasis added in bold italics]

64 Second, Tay J rejected the proposition that the English cases of *Pearce* and *Chester* supported an extension or repudiation of the *Bolam* test. He found that notwithstanding Lord Woolf MR's language in *Pearce* which appeared to support the "reasonable patient" test (see [58] above) Lord Woolf MR had expressly accepted Lord Templeman's speech in *Sidaway* as the law (*Pearce* at P58) and had thereby "effectively supported the *Bolam* test" (*Gunapathy* at [138]). Tay J also rejected the plaintiff's reliance on *Chester* because: (a) *Chester* was a case on causation, and therefore any comments on the standard of care were only *obiter*; and (b) *Chester*'s emphasis on human rights and autonomy might be attributed to the binding effect of the European Convention of Human Rights on the English courts pursuant to the Human Rights Act 1998 (UK) (c 42) ("Human Rights Act"), which Singapore is not bound by (*D'Conceicao* at [123]).

65 I should add that *Chester* is not without its detractors even in the United Kingdom. It has been described as a radical decision which protects "autonomy interest in being fully informed"; see Jane Stapleton, "Occam's razor reveals an orthodox basis for *Chester v Afshar*" (2006) 122 LQR 426. I also note that, to date, no Singapore case has applied either *Chester* or *Pearce*.

66 Third, Tay J in *D'Conceicao* considered and rejected the plaintiff's argument that if the doctor failed to communicate a significant risk to the patient before carrying out the recommended treatment, this would fail to meet the *Bolitho* threshold of logic and thus amount to a breach of the doctor's duty of care. Tay J commented (at [124]):

The plaintiff's characterisation of the threshold of logic looks like an attempt to abolish *Bolam's* applicability to the issue of advice. This is at odds with the Court of Appeal's decision in *Gunapathy* which makes it clear that the *Bolam* and *Bolitho* jurisprudence applies to the issue of advice. *Gunapathy* is binding on me. I do agree with the plaintiff that if the medical profession illogically omits to warn of certain risks which patients should undoubtedly be informed of, then the court should interfere on the authority of *Bolitho*. In this regard, I turn to a passage from the

speech of Lord Bridge in *Sidaway* (at 900), where he was one of the majority judges:

> But even in a case where, as here, no expert witness in the relevant medical field condemns the non-disclosure as being in conflict with accepted and responsible medical practice, *I am of opinion that the judge might in certain circumstances come to the conclusion that disclosure of a particular risk was so obviously necessary to an informed choice on the part of the patient that no reasonably prudent medical man would fail to make it*. The kind of case I have in mind would be an operation involving a substantial risk of grave adverse consequences, as, for example, the ten per cent. risk of a stroke from the operation which was the subject of the Canadian case of Reibl v. Hughes, 114 D.L.R. (3d) 1. In such a case, in the absence of some cogent clinical reason why the patient should not be informed, a doctor, recognising and respecting his patient's right of decision, could hardly fail to appreciate the necessity for an appropriate warning.

[emphasis in original]

67 It is clear from the foregoing that a doctor's duty to give advice cannot be separated from his general duty of care to his patient: the *Bolam* test supplemented by the *Bolitho* test of logic (collectively "the *Gunapathy* test"), applies equally to a doctor's giving of advice as to his duties of treatment and diagnosis. I accordingly reject the plaintiff's reliance on *Pearce* and *Chester*.

The taking of informed consent in the context of obstetric anaesthesia

68 While the law on the giving of advice is clear, its practical application to the specific context of obstetric anaesthesia is more difficult and requires further analysis.

The joint responsibility of giving advice

69 Two related concepts govern the taking of informed consent: First, the giving of advice is the joint responsibility of both the anaesthetist and the primary treating physician. Second, the giving of advice is a process, and not an event, which begins from the moment relevant information is given to the patient until final confirmation of that information by the anaesthetist before the procedure begins. The relevant information thus need not emanate from the same source throughout the process of informing the patient.

70 Anaesthesia is a *unique* medical speciality in the sense that it does not stand alone and is always performed in conjunction with some other surgical procedure. When exploring anaesthetic options, the anaesthetist is in the best position to advise the patient about anaesthetic considerations, while the obstetrician is best placed to advise the patient about obstetric concerns. Anaesthetic and obstetric considerations in relation to a patient's anaesthetic options are rarely ever mutually exclusive. In obstetric cases, two distinctive features stand out. First, unlike, for example, heart surgery, in relation to which GA is more often than not the only option available, a patient about to undergo LSCS usually has a real choice between several anaesthetic options. Second, as agreed by the obstetric experts on both sides, the patient's obstetric condition is a factor that can significantly affect the chosen mode of anaesthesia. This gives rise to joint responsibility on the part of the anaesthetist and the primary treating physician for the giving of advice.

71 On behalf of the plaintiff, it was brought to my attention that the Gleneagles Hospital consent form used during the plaintiff's LSCS has since been amended to separate a patient's consent to surgery from her consent for the anaesthesia. [note: 115] The plaintiff submitted that this new consent form showed that the anaesthetist has a personal and non-delegable duty [note: 116] to explain the

nature, purpose, risks of and alternatives to the proposed anaesthesia to a patient. [note: 117] I am unable to accept this submission.

72 First, the fact that an anaesthetist is responsible for final *confirmation* of the patient's consent before commencing the GA procedure does not detract from the fact that the initial process of advising the patient is a matter of joint responsibility. If the plaintiff's submission is right, the result would be to give one specialist the responsibility of giving advice in relation to another specialist's field of speciality when advising on anaesthesia options. This would be unjust.

73 Second, as the giving of advice is a process and not an event, the anaesthetist does not have to be the one to provide the relevant information to the patient. Information can be communicated by other relevant medical professionals such as the primary treating physician, medical officers, nurses, or even through available resources such as information pamphlets.

74 I note Tay J's comments in *D'Conceicao* (see [61] *supra*) that in a situation where a patient is attended to by a team of medical personnel (at [129]):

> ... Once a member of the team advises the patient of certain information and the patient understands such information, the patient can be said to have pre-existing knowledge of such information with the effect that the *other members of the team need not repeat the same information to the patient*. ... [emphasis added]

The anaesthetist's ultimate responsibility for ensuring informed consent

75 The content of an anaesthetist's non-delegable duty arises from his control of the conduct of the anaesthetic procedure; he must ultimately ensure that the patient's consent has been truly informed before commencing the procedure. In other words, the anaesthetist is responsible not only for explaining to the patient the risks of a particular procedure in so far as "pure" anaesthetic considerations are concerned; he must also confirm that the primary treating physician has explained to the patient the anaesthetic considerations relevant to his field of expertise. This final confirmation should be done in a meaningful way by checking with the patient what the primary treating physician had already discussed with her, as opposed to merely asking the plaintiff to confirm that there had been a discussion. However, as I will go on to elaborate, the question of whether or not an anaesthetist has discharged his duty of care in relation to final confirmation depends on the facts and circumstances of each case.

76 That said, it bears emphasising that there must still be a balance between ensuring the disclosure of every conceivable risk, the constraints of time, as well as the possibility of frightening the patient and inadvertently causing her to come to an unbalanced decision. Ultimately, the *Gunapathy* test applies in ascertaining the standard to which an anaesthetist will be held when determining whether he has breached his duty of care in this regard.

Issues to be determined

77 Having explained how the law on informed consent applies in the specific context of obstetric anaesthesia, I turn now to consider whether, on the facts of this case, the defendant had discharged his duty. To determine liability, the following components of informed consent need to be addressed:

(a) Sub-issue 1(a): nature and risks of GA generally;

(b) Sub-issue 1(b): the specific risk of neck injury;

(c) Sub-issue 1(c): the alternatives to GA; and

(d) Sub-issue 1(d): whether informed consent was vitiated by the location where consent was obtained.

Sub-issue 1(a): The nature and risks of GA generally

(i) The defendant's duty to explain about GA in so far as non-obstetric anaesthetic considerations were concerned

78 The parties' respective positions are as follows:

(a) According to the plaintiff, the defendant came into the OT and started the GA procedure immediately without saying a single word to her. The plaintiff relied on three pieces of evidence to show that the defendant could not possibly have spoken to her:

(i) inaccuracies in the anaesthetic record which would have been avoided if the defendant had checked with the plaintiff;

(ii) records of timing which are inconsistent with the defendant having spoken to the plaintiff; and

(iii) the defendant's rushed manner, preventing him from speaking to the plaintiff.

(b) According to the defendant, he had specifically advised the plaintiff on the general risks associated with GA which included post-operative nausea, vomiting, and soreness of the throat, and that the plaintiff had indicated that she was aware of and understood the general risks associated with GA. [note: 118] He had also asked the plaintiff if she had any questions, to which she answered in the negative. [note: 119] It was only thereafter that he countersigned the plaintiff's consent form and commenced the GA procedure. The defendant explained that he did not document his discussions with the plaintiff as he had relied on the consent form to record that he had done so. [note: 120]

The Anaesthetic Record

79 The plaintiff claimed that inaccuracies in the Anaesthetic Record were proof that the defendant could not possibly have spoken to her as he claimed. [note: 121]

80 First, the defendant wrote "prev GA ok" (*ie*, "previous GA okay") under the section on "Anaesthetic History", [note: 122] although the plaintiff had never undergone GA before. When cross-examined on this mistake, the defendant maintained that he had only written down what the plaintiff had told him:

Q: Tell us how the patient came to tell you that she had previous GA?

A: I don't know why but I only wrote what I heard.

Q: So let me just get your case. You are saying this particular patient when asked about her anaesthetic history decided to tell you that she had undergone a previous GA procedure. Is that your evidence?

A: Yes.

Q: Dr Yau, it is obvious that you did not speak to the patient, certainly not about anaesthetic history, and that is why you wrote an entry which is not borne out in fact. Agree or disagree?

A: I disagree because although the entry is wrong, where else could I have got that information from? Because if I hadn't spoken to her, I could have just looked at the medical records and gotten the history and saw in the medical records that actually she had no previous surgery. And then I would have written correctly in there.

Q: I know.

A: The fact that it's wrong only goes to show that I must have spoken to her, although why it's wrong I cannot explain, because if I hadn't asked her that question and I needed to fill in for documentation purposes that particular entry, I could have gone through the medical records to look for that information. It's recorded in the medical records. [note: 123]

I note that this is inconsistent with the defendant's subsequent assertion that he had looked through the Admission History and Nursing Assessment records which reflected that the plaintiff's previous deliveries were all vaginal deliveries. [note: 124] However, this is not necessarily an irreconcilable inconsistency since the defendant did not specify exactly which of the medical records he was referring to. The fact of the matter is that *what was recorded in the Anaesthetic Record was different from what the defendant would have recorded had he relied on any of the other medical records available instead of talking to the plaintiff*. The defendant's explanation was therefore reasonable on the evidence. In fact, based on the defendant's evidence during cross-examination, it is possible that the mistake arose out of miscommunication:

Q: All right. Now let's look at anaesthetic history. Tell us how you obtained this information?

…

A: I cannot remember precisely what I said five years ago, Your Honour, but based on my usual practice, I say "Do you have any previous general anaesthesia and, if so, did you have any problems". That is what I normally say. [note: 125]

Based on the defendant's evidence of his usual practice, the plaintiff might have said "no" to mean that she had not undergone any previous GA procedures, but the defendant had mistaken her reply to mean that there was no problem with her previous GA procedures instead.

81 The other inaccuracy in the Anaesthetic Record was found in the section on medical history. The tick in the box marked "Nil" was cancelled and the words "Thal Minor" (*ie*, thalassaemia minor (a blood disorder)) was added. Consequently, the American Society of Anaesthesiologists ("ASA") classification of "1" was amended to "2". [note: 126] The ASA classification is a system for assessing the physical fitness of patients before surgery. The plaintiff's case was that the amendments showed that the defendant did not speak to her at all, and that he subsequently obtained the information about the plaintiff's thalassaemia minor from the various medical records including Dr Tham's clinic notes, the Admission History and Nursing Assessment, the Partogram & Labour Chart and the Peri-Operative Nursing Record. [note: 127] The defendant explained that his working habit was to fill up the Anaesthetic Record only after the surgery had started, and not to transcribe his notes while he was

speaking to the patient. [note: 128] As such, the amendments were made when he realised that he had filled in the information wrongly. [note: 129] Counsel for the plaintiff, Ms Melanie Ho ("Ms Ho"), submitted that had the defendant really spoken to the plaintiff, her condition of thalassaemia minor would not have slipped his mind just several minutes later. [note: 130] I do not find this argument compelling. If the defendant had not spoken to the plaintiff but had relied on the other medical records to obtain her medical history, he would more likely than not have copied the information down correctly the first time and would not have had to make subsequent amendments. The defendant's explanation was therefore credible on the evidence before me.

The issue of timing

82 The plaintiff also relied on the documented timing of events to argue that the defendant could not have had enough time to carry out all that he claimed to have done in the pre-anaesthetic assessment, which includes the discussion of risks of GA. The plaintiff's case was that the defendant had, at most, five minutes to carry out his entire pre-operative assessment for the following reasons:

(a) According to the Peri-Operative Nursing Record, [note: 131] Nurse Honrado completed her checks in the OT Reception Room and then entered the time on the Peri-Operative Nursing Record as 9.50am, [note: 132] based on the OT Reception Room clock. [note: 133] The plaintiff was wheeled into the OT immediately after. [note: 134]

(b) Since it was undisputed that the defendant only saw the plaintiff when she was already in the OT, he must have arrived just after 9.50am at the earliest.

(c) The documented time of the commencement of the LSCS, as recorded in the Peri-Operative Nursing Record, was 9.55am. [note: 135] According to Dr Tham, that would have been the time that the intravenous cannula was inserted in preparation for the start of the GA procedure. [note: 136]

83 However, contrary to what Dr Tham explained, Nurse Honrado's evidence was that the start time of the surgery was the time that the surgeon made the first incision based on the OT clock and not the time that the cannula was inserted. [note: 137] Nurse Honrado confirmed that she, rather than Dr Tham, was the one filling in the records. One would therefore expect Nurse Honrado to be more familiar with the correct documenting practices of the hospital than Dr Tham. However, if one were to accept Nurse Honrado's evidence that the first incision was made at 9.55am, the documented time of events would not tally for the following reasons:

(a) First, if the time Dr Tham had made the first incision was 9.55am, it would be inconsistent with the fact that the "time out" safety check usually performed just before a surgeon makes his first cut was documented at 10am in the Peri-Operative Nursing Record. [note: 138]

(b) Next, the idea that Dr Tham made the first incision at 9.55am would also be inconsistent with inferences drawn from the Vital Signs Report [note: 139] that pre-oxygenation for the GA procedure only started just after 10am and intubation was completed just before 10.05am. These two inferences, which both parties' anaesthetic experts have confirmed are valid, are based on the following parameters:

(i) inO_2 (inspired oxygen) reading was 21% (*ie*, oxygen concentration in room air) at

10am and 67% at 10.05am, suggesting that pre-oxygenation started just after 10am; and

(ii) $etCO_2$ (end-tidal carbon dioxide) reading was 0% before 10.05am and 29% at 10.05am, suggesting that intubation was accomplished by 10.05am for the carbon dioxide in the expired breath to be detected in the anaesthetic circuit. [note: 140]

84 Although the point made in [83(b)] above seems to support the plaintiff's case, the documented times in the plaintiff's case *still* would not tally for the following reasons:

(a) First, the time of the baby's birth was documented as 10.06am on the Infant Examination records [note: 141] (although it bears noting that there is no evidence as to what clock the timing was based on). However, as verified by the anaesthetic experts on both sides, one could infer from the Vital Signs Report that the baby was born sometime between 10.10am and 10.15am, and not at 10.06am, as the Vital Signs Report showed that the plaintiff's heart rate and blood pressure dropped significantly during that period. [note: 142]

(b) Second, the plaintiff was unhooked from the monitors in the OT at 11.25am when the surgery ended, as documented in the Vital Signs Report. [note: 143] The end time of surgery, which was taken by Nurse Honrado *after* [note: 144] she wheeled the plaintiff to the OT Recovery Room based on the OT Recovery Room clock, was *also* recorded as 11.25am in the Peri-Operative Nursing Record. [note: 145] According to Nurse Honrado, she would have needed at least a minute or two to transfer the plaintiff onto the trolley and to wheel her to the Recovery Room. [note: 146] It was unlikely that the clocks in both the OT and the OT Recovery Room were synchronised.

85 It is immediately apparent that the various documented times simply do not tally with each other regardless of whether it was based on the plaintiff's or Nurse Honrado's account. The defendant's explanation for this was that the documented times were based on different room clocks, machines and/or watches that were not synchronised. In relation to the manual entries, the recording could also have been made *ex post*, which meant that the relevant persons might have recorded an estimated time (*eg*, 9.50am instead of 9.51am) and that they might also have recalled the time wrongly. As such, it is possible that the defendant could have had more, or even less, time to carry out the pre-anaesthetic assessment than what the plaintiff claimed. Given the state of the evidence, I am unable to make a finding of fact as to exactly how much time the defendant had for the pre-anaesthetic assessment.

86 Notwithstanding the serious dispute regarding the timing of events, little actually turns on the issue of time when it comes to assessing whether the defendant had breached his duty of care in the manner that he carried out his pre-operative assessment. Although more time spent on a pre-anaesthetic assessment may indicate that it was more likely to have been done properly and *vice versa*, that itself is inconclusive. The time taken for a pre-anaesthetic assessment depends on many varying factors, such as the anaesthetist's efficiency, the patient's medical and surgical history, and whether the patient has many questions to ask. I heard evidence from Nurse Honrado that most anaesthetists she works with only take an average of five minutes to complete the anaesthetic assessment of a patient who has no significant medical and surgical history and who does not ask any questions. [note: 147] The defendant's anaesthetic expert, Prof Sia, indicated that he would probably take about ten minutes for such a patient. [note: 148] The plaintiff's anaesthetic expert, Prof Delilkan, gave the longest estimate of 30 minutes but I am less inclined to accept Prof Delilkan's evidence over the others as he admitted to having been out of practice for more than 11 years. [note: 149]

Other alleged shortcomings

87 The real question, in my opinion, is this: even if the defendant was running late, would that have been sufficiently compelling for him to omit the pre-anaesthetic assessment, including informing the plaintiff about the nature and risks of the GA procedure? On this point, Ms Ho referred to other alleged shortcomings on the part of the defendant to persuade me to find that it was more likely than not that the defendant proceeded with the GA procedure without performing a pre-anaesthetic assessment. These alleged shortcomings were as follows:

(a) the omission to always ensure a reasonable time buffer between appointments;

(b) the omission to order cross-matching tests for blood; and

(c) the omission to prescribe pre-surgery medication.

The omission to always ensure reasonable time buffer between appointments

88 Much time at trial was spent cross-examining the defendant on his usual course of practice and, in particular, the various instances when he had accepted almost back-to-back and even overlapping appointments. It was submitted, on behalf of the plaintiff, that by failing to ensure that there was always a reasonable buffer between appointments to: (a) follow up properly with the earlier patient; and (b) to carry out a proper pre-operative assessment on the next patient, and a domino effect arose which compromised the care of his patients. I will first set out the defendant's explanation on his practice generally before turning specifically to the schedule of events on the day of the plaintiff's LSCS.

89 The defendant explained that in cases where the surgeries were performed in the same clinic or hospital, less buffer time would be needed as travelling time would be minimal. Further, in cases where the surgeon had booked the defendant for a longer period than what would normally be required for the surgery, buffer time might have already been built into the scheduling. [note: 150] The defendant also pointed out that the day-to-day practice of elective medicine does not always run with clockwork-like precision because surgeries and post-operative care may take more or less time than anticipated. In group practices such as the defendant's, fellow anaesthetists often cover for each other when needed. Therefore, if Surgery A looks like it will overrun, or if Patient A develops complications post-surgery, the defendant would ask the surgeon performing Surgery B (which was scheduled to follow) to delay Surgery B, or call his fellow colleague in the same practice to take on Surgery B. [note: 151] When cases are performed in clinics (as opposed to hospitals), the schedules are even more flexible. [note: 152] The defendant explained that he would accept back-to-back and overlapping cases as it is common for a group practice to accept the cases first and redistribute them later if necessary. [note: 153] Patient safety would not be compromised as the anaesthetists in his group practice are all qualified and competent [note: 154] although, as the defendant candidly admitted, such an arrangement would not be ideal from a patient's perspective. [note: 155] The plaintiff pointed out that such subsequent changes were not reflected in his appointment books. However, as the purpose of appointment books is to record *prospective* appointments, I do not think it unreasonable that the defendant and/or his clerks did not retrospectively update the entries to reflect the actual events of the day. I would, however, add that the defendant's practice of accepting appointments so close together is of some concern.

90 Unsatisfactory as the defendant's practice was, the issue of how the defendant usually

scheduled his appointments is not crucial to the present case. What is more important is the defendant's schedule on 26 October 2006, the day of the plaintiff's LSCS. The relevant surgeries that he had to attend in the morning were as follows: [note: 156]

	Time	**Surgery**	**Hospital**
1	8.45am	Evacuation of uterus	Mount Elizabeth Hospital
2	9am	Marsupialisation of Bartholin cyst	Mount Elizabeth Hospital
3	10am	The plaintiff's LSCS	Gleneagles Hospital
4	11.30am	Laparascopic hysteroscopy	Gleneagles Hospital

91 I digress for a moment to deal with the plaintiff's allegation that the defendant had tampered with the entries for 26 October 2006 in his appointment book. In his affidavit of evidence-in-chief ("AEIC"), the defendant stated that he would not have agreed to take on the plaintiff's case if the preference indicated by Dr Tham was for regional anaesthesia ("RA") instead of GA as he would not have had enough time to prepare for the LSCS to start on time at 10am. [note: 157] During cross-examination, the defendant supplemented his reasoning by saying that since he had had an early start to the day with his first appointment at 7.45am, he wanted to have some refreshments before going for the plaintiff's LSCS at 10am. [note: 158] Since an RA generally takes longer to set up than a GA, he would not have had time to do so before the plaintiff's LSCS if it was to be done under RA. (I pause to note that this explanation about needing refreshments was only raised at trial and not in the defendant's AEIC. My impression is that this reason was an embellishment and I accordingly place little weight on it.) Ms Ho then asked the defendant where the 7.45am entry was, as it was not very clear in her bundle of documents. [note: 159] The defendant replied that he was referring to the very first entry of the day. [note: 160] After close scrutiny, I agreed that I could just about make out the time "7.45" in the court's copy of the bundle. [note: 161] The cross-examination then continued on the basis that the very first entry of the day was at 7.45am. However, upon re-inspection of the original appointment book after the trial had ended, both Ms Ho and the defendant's counsel, Mr Lek Siang Pheng ("Mr Lek"), confirmed that the correct timing was actually "8.45am" and not "7.45am".

92 Ms Ho then raised the allegation that the defendant had tampered with the photocopying process so as to cause a mark resembling the digit "7" to appear in the first entry. Upon learning of such an allegation, I directed both Ms Ho and Mr Lek to appear before me in chambers. At the hearing in chambers, Mr Lek assured the court that the defendant had had no part to play in the photocopying process, and that the photocopying of bundles of documents in preparation for trial had been outsourced to the firm's photocopying contractor. Mr Lek also explained that the mark resembling the digit "7" somehow appeared in the course of photocopying and re-photocopying the page after redaction to leave out the patients' names in the appointment book. In the original appointment book, there was nothing resembling the digit "7" at all. However, in the original redacted photocopy, a very faint shadow resembling the digit "7" appeared to have been made during the course of photocopying. Subsequently, in the course of re-photocopying the documents to prepare the bundles for trial, the shadow became more distinct. All these explanations were affirmed in an affidavit filed by Mr Lek after the hearing.

93 Having personally inspected and compared the original appointment book, the original redacted photocopy, as well as the relevant bundles used by the Mr Lek, Ms Ho, and the court's copy, I

conclude that the shadow in the original redacted photocopy and the distinct mark in the bundles used at trial did not look like they had been deliberately made. Further, the distinct "7" in the bundles used at trial were at the exact same spot where the shadow had appeared in the original redacted photocopy. I am therefore fully satisfied on the evidence that no tampering was made. I am also of the view that, on balance, the defendant had made an honest mistake in thinking that the first entry of the day was 7.45am instead of 8.45am. I do, however, wish to add that Mr Lek should have informed the court of this mistake at the earliest opportunity.

94 Returning to the analysis of the defendant's schedule, I find that all that the plaintiff has succeeded in doing is to satisfy me that the defendant was often in a rush and that he was probably in some rush on the morning of the plaintiff's LSCS. It is, however, a big leap to say that the defendant had compromised the plaintiff's care just because he was in a rush. It bears emphasising that the LSCS was, on the evidence of Dr Tham as well as the O&G experts, an *elective* surgery and not an emergency surgery even though the plaintiff's original delivery date was pushed forward by about a month. Surgeries can and often do overrun in practice and there was no compelling reason for the defendant to compromise basic patient care just for the sake of starting the anaesthetic procedure on time. It is also a leap for the plaintiff to say that the defendant was compelled to start the anaesthetic procedure at 10am on the dot because he had a later surgery scheduled at 11.30am. It is undisputed that Dr Tham usually takes only about 40 to 60 minutes to complete an LSCS for patients who are undergoing an LSCS for the first time, and that the OT will usually be booked for 60 minutes only. [note: 162] Dr Tham himself was unsure why he ended up taking about 85 minutes to complete the plaintiff's LSCS. [note: 163] Therefore, at the time when the plaintiff's LSCS was about to start, the defendant would not have expected to be late for his 11.30am appointment, which was also in the same hospital. Furthermore, the defendant had explained that if he was running late for his next appointment, he would either have called the next surgeon to delay the surgery or asked one of his fellow anaesthetists in his group practice to take over. On a related point, it is also farfetched to say that the defendant had, from the beginning, closed his mind to the possibility of administering RA [note: 164] because he had said that he would not have accepted the plaintiff's case if it had been an RA instead of a GA. [note: 165] The defendant's statement was made in the context of scheduling, and it is a stretch to say that he would have doggedly insisted on proceeding with GA even if the plaintiff was found to be contra-indicated for GA.

95 As such, even if the defendant was running late and the LSCS was unable to start on time at 10am, I am not satisfied on the evidence that this proves on a balance of probabilities that the defendant had compromised basic patient care.

The omission to order cross-matching tests for blood

96 The plaintiff's next allegation was that the defendant omitted to order cross-matching tests for blood despite his concern for the plaintiff's earlier bleeding problems. "Cross-matching" refers to the process of taking a sample of blood from the patient, sending it to the laboratory to identify what blood type it is, matching with a donor's blood, and having that blood ready to be given to the patient in the event of blood loss. This process usually takes about two hours. [note: 166] In this regard, the plaintiff relied on cl 1.1.3 of the Singapore Society of Anaesthesiologists ("SSA") Guidelines which states as follows:

> 1.1.3 **Blood Type and Screen**:
>
> 1.1.3.1 The anaesthesiologist's decision to order or require a blood type and screen or cross-match should be individualised and based on anticipated haemorrhagic complications, for example,

placenta praevia in a patient with previous uterine surgery. [note: 167]

97 Although guidelines such as the SSA Guidelines are useful in assessing the standard of care that a doctor should be held to, they are not sacrosanct. It must be remembered that guidelines often set out best practices and a departure from best practice is not necessarily improper. According to Prof Sia, [note: 168] even KK Women's and Children's Hospital does not incorporate medical guidelines in totality. One must look at all the facts and circumstances to determine if the defendant's conduct would be regarded as proper by a responsible body of medical men.

98 The defendant explained that he did not order cross-matching tests as he took into account Dr Tham's general preference not to do so because cross-matching is an expensive procedure which often gets wasted. [note: 169] Further, should bleeding actually occur, there is always a store of emergency blood available in the hospital which can be mobilised immediately. [note: 170] The defendant also explained that in an emergency the most important step in maintaining life would be to maintain the volume of blood, and this can be done with other blood products while blood is sent off for cross-matching. [note: 171] As such, the fact that there was no cross-matched blood immediately available would not mean that the patient's life would be endangered. [note: 172] Both parties' anaesthetic experts also agreed that blood tests and investigations are usually ordered by the primary physician when the patient sees him at his clinic, and not by the anaesthetist. [note: 173] It is only when there are certain medical indications that the primary physician may sometimes refer to the anaesthetist for a further opinion as to whether such tests and investigations are required. [note: 174] Even the plaintiff's O&G expert, Dr Lai, agreed that such tests would have been ordered by him as the primary physician, and not by the anaesthetist. [note: 175]

99 On the evidence, the defendant's omission to order blood tests and investigations does not help to prove the plaintiff's case that the defendant had a disregard for basic patient care.

The omission to prescribe pre-surgery medication

100 The plaintiff also alleged that the defendant omitted to prescribe pre-surgery medication to prevent or minimise damage to the patient's lungs should the stomach contents enter the patient's lungs during the intubation process. Generally speaking, there are two types of pre-surgery medication:

(a) an alkali such as an antacid to neutralise the acidity of the stomach; and

(b) medicine to decrease acid production by the stomach.

In this regard, the plaintiff relied on cl 1.6 of the SSA Guidelines which states that "pulmonary aspiration prophylaxis should include fasting, and use of a non-particulate antacid and histamine receptor (H_2) antagonist." [note: 176] My comments about the role of guidelines in ascertaining the standard of care discussed above in the context of cross-matching tests (at [97] above) also apply here.

101 In relation to the first type of pre-medication, *viz*, an alkali, the defendant explained that recent studies show that such medication was only effective if the acid in the stomach and the alkali in the medication mixed evenly. [note: 177] If the substances did not mix evenly, the patient might be worse off because there would be even more liquid in the stomach. [note: 178] As for the second type

of pre-medication, the defendant said that because of the practice of admitting the patient only on the same day as the surgery in elective procedures, it was difficult to ensure that the patient takes such medication at least two hours before the surgery, which is the time needed for the medication to be effective. [note: 179] Since the prescription of pre-surgery medication did not make much difference to the mortality figures, the defendant was of the view that it is therefore not cost-effective to prescribe such medicine. [note: 180] The defendant also emphasised that for both types of pre-medication, the drugs could only, at best, reduce the harmful consequences of acid aspiration. They would not minimise the risk of aspiration. [note: 181] As such, he felt that it was more important to have good anaesthetic techniques to *prevent* acid aspiration. [note: 182]

102 The defendant's anaesthetic expert, Prof Sia, agreed that the role of antacids in an elective setting is now debatable in light of recent developments. [note: 183] He also agreed that it would be the primary treating physician, and not the anaesthetist, who would prescribe pre-surgery medication. [note: 184] In contrast, the plaintiff's anaesthetic expert, Prof Delilkan, insisted that pre-medication must be given by the anaesthetist and not the obstetrician, for the reason that pre-medication is for the anaesthetic procedure and not the obstetric operation. [note: 185]

103 I am disinclined to accept Prof Delilkan's views. As I have outlined (at [70] above), the duty to give advice for an anaesthetic procedure is shared between the primary treating physician and the anaesthetist. If the primary treating physician is jointly responsible for telling the patient to fast before surgery, it follows that he should also be jointly responsible for advising and prescribing pre-surgery medication if necessary, as both measures are intended to prevent or minimise the harmful consequences of acid aspiration. As Prof Sia pointed out, although the latter involves the prescription of medication, pre-surgery medication is not a specific anaesthetic drug which lies in the exclusive domain of the anaesthetist. [note: 186] It is a drug which any doctor can prescribe. [note: 187] In my view, since Dr Tham as the primary treating physician did not consider it necessary to prescribe pre-surgery medication for the plaintiff and no evidence has been led to the effect that Dr Tham was wrong, the defendant's omission to do so cannot reasonably be said to have been a shortcoming on his part and cannot constitute a breach of his duty of care.

The court's finding

104 Apart from the abovementioned issues, it is also relevant to note these other points that surfaced during the trial:

(a) the plaintiff said that she had expected the defendant to see and assess her before the commencement of the anaesthestic procedure. [note: 188] It is therefore difficult to believe that she would have remained silent if the defendant had not said a word to her. There was no barrier to communication since the plaintiff is a well-educated woman who, by her own evidence, is also sociable. [note: 189] The plaintiff did not give any evidence that she was so afraid that she could not speak up for herself;

(b) the plaintiff's husband claimed that at some time during her hospital stay, the plaintiff had told him that the defendant had failed to advise her before commencing the GA procedure. [note: 190] If this were really the case, one would reasonably have expected the plaintiff's husband to immediately raise the matter with Dr Tham or the defendant, particularly since the plaintiff's husband is also a medical practitioner who had previously done an anaesthetic posting and would have been aware of the gravity of such an alleged breach of professional conduct by the

defendant. It was undisputed that no such complaint was ever lodged. The plaintiff's husband's explanation was as follows:

> ... I did not raise the defendant's conduct to Dr Tham because Dr Tham had said the defendant was somebody he worked with constantly. I did not want to make it a difficult thing for Dr Tham so I did not raise it and of course at that time, if the defendant comes in and does the proper job and if nothing happened to my wife, I don't see the reason why we should raise an issue like the defendant coming in and not doing anything and just starting the thing. I mean, I think it's not nice for one doctor to go around criticising another, so I did not raise it. [note: 191]

(a) Since Dr Tham is a family friend of the plaintiff and her husband, it is difficult to believe that the plaintiff's husband was content to keep quiet about the defendant's alleged misconduct despite knowing that the safety of Dr Tham's patients might be in serious jeopardy if he continued working with the defendant. It is also telling that when the plaintiff's husband spoke to the defendant over the phone on 29 October 2006, he did not confront the defendant about such irresponsible and dangerous conduct; and

(c) the only other witness who was present by the plaintiff's side prior to the commencement of the GA procedure was the anaesthetic nurse, Nurse Honrado. Nurse Honrado had worked with the defendant on many other occasions before. Her evidence was that the defendant always conducts a pre-anaesthetic assessment which includes the discussion about GA. [note: 192] The fact that Nurse Honrado was unable to recall anything about the plaintiff's case suggests that nothing out of the ordinary happened during the plaintiff's LSCS.

105 Having considered the evidence before me (including the plaintiff's further allegations that the defendant had intubated her negligently (see [174]–[265] below) and that he had omitted to provide adequate post-operative care (see [266]–[276] below)), I find that the plaintiff has not proved her case that the defendant neglected to discuss GA considerations with her. I turn now to consider whether the defendant had discharged his duty of care to confirm that Dr Tham had advised the plaintiff about the GA procedure in so far as obstetric considerations were concerned.

(ii) The defendant's duty to confirm that obstetrics related anaesthetic considerations had been explained to the plaintiff

106 As I have explained earlier (at [70]–[74] above), the taking of informed consent for obstetric anaesthesia is a matter of joint responsibility between the obstetrician and the anaesthetist, with the anaesthetist taking ultimate responsibility for ensuring the patient's consent.

107 The plaintiff's position was that she was never properly advised by anyone about obstetric considerations in relation to anaesthesia. The defendant explained that he did not expressly confirm with the plaintiff that Dr Tham had explained the relevant considerations to her because he had relied on the usual working practice between himself and Dr Tham where Dr Tham would always discuss with his patients the risks of anaesthesia with respect to obstetric considerations. To determine liability on this point, two specific findings of fact need to be made. First, did Dr Tham discuss anaesthesia with the plaintiff, at least in so far as obstetric considerations were concerned? Second, was the defendant's reliance on his usual working relationship with Dr Tham sufficient so as to discharge his duty of care?

The discussion between Dr Tham and the plaintiff on 25 October 2006

108 Dr Tham's evidence was that he could not remember clearly the details of the consultation on 25 October 2006, the night before the LSCS. He admitted that he probably would have discussed the pros and cons of doing either a GA or RA from his point of view as an obstetrician [note: 193] and communicated his preference for GA to the plaintiff "generally". [note: 194] As for the plaintiff and her husband, their evidence as to whether, and to what extent, anaesthesia was discussed during the consultation with Dr Tham was, in my opinion, deliberately imprecise. In the course of cross-examination, the position taken by the plaintiff vacillated from saying that there was no discussion about the mode of anaesthesia, [note: 195] to saying that there might have been some "general discussion" although she could not remember the details. [note: 196] The plaintiff's husband confirmed that there was a discussion on the mode of anaesthesia that night, although his evidence was couched in similarly vague terms that they did not "go into detail" about anaesthesia. [note: 197] Given that the plaintiff and her husband could somehow remember the other aspects of the consultation with Dr Tham in a fair amount of detail, [note: 198] I have my doubts as to the veracity of their claim that they could not remember the anaesthetic aspect of the consultation.

109 The O&G experts of both parties generally agreed that any reasonable obstetrician would advise his patient about anaesthesia. The difference between the testimony of the plaintiff's O&G expert, Dr Lai, and the defendant's O&G expert, Dr Rauff, was that Dr Lai was of the opinion that RA was the default choice of anaesthesia unless the patient was contra-indicated for RA. As such, Dr Lai would not talk about GA to his patient unless the patient brought it up. [note: 199] This difference aside, it is clear that one would reasonably expect the obstetrician to discuss anaesthesia with the patient, at least in so far as obstetric considerations are concerned.

110 It also bears noting that that the consultation between Dr Tham, the plaintiff and her husband was about two hours long. Although Dr Tham was not present for the entire two hours, as he was also busy making arrangements for the plaintiff's surgery the next morning, [note: 200] there was more than sufficient time and opportunity to discuss anaesthesia in so far as obstetric considerations were concerned. Furthermore, the plaintiff's husband is a general practitioner who had previously done obstetric and anaesthetic postings in hospitals. [note: 201] It is unlikely that he would not have asked about anaesthesia even if Dr Tham did not bring it up. It is also difficult to believe that the plaintiff, despite being nervous about the LSCS surgery as she never had surgery in her life, [note: 202] would have failed to ask about anaesthesia. There was no impediment to communication since the plaintiff is a well-educated woman who admitted to having been a sociable person before the LSCS. [note: 203] Moreover, the plaintiff was familiar with Dr Tham as he was a close family friend and had previously delivered her fifth child. Although the couple were understandably anxious about their unborn child, I do not think on the evidence that this concern would have blocked out other considerations, such as concern for the plaintiff as the mother, during the entire consultation.

111 According to Dr Tham's staff nurse, Nurse Fay, Dr Tham would usually speak to the patient, confirm the surgery and obtain the patient's signature on the consent form before she arranged the booking of the OT. It was only after all these procedures were completed that an anaesthetist would be booked. [note: 204] Usually, when Dr Tham wanted to engage the defendant to perform an anaesthetic procedure in support of an LSCS, Dr Tham or his staff would call the defendant to give him the general details of the operation, including the mode of anaesthesia that the patient had indicated a preference for. [note: 205] When a patient had difficulty choosing which mode of anaesthesia to undergo [note: 206] or if Dr Tham assessed that a patient might have some anaesthetic risk, [note: 207] Dr Tham would ask the defendant to meet with the patient earlier to discuss the

various anaesthetic options with her. Since Dr Tham did not ask the defendant to meet with the plaintiff to discuss the anaesthetic options with her, it suggested that in all likelihood Dr Tham had: (a) assessed the plaintiff to be suitable for GA in so far as obstetric considerations were concerned; and (b) the plaintiff had agreed with Dr Tham's indicated preference for GA.

112 The consent form signed by the plaintiff also indicated that Dr Tham did discuss anaesthesia with her during the consultation, at least in so far as obstetric considerations were concerned. In particular, cl 2 of the consent form stated: [note: 208]

> 2. I, also consent to:
>
> 2.1 The administration of General, Local or other forms of anaesthesia, and confirm that the nature, risks and alternatives of such anaesthesia have been explained to me.

The consent form was dated 26 October 2006. The plaintiff's evidence in her AEIC was that she was asked to sign the consent form only on 26 October 2006 in the OT Reception Room while lying on the trolley and without her glasses. [note: 209] However, when the plaintiff was asked during cross-examination whether she had also filled in the details of the consent form while lying on the trolley and without her glasses, she said that she could not remember. [note: 210]

113 The documentary evidence plainly contradicts the plaintiff's claim that she had only signed the consent form on 26 October 2006 in the OT Reception Room. It showed that she had signed the consent form in the ward on the night of 25 October 2006, and not on the morning of 26 October 2006:

(a) First, the Nursing Care Plan had an entry "valid consent up" at 2237 hours on 25 October 2006. [note: 211] The entry "valid consent up" meant that the consent form had been signed.

(b) Next, the Peri-Operative Nursing Record showed that the ward nurse had ticked the corresponding "Ward" box for section B, item 2, titled "Valid Consent Taken and Signed" at 0630 hours. [note: 212] That indicated that the consent form had already been signed while the plaintiff was still in the ward.

(c) Third, the witness to the plaintiff's signature on the consent form was the ward nurse and not the OT Reception Nurse. [note: 213]

On the evidence, I find that the plaintiff had signed the consent form in the ward on the night of 25 October 2006 at or before 2237 hours. The date entered in the consent form, 26 October 2006, must have been an error. There is therefore nothing to suggest that the plaintiff did not have the time and ability to read and understand the contents of the consent form before signing it. More likely than not, the plaintiff was aware of the nature and risks of GA after the consultation with Dr Tham, at least in so far as obstetric considerations were concerned.

114 For these reasons, I find that the plaintiff was informed about the nature and risks of GA in so far as obstetric considerations were concerned. I turn next to the question of whether the defendant had breached his duty of care in omitting to expressly confirm with the plaintiff what Dr Tham had discussed with her.

The defendant's omission to expressly confirm with the plaintiff what Dr Tham had discussed with her

115 It was undisputed that the defendant had been Dr Tham's main anaesthetist for about five years, before the plaintiff's LSCS, and the two were familiar with each other. [note: 214] The evidence of the defendant, that the usual working practice between himself and Dr Tham was that Dr Tham would always discuss with his patients the preferred choice of anaesthesia where obstetric considerations are concerned was not contradicted. I have also already accepted, in the preceding section, the evidence of the defendant that he had advised the plaintiff on the general risks associated with GA – which included post-operative nausea, vomiting and soreness of the throat – and confirmed that she had no questions to ask about GA. In view of these circumstances, and in particular the fact that the evidence of the O&G experts was that they would always discuss anaesthesia with the patient in so far as obstetric considerations are concerned, I am of the view that the defendant did not breach his duty of care in omitting to expressly confirm with the plaintiff what Dr Tham had discussed with her.

Conclusion on sub-issue 1(a)

116 In conclusion, I find that the defendant had not breached his duty of care in so far as the disclosure of the general nature and risks of GA was concerned. I now turn to consider whether the defendant was under a duty to disclose the specific risk of neck injury and, if so, whether such duty was breached.

Sub-issue 1(b): The specific risk of neck injury

117 It was undisputed that the defendant (and Dr Tham) did not disclose the risk of neck injury to the plaintiff. The question is: was the defendant under a duty to do so? Both parties' anaesthetic experts have never come across any case of neck injury arising from GA. [note: 215] The anaesthetic experts also agreed that they would not discuss the risk of neck injury with a patient unless:

(a) their assessment revealed that intubation might potentially be difficult; and/or

(b) if it was made known that the patient had an existing neck condition or history of neck injury. [note: 216]

In an otherwise normal and healthy patient, neck injury arising from intubation is not a commonly known risk. Given the evidence of both anaesthetic experts, it came as a surprise that the plaintiff's orthopaedic expert, Dr Singh, took the position that neck injuries arising from the GA intubation process were well documented and that he had treated seven to ten such cases over the past ten years. [note: 217]

118 The relevant issues for determination are as follows:

(a) Did a duty of care to disclose the risk of neck injury exist because:

(i) the plaintiff was considered a potentially difficult patient to intubate; or

(ii) the plaintiff had made it known that she had an existing neck condition or history of neck injury?

(b) Even if the answer to (a) is no, did a duty of care to disclose the risk of neck injury nonetheless arise because it is a commonly known risk of intubation?

Since it was undisputed that the plaintiff had no known existing neck condition or history of neck injury at the material time, the analysis below will focus only on the issues listed at (a)(i) and (b) above.

Whether the plaintiff was considered a potentially difficult patient to intubate

119 It was the plaintiff's case that she was, at the material time, considered a potentially difficult patient to intubate, and that the defendant did not realise this because he did not carry out a pre-anaesthetic assessment on her before commencing the GA procedure. For the reasons given in the preceding section, I do not accept this claim. I will nevertheless consider the plaintiff's case at its next highest, *viz*, that the defendant had performed the pre-anaesthetic procedure improperly.

120 The inquiry as to whether the defendant's conduct of the GA procedure was proper, as accepted by a responsible body of medical opinion, focuses on the defendant's assessment of the plaintiff's airway, the key component of a pre-anaesthetic assessment to determine whether a patient is considered a difficult patient to intubate. The airway assessment consists of two parts. The first part is the Mallampati scoring, which looks at the patient's oral cavity. The second part involves examining the plaintiff's physical features. I will address each part in turn.

(i) Mallampati scoring

121 Put simply, the Mallampati scoring is done by looking at the anatomy of the patient's oral cavity and grading the view on a scale of 1 to 4. The higher the grade, the more likely it is that intubation will be difficult. The defendant carried out the Mallampati assessment with the plaintiff lying supine, and found that she had a Mallampati score of "2". The plaintiff's case was that the defendant's assessment was erroneous for the following reasons:

(a) the classical teaching of Mallampati scoring is done with the patient sitting up and not lying supine; and

(b) Prof Delilkan and Dr Ho (one of the plaintiff's pain specialists and also an anaesthetist) assessed the plaintiff's airway in 2009 and 2010 respectively and assessed her score as a "3". It was undisputed that a woman's Mallampati score generally tends to be higher when she is pregnant because of water retention and swelling associated with pregnancy. As such, according to the plaintiff, her true Mallampati score at the time of the LSCS should have been "3" or higher.

122 The plaintiff has, however, failed to prove that the defendant's assessment of score "2" was erroneous and that she was actually a difficult patient to intubate for two reasons. First, although the *classical* Mallampati scoring is done with the patient sitting upright, there was evidence in the medical literature (E J Tham *et al*, "Effects of Posture, Phonation and Observer on Mallampati Classification" British J of Anaesth 1992; 68: 32–38) that the patient's position made little difference to the scoring. [note: 218] Contrary to the plaintiff's submissions, the medical evidence showed that an examination in a supine position would tend to show a *higher* Mallampati score as compared to an examination done in a seated position. [note: 219] The plaintiff's witness, Dr Ho, agreed with this. [note: 220] Further, the defendant's anaesthetic expert, Prof Sia, gave evidence that he would score his patients in *both* the seated and supine positions because although the seated position is the *classical* position, it was not necessarily the *optimal* position. [note: 221] According to Prof Sia, an examination of the patient lying supine was more valuable since that will provide the same view that he would see just before carrying out the intubation process. [note: 222] According to Prof Sia, a possible explanation as to why the classical Mallampati scoring is done with the patient seated is that most

patients would usually be examined by an anaesthetist in an ambulatory setting. [note: 223]

123 As observed by the Court of Appeal in *Gunapathy* at [64], an expert witness has not reached a "defensible conclusion" unless the opinion "make[s] sense as a whole, such that no part of the opinion contradicts with another. A doctor cannot say, for example, that he supports a certain approach and attest that in that very situation, he would have nevertheless done quite the opposite". To put it simply, an expert witness has to put his money where his mouth is. I am thus unable to place much weight on Prof Sia's evidence on this point as he had simultaneously condoned the defendant's practice of assessing the Mallampati scoring in the supine position while professing to his own practice of assessing his patients in *both* the supine and seated position. Nevertheless, this point is, at best, neutral and the plaintiff has not proven, on a balance of probabilities, that her Mallampati scoring was higher than "2".

124 Second, substantial inter-observer variability exists in the Mallampati scoring. [note: 224] In other words, different observers performing the Mallampati scoring on the *same patient*, even at the *same time*, may not always report the *same score*. Factors causing such variability include subjectivity between different observers, as well as the element of patient co-operation (*eg*, how wide the patient chooses to open her mouth and whether she makes a sound). For these reasons, the Mallampati test is reported to be of "poor reliability". [note: 225] This inter-observer variability was documented in medical literature produced to the court and was also generally accepted by the anaesthetic witnesses of both parties. [note: 226] For this reason, Prof Delilkan's and Dr Ho's assessments of the Mallampati score "3" in 2009 and 2010 respectively have little evidential value to the plaintiff's Mallampati score in 2006.

125 The defendant also emphasised that in any event, the Mallampati scoring is just a predictive diagnostic scoring tool. It is not an actual indicator of whether there will be, or that there actually was, difficulty intubating the plaintiff.

126 Having considered the evidence before me, I find that the plaintiff has not proven on a balance of probabilities that the defendant's assessment of Mallampati score "2" was wrong. Before moving on, I should also mention that Ms Ho offered Prof Sia the opportunity to assess the plaintiff's airway during the trial. [note: 227] Prof Sia declined to assess the plaintiff's physical features (which is the second part of the airway assessment) for reasons set out below at [128]. The plaintiff contended that as Prof Sia had not offered any reason for declining to assess the plaintiff's Mallampati score (which is the first part of the airway assessment), the court should draw an adverse inference that he was seeking to avoid giving evidence unfavourable to the defendant. I disagree. Although the invitation to Prof Sia to assess the plaintiff extended to both the Mallampati scoring and the examination of physical features, [note: 228] in fairness to Prof Sia, what transpired *after* that invitation focused only on the examination of the plaintiff's physical features. In any event, this contention was not put to Prof Sia. I should also add that the evidential value of any assessment by Prof Sia would be low because of the inter-observer variability present in the Mallampati scoring (see [124] above). Having made my findings as to the first part of the airway assessment, I turn now to consider the evidence in relation to the second part of the airway assessment involving the examination of the plaintiff's physical features.

(ii) Examination of physical features

127 The examination of a patient's physical features for the purposes of airway assessment involves looking at whether the patient has a limited mouth opening, a receding chin and/or limited neck movements. The defendant had recorded in the Anaesthetic Record that all these

characteristics of the plaintiff were normal. The plaintiff's position was that she had limited neck movement and a receding chin in 2006, as found by her anaesthetic expert, Prof Delilkan, when he examined her in November 2009. [note: 229]

128 As a preliminary point, I am unable to place much weight on Prof Delilkan's alleged observations of the plaintiff's limited neck movement and receding chin because he had no supporting documents to show that these features were noted during his examination of the plaintiff in November 2009. [note: 230] Further, as Prof Sia pointed out, the plaintiff's neck pains which surfaced *after* the LSCS would have had a bearing on her subsequent range of neck movements. [note: 231] Moreover, the plaintiff's neck deformity that developed over the years *after* the LSCS might have altered her facial profile over the years, particularly the chin. [note: 232] As such, even if Prof Delilkan's observations in November 2009 were true, they are of limited value as to the plaintiff's state at the time of the LSCS. I find these reasons valid and do not draw any adverse inference from Prof Sia's failure to accept the invitation to examine the plaintiff. I accept Prof Sia's explanation that there would have been little value in his doing so.

129 At the trial, Ms Ho also suggested that the anaesthetic experts look at photographs [note: 233] that showed the profile of the plaintiff taken *before* the LSCS, and give their opinion as to whether the plaintiff had a receding chin back in October 2006. [note: 234] Prof Delilkan claimed that the relevant photographs showed that the plaintiff had a receding chin because the lower jaw was "underdeveloped" and thus had a tendency to "recede" and "cause an overbite". [note: 235] In contrast, Prof Sia did not see any such overbite and was of the opinion that the plaintiff's chin was normal. [note: 236] I too was unable to see evidence of an overbite and therefore agree with Prof Sia.

130 Having considered all the evidence before me, I find that the plaintiff has failed to prove on a balance of probabilities that the defendant had performed any part of the airway assessment in a manner not regarded as proper by a responsible body of medical opinion. There is therefore no basis to say that the defendant's assessment that the plaintiff was not a difficult patient to intubate was wrong. I pause to note, parenthetically, that even if the plaintiff's Mallampati score in October 2006 was "3", as she claimed, she may still not be considered a difficult patient to intubate because, according to Prof Sia, it is only when a patient's Mallampati score is "4" that he will consider her to be a potentially difficult patient to intubate. [note: 237]

Whether the risk of neck injury is commonly known

131 In view of the dispute between the anaesthetic experts on one side and Dr Singh on the other as to whether the risk of neck injury is a commonly known risk of GA, and to determine whether the anaesthetic experts' views meet the *Gunapathy* test, it is necessary for me to examine: (a) Dr Singh's alleged experience; and (b) the medical literature he tendered to support his position.

(i) Dr Singh's alleged experience

132 Of those seven to ten cases he claimed to have treated, Dr Singh was able to recall from memory some details of four of them [note: 238] but was unable to produce the medical records in relation to any of them. His reason was that the hospital in Malaysia declined to release them. This was despite my granting another further tranche of hearing for this issue to be heard. Since the defendant's orthopaedic expert was not given a fair opportunity to examine the records and comment on the cases that Dr Singh sought to rely on, I am unable to place weight on Dr Singh's evidence in

relation to those four cases.

133 On the last day of the trial, Dr Singh was able to produce some supporting documentary evidence [note: 239] in relation to one *other* case (hereinafter referred to as the case of "Patient X"). As a preliminary point, the probative value of this case is limited because Dr Singh was only able to produce his own case notes and the MRI scans. Other important documents, such as the operation records, anaesthetic record, nursing records and emergency department records, were all unavailable. The defendant's orthopaedic expert, Dr Li, therefore did not have the opportunity to properly consider and comment on the case of Patient X. I nevertheless allowed both orthopaedic experts to consider the MRI scans of Patient X to see if there was any objective evidence of Patient X suffering from an injury similar to the plaintiff's.

134 Patient X was a 45-year-old male who allegedly suffered neck pains after undergoing GA for a lipoma (*ie*, lump) excision on 7 October 2011. He was seen by Dr Singh on 10 October 2011. The relevant sequences of MRI for the case of Patient X were as follows:

(a) MRI 1: T1 sequence (*ie*, the sequence which better shows anatomical structure than fluid);

(b) MRI 2: Short Tau Inversion Recovery ("STIR") sequence (*ie*, sequence which is the most sensitive to detect fluid); and

(c) MRI 3: T2 sequence (*ie*, the sequence weighted such that fluids show up as bright images).

135 According to Dr Li, MRI 3 showed that Patient X already had severe pre-existing cervical spondylosis as evidenced by multiple anterior osteophytes, particularly at C4/C5 and C5/C6, and compression of the spinal cord. [note: 240] There was also either a haematoma (swelling containing blood) or oedema (swelling containing fluid) spreading from C2 to C6 as evidenced by a high signal change anterior to the cervical spine which was most evident on MRI 2. [note: 241] According to Dr Li, MRI 2 also showed a break anterior to the disc space of C5/C6, suggesting that there may be some injury at that level. [note: 242] His conclusion was that Patient X suffered from an injury at the C5/C6 level and not the C4/C5 level. [note: 243] Further, the injury was quite a serious one resembling an injury from a high speed whiplash and he doubted that it was caused by intubation. [note: 244]

136 Dr Singh's position was that the MRI scans showed that Patient X had suffered an ALL injury at C4/C5. According to him, there was a haematoma in front of C4/C5 seen in MRI 1 and MRI 2. [note: 245] There was also a signal change at the anterior portion of the lower border of C4 and upper border of C5, and soft tissue swelling and bleeding representing a haematoma shown "in MRI 3 in the STIR sequence". [note: 246] However, since it is MRI 2 and not MRI 3 that is the STIR sequence, it is unclear which MRI Dr Singh was actually referring to. He might also actually have been referring to MRI 1 since he had earlier said the high signal change at C4/C5 in MRI 1 indicated a tear in the ALL. [note: 247] When challenged on what he interpreted a high signal change to mean, Dr Singh at first said it meant an oedema, [note: 248] but just a few minutes later conceded that it actually represented fat. [note: 249] Dr Singh disagreed with Dr Li's observation that MRI 2 showed a tear in C5/C6 on the basis that the black line which Dr Li had identified as the ALL was actually the bone structure. [note: 250]

137 Owing to the dispute between the orthopaedic experts as to the interpretation of Patient X's MRIs, a radiologist at Medi-Rad Associates Radiology Clinic at Mount Elizabeth Hospital, Dr Tsou, was called in as a court expert by agreement of both parties (see [52] above). Dr Tsou's evidence was that based on MRI 2, there was a loss of anterior continuity at the C5/C6 level of the disc which most likely indicated a small tear. [note: 251] He also noted that there was preverterbral oedema between C2 and C6. [note: 252] In finding that there was a small tear at the C5/C6 level, Dr Tsou pointed to there being "additional evidence" of soft tissue swelling, oedema and fluid anterior to the cervical spine at C5/C6. [note: 253] Dr Tsou's interpretations bore out Dr Li's interpretation but not Dr Singh's interpretation. When further queried by the court, Dr Tsou said that Patient X's spine had undergone a lot of degeneration as evidenced by the multiple anterior and posterior osteophytes. As such, Patient X was likely elderly or had suffered a previous injury. [note: 254] In short, Dr Tsou's views were more consistent with Dr Li's views than with Dr Singh's views.

138 At this juncture, I pause to note that Dr Singh was confusing and misleading in his testimony. He was unclear as to which specific MRI he was relying on in relation to his various observations and tried to cover up his ambiguity by saying that he was looking at the different films in totality. He swung from insisting that a high signal in MRI 1 referred to oedema before conceding a few minutes later that it was actually fat. He had tried to rely on MRI 1 to support his conclusion of haematoma when the focus of MRI 1 was on anatomical structure and would not show fluids as clearly. He insisted that the black line in MRI 2 which actually represented the ALL was only the bone. Had these few points been the only incidents, I might have been prepared to accept that Dr Singh was not being deliberately misleading but was merely out of his depth as his expertise was not in radiology. However, as I will point out further on, there were many other incidents which showed Dr Singh's lack of credibility as an expert witness. Take, for example, the following exchange after Dr Tsou finished giving his observations on Patient X's MRIs:

> Court: Now, if counsel will agree, I think the best way to proceed is as I indicated: let Dr Harwant Singh start first, because this is something that he has brought to the court's attention. Let's look at it.
>
> Dr Singh, what is it that you seek agreement from Dr Tsou about?
>
> Dr Singh: *Can I give him a brief history? Would you want a history of the patient*?
>
> Court: *No*, I think -- can I do this? *I want to depend on the MRI*.
>
> Can you pose the points that you say are borne out by the MRI to Dr Tsou, and see whether Dr Tsou agrees with you on the points that you make, *before* you go into the history?
>
> Dr Singh: *I understand*.
>
> Court: Just tell him, "This is what I observed in the MRI," and see whether he agrees.
>
> Dr Singh: This is a patient that I managed for a hyperextension injury. Is this consistent with a hyperextension?
>
> Court: *Dr Singh, I have just told you. The whole idea is I want you to seek confirmation of whatever points you are able to see from the MRI*.
>
> Dr Singh: I thought -- I mean -- [note: 255]

[emphasis added]

It was clear to all that the purpose of calling Dr Tsou was to obtain an objective interpretation of Patient X's MRIs. It was also made very clear that Patient X's history was not to be given before Dr Tsou had given evidence as to which expert's interpretation was borne out by the MRIs and Dr Singh had said that he understood. By informing Dr Tsou that Patient X was a patient he managed for a hyperextension injury *in the very next breath*, Dr Singh was, to my mind, deliberately trying to colour Dr Tsou's mind. Dr Singh's explanation that he did not know how to frame the questions unless he gave Dr Tsou the history was a lame excuse. [note: 256]

139 Accordingly, I find that Dr Singh was either trying to mislead the court, or was simply not competent in interpreting MRI scans. In either event, I view his evidence with circumspection. I accept the opinion of Dr Li, as independently corroborated by Dr Tsou, that more likely than not, Patient X had suffered an injury at the C5/C6 level and not the C4/C5 level. I also accept Dr Li's evidence that it was doubtful that Patient X's injury was caused by intubation. The injury suffered by Patient X was therefore *not* similar to that of the plaintiff and cannot be used by the plaintiff to support her claim that neck injuries are a common risk of intubation.

140 In the plaintiff's closing submissions, it was submitted that if this court was not inclined to accept that there had been an ALL injury at C4/C5, it should nonetheless accept that the location of the plaintiff's ALL injury could also have been at C5/C6. [note: 257] I do not accept this. It is clear that until the case of Patient X was discussed on the very last day of the trial, the plaintiff's case theory throughout the trial was that there was an ALL injury at the C4/C5 level. It is untenable to dismiss the difference in location just because, according to the plaintiff, "the physical distance between C4/C5 and C5/C6 is mere millimeters on the MRI scans and the slight disparity in views may be the result of interpretation of the MRI scans". In fairness to the defendant, the only case that he needs to meet is in relation to the plaintiff's allegation that there had been an injury to the ALL *at the C4/C5 level*.

(ii) Medical literature

141 The anaesthetic experts [note: 258] and the orthopaedic experts [note: 259] of both parties agreed that there are no reported cases of injuries similar to that allegedly suffered by the plaintiff in medical literature. Dr Singh, however, tendered six articles which allegedly prove that the mechanism of such injuries was nonetheless, in his words, "well-documented". These articles, as we shall see, were either not on point or taken out of context by Dr Singh.

142 The first article was John W R McIntyre, "The difficult tracheal intubation" Can J Anaesth 1987; 34(2): 204–213. [note: 260] Dr Singh highlighted p 206 of the article which states as follows:

> … If recourse is taken to one of the hazardous earlier positions advocated for laryngoscopy in which the cervical spine and atlanto occipital joint are extended, then damage to bony and cartilaginous structures must be carefully avoided. It should be noted that vigorous attempts to improve visualisation by extending the cervical spine can bow it forward, thus lifting the larynx of some patients anteriorly and out of the line of view. [note: 261]

According to Dr Singh, this passage explained that an anaesthetist "can lift the cervical spine, especially the anterior portion at the C4/C5 level, which then can injure the [ALL]". [note: 262] However, as Mr Lek pointed out, this article was written specifically in the context of difficult

intubation. [note: 263] Dr Singh eventually admitted that this context was crucial after the question was put to him by Mr Lek. [note: 264]

143 The next article was Divatia J V and Bhowmick K, "Complications of Endotracheal Intubation and other Airway Management Procedures" Indian J Anaesth 2005; 49(4): 308–318. [note: 265] Dr Singh highlighted Table 1 at p 309 where "spinal cord and vertebral column injury" were stated to be a complication of endotracheal intubation "at the time of intubation". He then referred to the section on "spinal cord and vertebral column injury" at p 310 which states as follows:

> Extension of the cervical spine during laryngoscopy may cause trauma to the spinal cord resulting in quadriplegia. …

As Mr Lek again pointed out, Dr Singh failed to bring to the attention of the court that the statement relied on by him was made in the following context: [note: 266]

> … This is more likely in patients with cervical spine fractures or malformations, tumours or osteoporosis. In patients with suspected instability of the cervical vertebrae, the head must be maintained in a neutral position during laryngoscopy and intubation at all times; hyperextension is strictly avoided. …

Since the plaintiff had no known pre-existing cervical spine problems before the LSCS, the statement Dr Singh relied on carries little weight. It also bears noting Dr Li's comment that even though the ALL is anatomically a part of the vertebral column, it is still a stretch to say that the writer meant to also include ALL injury when he referred to vertebral column injury. [note: 267]

144 The third article Dr Singh relied on was "Virtual Disaster Medicine Training Center (VDMTC): Module 3: Complications of Managing the Airway, Complications with Intubation", http://vdmtc.org/module03/intubate/intubate03.htm (accessed 7 October 2011) [note: 268] and in particular the following passage at pp 2 and 3:

> Trauma to the larynx and vocal cords is not uncommon following endotracheal intubation. It depends on the experience and skill of the intubator, as well as the degree of difficulty. … Injuries of the laryngeal muscles and suspensory ligaments are also possible. …

However, as Prof Sia explained, when this article was raised, "suspensory ligaments" refer to the ligaments relating to the vocal cords. [note: 269] Since the laryngeal muscles and suspensory ligaments are structures that are located *above* where the laryngoscope blade would sit when it is inserted into the patient, and the ALL is located *below* that, it is difficult to see the direct relevance of this passage. [note: 270] Dr Singh also sought to rely on the following passage at p 5 of the same article:

> Airway management techniques such as chin lift, jaw thrust and direct laryngoscopy transmit movement to the cervical spine and may induce *cervical spine injury*. Attempts to hyperextend the necks of patients with ankylosing spondylitis may result in cervical fractures and quadriplegia. [emphasis in original]

On the face of it, it is unclear whether the first sentence above also referred to patients with ankylosing spondylitis (an underlying spine problem) or if it was meant to be a general statement also applicable to healthy patients. The weight of all the other evidence, however, clearly showed that the risk of neck injury was not a commonly known risk of intubation in a normal healthy patient.

As such, I find that the first sentence was more likely than not made in the context of patients who have ankylosing spondylitis, and not as a general statement.

145 The fourth article was Randolph H Hastings *et al*, "Cervical Spine Movement during Laryngoscopy with the Bullard, Macintosh and Miller Laryngoscopes" Anaesthesiology 1995; 82(4): 859–869. [note: 271] Specifically, Dr Singh referred to Figure 5 on p 865 which compared the head extension angle with the angle between the occiput and C4 (*ie*, the angle between C0 and C4). According to him, the figure showed that when a laryngoscope is used, "the mechanics of getting the head back causes an extension all the way right down to … at least the C4/C5 segment". [note: 272] However, it bears noting that:

(a) C5 was never mentioned in Figure 5; and

(b) Dr Singh's evidence on this article was given *after* Dr Tsou had confirmed that Patient X's injury was at the C5/C6 level and not at the C4/C5 level.

Dr Singh was deliberately imprecise in explaining to the court how this article supported his position. The relevant parts of the transcript are set out below to provide a fuller picture:

Ms Ho:… Dr Singh, you have to help us interpret, very briefly, what you want us to understand from this?

Dr Singh:Okay. When we use a laryngoscope, the mechanics of getting the head back causes an extension all the way right down to C -- *at least to the C4/C5 segment*.

Court:W*here does it say C5?*

Dr Singh:*The C4 angle is the upper part of the C5 segment.*

Mr Lek:No. Dr Singh has to be very careful. A few times now, even to Dr Tsou, he slipped in the word "C5". I was letting him [know] it, because I [know] the Hastings article does not have the reference to C5 at all, yet he is doing it still in the middle of his testimony, slipping in C5.

Dr Singh:It is not slipping in, Sir. What comes below the C4, what is the lower border of C4? C5.

Court:Dr Singh, if you are referring to this article, then stick to this article, what the article says.

Dr Singh:Yes.

Ms Ho:No, but --

Court:*If you say it refers to C5, then point us to the relevant paragraph that says so.*

Dr Singh:*To the C4?*

Court:*So is it C4 or C5?*

Dr Singh:*I am inferring, to the C4 angle, that it is an extension all the way through at the C4. C4 is up to the C5.* That is what I'm trying to say.

Court:Sorry, I do not get you. *Why is C4 up to the C5*?

Dr Singh:*Because below the C4 segment is C5, so it is C5 and above, so it is C0 to C4. If you prefer, C4.*

Dr Li:I disagree. I think you cannot, just because C5 is below C4, that you can -- … So this article just mentions actually the whole angle from C0 to C4 as the angle, not whether it is the C4/C5, angle, which is what he says. He has to take it in context, because this is measured, C0 to C4 is measured as one angle.

…

Dr Singh:The purpose of this was that whenever you extend the head and neck, you will have an extension *all the way through up to C4*, as it says here then. So you cannot have any other movement except an extension up to there. There can never be any movement except an extension based on this study. That is the reference point for this.

…

Court:So you say this article, and I suppose in particular Figure 5, shows that there is extension --

Dr Singh:*All the way up to C4.*

Court:-- *up to C4.*

Dr Singh:*Yes*.

Court:*From where to C4?*

Dr Singh:*From C0, the back of the head, up to C4.* …

…

Dr Singh:*I added in C5 because the end point of C4 is at the C4/C5 junction. But I am happy to just say at C4 if that is what the court wishes.*

Court:It is not what the court wishes, it is what the article talks about. Dr Singh, I think you have to be fair. I am not trying to put words into your mouth. But when you speak and you refer to 5, I find no reference to 5 here, so I asked you, "Where is 5?"

Dr Singh:*Yes, okay. C4.* [note: 273]

[emphasis added]

In any event, these results were qualified at p 865 with the express proviso that:

> … Manual stabilization, cricoid pressure, and immobilizing devices, which are also components of standard techniques for direct laryngoscopy of trauma patients with potential cervical spine injuries, were not employed. … [note: 274]

This article was therefore of little relevance to the present case since a pillow (for manual stabilisation) and cricoid pressure were used in the plaintiff's case.

146 The fifth article was Kun Yan & Mary Frances Diggan, "A Case of Central Cord Syndrome Caused by Intubation: A Case Report" J of Spinal Cord Med 1997; 20: 230–232. [note: 275] It reported a case where the patient suffered an injury to the cervical cord (*ie*, central cord syndrome) due to hyperextension of the neck during intubation, for which there was no history of high velocity force. According to Dr Singh, if a devastating injury could have happened to a normal patient, then a minor injury with just minimal trauma can also cause an injury to the ALL. [note: 276] However, as Dr Li pointed out, the MRI scan done on the patient after the surgery revealed that the cervical spine was "entirely normal". [note: 277] There was no discussion in the article on ALL injury. It was also expressly stated in the introduction that this was an isolated case since "there have been no reports in the literature of central cord syndrome caused by intubation". [note: 278] There were also several distinguishing factors in the case reported in this article, in particular:

(a) The patient already had some neurological function impairment as evidenced by her muscle weakness and foot drop. [note: 279]

(b) This was an emergency intubation done to resuscitate the patient who had developed severe hypoxia, the intubation was likely to have been done in a rush, [note: 280] and the patient's neck might be moved about more because of the need to do cardiopulmonary resuscitation. [note: 281]

(c) It was not known whether the doctor who performed the intubation was a skilled anaesthetist. If it had been done by an inexperienced doctor, he might not have positioned the patient's neck properly and/or inserted the laryngoscope properly, thus causing injury to the patient's neck.

147 The sixth article was Bradley J Hindman *et al*, "Cervical Spinal Cord, Root and Bony Spine Injuries" Anaesthesiology 2011; 114(4): 782–795. [note: 282] According to Dr Singh, this article chronicled six cases in which difficulty in airway management was a possible contributor to cervical spine injury. [note: 283] However, as Dr Li pointed out, the discussions in the article noted that the patients in most of these cases had pre-existing cervical spine problems. [note: 284] For one of the cases, there was some ambiguity as to whether the patient's cervical spondylosis and cord compression were pre-existing at the time of surgery. Nonetheless, reading the article as a whole, it is clear that the article concludes that:

> … in almost all of these cases, it appears that severe cervical spondylosis was present, in patients undergoing cervical spine surgery as well as patients who experienced cord injury during noncervical spine procedures. [note: 285]

The ambiguous case was, more likely than not, a case where the patient had a pre-existing spine problem which was not discovered until after the surgery. Even if this was not so, the weight of the evidence (including the other cases discussed in these medical articles, as well as the evidence of the anaesthetic experts) clearly show that the risk of neck injury was not a commonly known risk of intubation.

148 In conclusion, the articles tendered in support of the plaintiff's case were of little evidential value, if at all, as none of them were written in the specific context of an experienced anaesthetist carrying out an intubation procedure in an otherwise healthy patient with no known existing neck injury.

Conclusion on sub-issue 1(b)

149 For the reasons given above, I find that the plaintiff has failed to prove on a balance of probabilities:

(a) that the defendant's assessment of her airway was erroneous and that she was actually considered a difficult patient to intubate (see [119]–[130] above); and

(b) that neck injury is a commonly known risk of GA in an otherwise normal patient (see [131]–[148] above).

I find that the defendant's omission to advise her on the risk of neck injury is supported by a respectable body of medical opinion which meets the threshold test of logic in the *Gunapathy* test (see [53] *supra*). Accordingly, I find that the defendant was not under a duty to disclose that there was a risk of neck injury, or to ensure that the risk of neck injury was disclosed to the plaintiff.

150 It is also worth noting that even if the principles in the English cases of *Pearce* (see [58] *supra*) and *Chester* (see [58] *supra*) were applicable in our local courts, such that a patient has a right to be informed of a small but well established risk of serious injury, the defendant would still not be liable. This is because, as set out above, the evidence before me was that neck injury arising from the GA intubation process in a normal patient is not a commonly known or well-established risk at all.

Sub-issue 1(c): The alternatives to GA

151 It was undisputed that the defendant did not discuss any alternatives to GA with the plaintiff. Neither did he expressly confirm with the plaintiff that Dr Tham had discussed the alternatives with her.

The applicable legal principles

152 It was submitted on behalf of the plaintiff that the alternatives to a chosen treatment must always be disclosed regardless of whether the alternatives were actually less suitable. The plaintiff relied on the case *Birch v University College London Hospital NHS Foundation Trust* (2008) 104 BMLR 168 ("*Birch*"). In *Birch*, the patient was informed of the risks involved with catheter angiography but not the comparative risks associated with MRI, an alternative to the angiography. She then suffered a stroke because of complications from the angiography. In finding that the defendant, Queen Square Practice ("Queen Square"), had breached its duty of care to the patient by not disclosing the comparative risks of MRI, Cranston J stated (at [74]) that:

> ... there will be circumstances where consistently with Lord Woolf MR's statement of the law in *Pearce* [*v United Bristol Healthcare NHS Trust*] the duty to inform a patient of the significant risks will not be discharged unless she is made aware that fewer, or no risks, are associated with another procedure. In other words, unless the patient is informed of the comparative risks of different procedures she will not be in a position to give her fully informed consent to one procedure rather than another. ...

153 However, the duty to inform in *Birch* arose out of "special" (at [77]) and "unusual" (at [78]) circumstances which the court took pains to highlight:

(a) Mrs Birch had been referred to Queen Square by a neurologist, Professor Giovannoni ("Prof Giovannoni"), who had specifically recommended an MRI;

(b) Prof Giovannoni had raised concerned about cavernous sinus pathology which could not be detected by an angiogram but could be detected by an MRI;

(c) Mrs Birch was at a higher risk of stroke with the angiography as she was a poorly controlled longstanding diabetic, with a vascular history. By contrast, there was no risk associated with an MRI;

(d) her admission notes identified both an MRI and catheter angiography as possibilities for the next day; and

(e) when the decision for an angiogram was made later, one of the four key doctors involved in the decision, a general radiology registrar, continued to suggest an MRI as a suitable possibility.

154 Cranston J concluded at [78]–[79]:

[78] ... Given this background, where *two procedures were open for Mrs Birch*, she needed to have explained to her the comparative risks. While I do not accept the claimant's submission that she needed to be informed explicitly what Professor Giovannoni had proposed, she did need to know than an MRI would have provided answers to the concerns Professor Giovannoni had raised about both an aneurysm and cavernous sinus pathology, and to the degree of confidence he thought necessary. ...

[79] ... I am convinced that in Mrs Birch's case *no reasonable, prudent medical practitioner would have failed to discuss the respective modalities and risks with her along the lines outlined*. In their absence she was denied the opportunity to make an informed choice. Even if I am wrong on this, the failure to discuss with Mrs Birch these matters could not be described in law as reasonable, responsible or logical. On either approach, therefore, the failure to provide her with this information was in breach of duty.

[emphasis added]

155 The duty to inform arose out of the fact that it was unreasonable and imprudent for the four doctors in *Birch* not to have discussed the comparative risks of a suitable treatment which they had been considering up until the last moment. *Birch* does not lay down a general rule that a doctor has a duty of care to disclose all other alternatives to a patient regardless of their suitability.

156 In any event, the applicable test in Singapore, as set out in *Gunapathy* (see [53] *supra*), is whether a responsible body of medical opinion would regard the defendant's omission, to discuss with the plaintiff any alternatives to GA and to verify whether Dr Tham had done so, as proper.

Analysis on the facts

157 To determine liability, the first factual question to be considered is whether the alternatives to GA were reasonably ruled out in the plaintiff's case. During cross-examination, Dr Tham agreed that GA was preferable in the plaintiff's case because of the totality of the following obstetric considerations: (a) the concern for bleeding by the plaintiff; (b) the baby's unstable lie; and (c) the baby's prematurity. [note: 286]

158 The concern for bleeding was caused by three factors:

(a) the antepartum haemorrhage (*ie*, bleeding *before* delivery) although it had stopped by the night of 25 October 2006; [note: 287]

(b) the plaintiff's history of postpartum haemorrhage (*ie*, bleeding *after* delivery) with two of her previous pregnancies; [note: 288] and

(c) the plaintiff's status of "grand multip" (*ie*, woman who has given birth five or more times) which predisposed the plaintiff to postpartum haemorrhage. [note: 289]

The defendant explained that GA would have been preferable should bleeding actually occur during the LSCS. This is because if the plaintiff was under GA her airway and breathing would already have been secured as she would have been intubated and ventilated, and he would only need to concentrate on restoring her circulation. [note: 290] In contrast, if the plaintiff was under RA, he would first have to *convert* the RA into a GA so as to secure the plaintiff's airway and breathing before restoring her circulation. [note: 291] The drugs used in RA and GA might also aggravate the hypotension. [note: 292] I should mention at this juncture that for the reasons set out above (at [96]–[99]), the fact that the defendant did not order cross-matching tests for blood is not inconsistent with his claim that he was concerned about bleeding.

159 Both the plaintiff's obstetric expert, Dr Lai, [note: 293] and the defendant's obstetric expert, Dr Rauff, [note: 294] generally agreed with the proposition that GA would have been preferable if bleeding was a serious concern, at least in relation to the state of medical technology back in 2006. Dr Rauff also explained that if there was some chance that an RA would have to be converted into a GA, then it might be better to start with GA from the outset so as not to expose the patient to the risks of *both* RA and GA. [note: 295] Although Dr Lai and Dr Rauff agreed that there was some general concern about bleeding, they differed as to how serious the concern actually was.

160 Dr Lai was of the view that the concern about bleeding was not very serious since:

(a) the plaintiff did not have to be monitored in the delivery suite instead of a ward; [note: 296]

(b) a heparin plug for intravenous excess was not inserted into the plaintiff while she was in the ward, which is the usual step taken when bleeding is a concern so that the patient can be resuscitated quickly without wasting time trying to find a vein in the event of a catastrophic bleed; [note: 297]

(c) blood tests and investigations were not carried out; [note: 298] and

(d) the plaintiff's LSCS was an elective and not an emergency procedure. [note: 299]

On the other hand, Dr Rauff was of the view that the concern about bleeding was probably serious enough to justify the choice of GA since: (a) Dr Tham ordered 60 units of Syntocinon and 1ml of Ergometrine (drugs commonly prescribed to prevent bleeding); [note: 300] and (b) although the situation was not so dire as to require an emergency LSCS, Dr Tham still felt it necessary to have the baby delivered about a month earlier than full term. [note: 301]

161 According to Dr Tham, the next factor that made GA more favourable was the fact that the

baby was in an unstable lie (*ie*, the baby's position in relation to the axis of the mother kept changing before labour). [note: 302] Dr Tham explained that because of this he might have needed to perform an additional vertical cut to manoeuvre the baby out, although he had not come across such a situation before. [note: 303] He nonetheless admitted that if such a need arose, it would have been more comfortable for the plaintiff if she was under GA as she would have been more relaxed. [note: 304] This view was also shared by Dr Rauff who further pointed out that the need for a vertical cut could also have arisen as the lower segment of the uterus would have been poorly formed at 35 weeks and six days. [note: 305] Dr Lai, however, was of the view that RA would still be good enough. [note: 306]

162 The third factor that made GA more favourable was the fact that the baby was of less than 37 weeks' gestation and therefore premature. [note: 307] Dr Tham explained that the baby's prematurity, on its own, was a "very minor" factor when considering whether to choose GA over RA. [note: 308] This was because although the plaintiff's baby was considered a pre-term baby at 35 weeks and six days, it was still relatively developed (as opposed to pre-term babies posing serious problems). [note: 309] Nevertheless, Dr Tham agreed that the totality of all the obstetric factors made GA the preferred choice. [note: 310]

163 On the evidence before me, it is quite clear that there were obstetric reasons to favour GA over RA but not such as to preclude RA as a viable option. The question then arises as to whether a responsible body of medical men would still have advised the plaintiff about RA in these circumstances. According to the defendant's anaesthetic expert, Prof Sia, he would not do so as long as the plaintiff was not found to be contra-indicated for GA. [note: 311] His position is that Dr Tham could not have reached a preference for GA without having first discussed alternatives with the plaintiff, and there would be no need for further discussion of the RA alternative. [note: 312] In contrast, the plaintiff's anaesthetic expert, Prof Delilkan, said that he would. [note: 313]

164 I accept Prof Sia's evidence as it meets the *Bolitho* (see [53] *supra*) threshold test of logic. It seems to me that if:

(a) the preference for GA was made because there were obstetric factors favouring GA over RA;

(b) this information had already been explained by Dr Tham to the plaintiff on the night before the LSCS;

(c) the defendant was aware of the obstetrician's preference for GA; and

(d) the defendant confirmed that the plaintiff was not contra-indicated for GA,

there would be no need to belabour the point and discuss alternative modes of anaesthesia and their comparative risks. In this particular case, it is also significant that the plaintiff did not indicate in any way that she did not want to proceed with the GA and/or that she was considering other alternatives.

Conclusion on sub-issue 1(c)

165 Accordingly, I find that the defendant did not breach his duty of care by not discussing with the plaintiff the alternatives to GA. In view of the usual working practice between the defendant and

Dr Tham (see [115] above), I also find that the defendant did not breach his duty of care in omitting to expressly confirm with the plaintiff that Dr Tham had indeed gone through the process of explaining the alternatives to her.

Sub-issue 1(d): Whether informed consent was vitiated by the location where the consent was obtained

166 The plaintiff took the position that her informed consent, if any, was vitiated by the fact that it was taken whilst she was lying on the OT table and in a vulnerable mental state. The plaintiff's anaesthetic expert, Prof Delilkan, agreed that informed consent should never be taken in the OT unless it is an emergency situation. [note: 314]

167 The defendant's anaesthetic expert, Prof Sia, disagreed with the plaintiff and Prof Delilkan's contention. Prof Sia explained that if the process of obtaining informed consent was started much earlier by the primary physician (as it usually would be), then the patient would have had time to think about her decision. [note: 315] In such a situation, there was nothing wrong in performing the final steps of confirming her informed consent in the OT itself. [note: 316] Even if for some reason the process of informed consent had not been started before the patient was wheeled into the OT, Prof Sia said that while it would not be ideal to take informed consent in the OT, [note: 317] he would not have the patient wheeled out of the OT and back in again just for the sake of doing so. He explained that what is more important is that the anaesthetist takes as much time as is needed to assess the patient and advise her. [note: 318] Location *per se* is not determinative as regard must be had to the practical realities of hospital administration, such as the best fit between the respective locations of the patient and the anaesthetist. [note: 319]

168 For the reasons explained by Prof Sia, I find that his opinion meets the *Gunapathy* test. I also find that since Dr Tham had already begun the process of obtaining informed consent on the night of 25 October 2006, the plaintiff would have had sufficient time and opportunity to process the relevant information. In the absence of any reason to think that the plaintiff's consent was not truly informed, in particular since she did not ask the defendant any questions about the GA procedure, the defendant was not in breach of his duty merely because he performed the steps leading to the final confirmation of informed consent in the OT. It follows that the plaintiff's informed consent was not vitiated by the circumstances in which it was taken.

Decision: No breach of duty of care

169 Having considered the relevant evidence in totality, I am of the view that the plaintiff's consent to GA was informed. Accordingly, I find that the defendant had not breached his duty of care to obtain the plaintiff's informed consent.

Decision: No causation even if there was breach of duty of care

170 Even if the defendant had breached his duty of care to obtain the plaintiff's informed consent, the plaintiff's claim would still fail for want of causation. This is because the plaintiff did not give any evidence to the effect that she would have chosen RA instead of GA if she was informed of the risk of neck injury and/or the alternatives to GA. Instead, the plaintiff's evidence was that she would have been content for the anaesthetist to make the choice of anaesthesia based on what was best for her. [note: 320] Since it was established that GA was indeed the preferred option for her and she was not contra-indicated for GA, causation is not made out.

171 Ms Ho submitted that the plaintiff should still be entitled to a remedy in the interests of justice even if the court is inclined to find that the defendant's breach of duty of care did not directly result in the plaintiff's injury. In this regard, the plaintiff relied on the case of *Chester* (see [58] *supra*) in which the House of Lords modified the traditional approach to causation. In *Chester*, the neurosurgeon did not warn the patient of the risks of cauda equina syndrome (1–2%), which was an inherent risk of the operation. While the patient, if warned of the risk, would not have agreed to the operation there and then, she did not go so far as to say that she would never have consented to the surgery in the future. In holding that there was a sufficient causal link between the failure to warn and the damage, the House of Lords held that the issue of causation has to be addressed by reference to the scope of the doctor's duty to advise his patient of the disadvantages or dangers of the proposed treatment. In particular, Lord Hope of Craighead recognised at [56] that the "but for" test is under-inclusive and concluded (at [88]) that:

> ... justice requires that Miss Chester be afforded the remedy which she seeks, *as the injury which she suffered at the hands of Mr Afshar was within the scope of the very risk which he should have warned her about* when he was obtaining her consent to the operation which resulted in that injury. [emphasis added]

172 In *D'Conceicao* (see [61] *supra*), the plaintiff similarly relied on *Chester* to establish causation. Tay J found that *Chester* does not represent the law in Singapore (at [199]) as the basis of *Chester*, *viz*, autonomy within the meaning of the Human Rights Act, has no application in Singapore (see [64] above). I agree, and also decline to apply *Chester*. The effect of *Chester* is to found liability purely on the basis of a breach of duty infringing the right of a plaintiff to choose for herself. This entirely sidesteps any enquiry of factual causation. I agree with Lord Hoffmann's dissenting opinion in *Chester* (at [31]) that the relevant question is "whether one would have taken the opportunity to avoid or reduce the risk, not whether one would have changed the scenario in some irrelevant detail". Given that the plaintiff has not proven that she would not have had the GA procedure, I find that the ordinary principles of tort law militate against my applying the rule in *Chester* simply to vindicate the plaintiff's right of autonomy when there has been no provable damage caused.

173 I note further that even if *Chester* does represent the law in Singapore, the principles on causation therein are not applicable to the present case as unlike the risk of cauda equina syndrome in *Chester* which was "within the scope of the very risk which [the doctor] should have warned [Miss Chester] about", the risk of neck injury in the present case is not one which a responsible body of medical opinion would disclose to an otherwise healthy patient as it is not a commonly known risk.

VIII. THE INTUBATION

The necessary preliminary factual findings to determine liability

174 As mentioned earlier, the plaintiff's case theory was that the defendant was in a rush and therefore negligent in the following aspects:

(a) he did not realise that the plaintiff was a difficult patient to intubate as he did not carry out a pre-anaesthetic assessment on her to ascertain her suitability for GA. The failure to anticipate this difficulty meant that the defendant did not ensure that adjuncts used to assist with difficult intubations were brought into the OT, and he was forced to intubate the plaintiff without these assisting adjuncts; and

(b) he did not carry out the pre-oxygenation process adequately resulting in insufficient time to intubate the plaintiff before her oxygen saturation levels dipped dangerously low.

It was alleged that the defendant thus used excessive force, hyperextending the plaintiff's neck and causing injury at the C4/C5 level of the ALL.

175 I have already found in the preceding section that the defendant did perform a pre-anaesthetic assessment on the plaintiff and that the plaintiff failed to prove that this assessment was erroneous. The remaining issues of fact that arise for my consideration are as follows:

(a) whether there was sufficient pre-oxygenation carried out;

(b) whether there was difficulty in intubation; and

(c) whether there was otherwise any need to use excessive force and/or to hyperextend the plaintiff's neck.

General explanation of the intubation process and the Vital Signs Report

176 To understand the technicalities of the necessary findings of fact to be made, it is useful to begin by explaining the intubation process generally. For ease of understanding, Nurse Honrado's detailed explanation of the intubation process is set out in the table below (hereinafter referred to as "Table 1"). After establishing venous access by inserting an intravenous cannula into the patient's left hand, the following steps are carried out: [note: 321]

TABLE 1

No	Details of step	Estimated time taken
1	The defendant or Nurse Honrado will administer 100% oxygen by mask to pre-oxygenate the patient.	3 minutes
2	The defendant will administer intravenous sedative like Propofol (120mg) for induction of sleep.	30 to 45 seconds
3	(a) Once the patient is asleep, Nurse Honrado will use the thumb, index and middle fingers of her right hand to apply pressure on the patient's cricoid (the ring of cartilage around the trachea) to reduce the risk of aspiration of stomach contents; (b) the defendant will administer Succinylcholine (100mg) which is a fast-acting muscle relaxant; and (c) Nurse Honrado will then hand the defendant the laryngoscope using her left hand.	1 minute
4	The defendant will open the plaintiff's mouth and insert the laryngoscope to visualise the plaintiff's trachea lumen.	10 seconds
5	(a) The defendant will pass the endotracheal tube into the plaintiff's airway; (b) Nurse Honrado will inflate the cuff of the endotracheal tube by pumping air in through the syringe; and (c) the defendant will connect the endotracheal tube to the anaesthetic machine's breathing circuit.	30 seconds

6	The defendant will then check that the endotracheal tube is in place by checking that end-tidal CO_2 is detected on the Vital Signs Monitor. Once the defendant confirms that the endotracheal tube is in place, Nurse Honrado will release the cricoid pressure.	15 seconds

177 Before turning to consider the disputes of fact, it is also useful to set out in tabular form ("Table 2" below) the relevant parameters in the plaintiff's Vital Signs Report. [note: 322] Subsequent references to the parameters will make use of the corresponding symbols in the third column of Table 2:

TABLE 2

No	**Parameter**	**Symbol**	**Reading at various time intervals**							
			0945	**0950**	**0955**	**1000**	**1005**	**1010**	**1015**	**1020**
1	Heart rate	HR		?	102	102	103	102	82	93
2	Oxygen saturation in the blood	SpO_2			?	?	100	99	98	98
3	Blood pressure (systolic)	NBPs			116	121	127	137	119	109
4	Blood pressure (diastolic)	NBPd			68	77	76	86	65	61
5	Concentration of carbon dioxide in the expired breath	$etCO_2$			0	0	29	34	35	36
6	Concentration of oxygen in the expired breath	etO_2			21	21	62	47	40	37
7	Concentration of oxygen in the inspired breath	inO_2			21	21	67	48	43	41
8	Concentration of nitrous oxide in the expired breath	etN_2O			0	0	19	44	51	54
9	Concentration of nitrous oxide in the inspired breath	inN_2O			0	0	25	47	53	55

Whether there was sufficient pre-oxygenation

(i) How does one determine if the pre-oxygenation given is sufficient?

178 Before I can make a finding of fact as to whether the plaintiff was in fact sufficiently pre-oxygenated, it is necessary to first address how sufficiency of pre-oxygenation is determined. The evidence on this score was confused and confusing. Witnesses were often talking at cross-purposes with Ms Ho. Ms Ho submitted that for a patient to be considered sufficiently pre-oxygenated, it was crucial for the inO_2 readings to reach close to 100% and the etO_2 readings to reach at least 90%. [note: 323] On behalf of the defendant, it was submitted, to the contrary, that sufficient pre-oxygenation is reached where inO_2 readings reach close to 100%, etO_2 readings reach anything above 85%, and SpO_2 readings reach close to 100%.

179 Much of the dispute between the parties centred on the significance of the three parameters (inO_2, $SpO_2$and etO_2). As explained in Table 1 (at [176] above), the process of pre-oxygenation starts with giving the patient 100%, or close to 100%, oxygen by dialling up the oxygen dial on the anaesthetic machine [note: 324] in order to increase the oxygen reserves of the patient before intubation. The key indicator with regard to this step is the inO_2 (or inspired oxygen) reading. The plaintiff and defendant agreed that this reading should reach as close to 100% as possible. This is to ensure that the patient is being given as close to 100% pure oxygen as possible. This would increase the reserves of oxygen in the patient's blood so that she would have a sufficient supply of oxygen during the intubation process when she would be unable to breathe on her own. [note: 325] However, the inO_2 may not always reach 100% because, for example, the face mask may not be completely airtight against the patient's face, consequently allowing some dilution of oxygen.

180 After cricoid pressure is applied, a fast-acting muscle relaxant Succinylcholine is administered and consequently the patient will not be able to breathe on her own. This can only be done when the patient has been sufficiently pre-oxygenated. It was a source of some confusion whether the SpO_2(the oxygen saturation of red blood cells in the arterial blood) or the etO_2(end-tidal oxygen or concentration of oxygen in the expired breath recorded in parts per volume) readings would be the indicator of sufficient pre-oxygenation. The defendant suggested that the SpO_2 reading would be an important indicator. He testified:

> Ms Ho:... I'm talking about if you don't reach the three-minute mark, is there an issue for the patient?
>
> A: An issue, sorry, in what sense?
>
> Ms Ho:Problems. Means the patient would not be at close to 100 *saturation* before the intubation process.
>
> A: While we are doing pre-oxygenation, we are *also* looking at the patient's oxygen saturation [ie. SpO2]. If we are happy with the patient's oxygen saturation, then the three minutes is completed, is good enough. [note: 326]
>
> [emphasis added]

181 Ms Ho submitted that this was inconsistent with the defendant's expert, Prof Sia's testimony to the effect that etO_2 would be the indicator of adequate pre-oxygenation. Prof Sia had testified:

Ms Ho:… Which recordings do you look at in order to see whether there was pre-oxygenation of a patient?

…

Ms Ho:… I'm asking is it in0_2, et0_2, Sp0_2.

Prof Sia:Et0_2.

…

Court:To see whether there has been sufficient pre-oxygenation, the anaesthetist would be looking at et0_2. Is that what you are saying?

Prof Sia:Yes, your Honour.

Ms Ho:And what numbers are you expecting to see which show you sufficient pre-oxygenation?

Prof Sia:I would want to see a number of 85.

Court:In the et0_2, is that what you are saying?

A: Yes, your Honour.

...

Court:So this is no longer Sp0_2.

Prof Sia:Yes, Your Honour. [note: 327]

182 Ms Ho further submitted that this was internally inconsistent with evidence that Prof Sia had earlier given:

Prof Sia:... SpO_2 is what we measure on the patient. That is the most important. If SpO_2 is 100 per cent, it means the patient is well. ...

...

Court:You are saying oxygen going in is 100 per cent and oxygen going out is 100 per cent but, if I understand you correctly, you are saying what is important is what is in the blood and that is SpO_2.

Prof Sia:Yes, Your Honour.

…

Prof Sia:So in the instance of Sp0_2, Your Honour – may I continue.

Court:Yes.

Prof Sia:My practice is I look at the $Sp0_2$, if it's 100 per cent, I don't write it down. I know it's 100 per cent and I would start the case. [note: 328]

Prof Sia had also explained that the SpO_2 after pre-oxygenation may not reach 100%:

Prof Sia:... In most people the SpO_2 will be around 97, 96, 97 per cent, above 95. But with additional oxygen, with pre-oxygenation, that could potentially go up to 100. Not all the time of course but it would go up by maybe one or two points. [note: 329]

183 The plaintiff's expert, Prof Delilkan, did not dispute this aspect of Prof Sia's evidence, but his contention was that the SpO_2reading should have been recorded on the Vital Signs Report. [note: 330] Neither did Prof Delilkan dispute Prof Sia's evidence on the importance of the etO_2 reading other than to say that a number of 90% and above would be a better indication of sufficient pre-oxygenation.

184 I do not find that Prof Sia and the defendant's statements were internally or externally inconsistent as Ms Ho claimed. Prof Sia and the defendant both agreed that the oxygen saturation in the blood, or SpO_2, was an important reading during the entire process leading up to intubation. The reason for this is clear: the whole purpose of pre-oxygenation is to increase the oxygen saturation in the blood so that the plaintiff will have sufficient reserves of oxygen to sustain her when Succinylcholine is administered. [note: 331] The SpO_2reading thus cannot be ignored. When asked whether there would be an issue in terms of oxygen saturation (*ie*, SpO_2readings being less than 100%), the defendant replied that he *also* looked at the SpO_2 readings. The import of both the defendant and Prof Sia's testimonies is that there is no single determinant of the success of the pre-oxygenation process, but the anaesthetist must keep an eye on all three readings, with different readings becoming more or less important depending on the situation. This is not an inconsistency which renders the defendant's testimony unreliable. I find that it is perfectly logical for an anaesthetist to always be keeping an eye on the SpO_2 readings since this is ultimately the reading that will matter during intubation.

185 In this regard, I also note that it was put to the defendant that the patient's pre-oxygenation saturation was "close to below 90 per cent when [the defendant] first started [intubation]" and that he did not wait for 100% pre-oxygenation because he was in a rush to have the surgery commence on time at 10am. [note: 332] The defendant disagreed, but agreed that if the SpO_2reading fell below 90%, the patient would be in a "life or death" situation. [note: 333] This assessment, *viz*, that a reading of below 90% would indicate that the patient was in critical condition, was wholly consistent with Prof Sia's evidence that an SpO_2reading in a normal person *before* undergoing pre-oxygenation would be 96% to 97%. The process of pre-oxygenation, according to Prof Sia (and which account Prof Delilkan did not dispute), would increase the SpO_2 reading potentially to 100% or (if less) by one or two percentage points. [note: 334] That being the case, how could the plaintiff's SpO_2 reading have been at close to below 90% while she was being pre-oxygenated or even before pre-oxygenation? There was no evidence whatsoever that the plaintiff was in critical condition even *before* the defendant commenced intubation, and there is accordingly no reason why the plaintiff's SpO_2 reading should have been "close to below 90 per cent" *during* pre-oxygenation when her SpO_2 reading would have been in the 96% to 97% range *before* pre-oxygenation. Ms Ho was clearly confused and the evidence elicited by her questioning was misinterpreted in her submissions.

186 During intubation, which occurs after the administration of Succinylcholine, the etO_2 and inO_2 readings would be irrelevant as the patient is not able to breathe on her own and would not be inhaling or exhaling any oxygen throughout this entire period. It is when the SpO_2 reading falls close to, or below, 90% *during intubation* that the patient would be in a critical "life or death situation". [note: 335] It is thus also perfectly logical that an anaesthetist would consider it apposite to start intubation when SpO_2 readings are 100% or close to 100% (Prof Sia's testimony).

187 I accept that the anaesthetic procedure is a complex one, and a global assessment of the situation is what informs actual practice. An anaesthetist may choose to focus on SpO_2 in one situation and etO_2 in another, or to focus on both at the same time. The fact that there is no single indicator of when pre-oxygenation is sufficient does not mean that reliance on one over the other, or on both, is inconsistent.

188 I further find that Prof Sia's reference to using etO_2 as an indication of sufficient pre-oxygenation is perfectly logical and consistent with the medical literature adduced by both parties, and with the defendant's testimony.

189 The process of pre-oxygenation is also known as denitrogenation. Ronald D Miller, *Miller's Anesthesia* (Elsevier Health Sciences, 7th Ed, 2010) ("*Miller's Anesthesia*"), a textbook that both parties made reference to, states (at p 1577):

> The principal oxygen stores are in the lungs. These stores can be increased by using a manoeuvre called "preoxygenation" (*also known as denitrogenation*), which is achieved by having the patient breath 100% oxygen from a close-fitting facemask before induction of anesthesia. Several techniques of preoxygenation have been described, and the most effective technique should be used. Deep breathing with a high fresh gas flow for 1-5 minutes and tidal breathing for 3 minutes are equally effective. [emphasis added]

190 During cross-examination, [note: 336] Ms Ho brought the defendant's attention to the chapter "Anesthesia for Obstetrics" in *Miller's Anesthesia*, and in particular, point 4, which states:

> *Denitrogenate* with a high flow of oxygen for 3-5 minutes or 4 vital capacity breaths. [emphasis added]

191 The longer time period of 3–5 (instead of 1–5) minutes is, as the defendant explained, [note: 337] due to: (a) a pregnant woman's higher metabolic rate resulting in a higher oxygen consumption and faster oxygen de-saturation; and (b) the reduction in lung volume caused by the swelling in the abdomen pushing the diaphragm upwards. [note: 338] The plaintiff did not dispute this explanation. Ms Ho's main line of cross-examination was that, as a matter of fact, the defendant had only pre-oxygenated the plaintiff for one minute, instead of the recommended three. [note: 339] However, her case theory, as we shall see, depended on the documented time in the hospital's Peri-Operative Nursing Record being accurate.

192 During cross-examination, [note: 340] Ms Ho also brought the defendant's attention to Issam Tanoubi *et al* "Optimizing Preoxygenation in Adults" Can J Anaesth 2009; 56: 449–466. [note: 341] By way of clarification, I asked the defendant if this article indicated that the purpose of pre-oxygenation is "to replace the nitrogen in the lungs with oxygen". He replied in the affirmative. [note:

342]

193 It is immediately obvious from this characterisation of pre-oxygenation as denitrogenation that another way of approaching the sufficiency of pre-oxygenation is by measuring how much nitrogen has been dispelled from the patient's lungs and, correspondingly, how much oxygen has now gone to replace the nitrogen. This measure can only be reached by looking at the etO_2 reading, as this would measure how much oxygen has actually replaced the nitrogen. The inO_2 reading would be insufficient for this purpose as it only measures the concentration of oxygen inspired by the patient. [note: 343] In this context, it should be noted, as both Prof Sia [note: 344] and the defendant [note: 345] testified, that the air expired would contain less oxygen than what was inspired as some oxygen would have already been extracted by the body for utilisation and the etO_2reading would thus be lower than the inO_2 reading. How much "de-nitrogenisation" has actually occurred would thus best be assessed by looking at the etO_2reading. Prof Sia testified:

> Your question earlier Your Honour, was that – if I got it correctly – is that should it have been 100 because of the process of pre-oxygenation. The answer to that question is it's not easy to get 100 on the end-tidal 0_2. Most people would aim for about above 85. That would have been taken as almost like the gold standard for pre-oxygenation, the end-tidal 0_2. [note: 346]

194 Prof Delilkan disputed this by saying that he would prefer a reading of above 90%. However, in contrast to Prof Sia, Prof Delilkan did not provide any basis for his opinion, nor did he provide any rebuttal of Prof Sia's explanation for why the etO_2reading would be lower than the inO_2reading. I also note that Prof Delilkan's evidence on this score was confused. In that same connection, he opined that the *plaintiff's* reading of 67% expired oxygen was not a good point to start intubation: [note: 347]

> Prof Delilkan: Because as I think Prof Sia mentioned, the aim should be to come to at least 85 and I think it has been pointed out that you want it to be at least towards 90. I think that would be a better assessment to start off the anaesthetic with the oxygenation coming up to already 90, which is a safer level to start and give your drugs and tube. But if you start and accept 67, I think it's not a good point to start, the oxygenation is not enough, had been provided by the pre-oxygenation.
>
> ...
>
> Prof Sia: Your Honour, I have a different take on this. The readings at 10.05 for the $et0_2$ as well as $in0_2$, as I said earlier, would be the ones *after* intubation. So these readings are not reflective of the $in0_2$ and the $et0_2$ at the time of pre-oxygenation which should have taken place prior to 10.05. [note: 348]

Prof Delilkan later became confused (perhaps by Ms Ho's question):

> Ms Ho: Prof Delilkan, if I say saturation of the oxygen in the lungs, is it SpO_2 or etO_2?
>
> Prof Delilkan: If I use the term "oxygen saturation", it obviously means oxygen saturation in the lungs which then transfers to the blood.
>
> Ms Ho: Yes. So when I say "saturation", what is the saturation of the oxygen in the lungs?

Prof Delilkan: That is a figure of oxygen saturation which is in the lungs at the terminal end of the breathing passages in the lungs at the alveoli level and that will reflect what the oxygen saturation will be. [note: 349]

This did not make sense as the oxygen in the lungs is measured by parts per volume and not as a function of saturation. Prof Sia corrected him as follows:

Prof Sia:I completely disagree. When you talk about etO_2, you are talking about end-tidal concentration of oxygen. And saturation of oxygen is – well, in this respect we are talking about the SpO_2 which is the oxygen saturation of the arterial blood. [note: 350]

As Prof Sia had earlier stated:

Prof Sia:In the lungs, Your Honour, we don't talk about oxygen saturation *per se*, we talk about oxygen concentration. [note: 351]

I was thus not able to put much weight on Prof Delilkan's evidence and consider Prof Sia's and the defendant's evidence cogent and believable on a balance of probabilities.

195 In sum, I accept the evidence of both the defendant and Prof Sia that the following parameters will indicate that a patient is sufficiently pre-oxygenated:

(a) inO_2 reading of a figure very close to 100%;

(b) etO_2 reading of anything above 85%; *and*

(c) SpO_2 reading of a figure very close to 100%.

It bears noting that despite the dispute over the evidence, what Ms Ho was endeavouring to establish was that the time the defendant took for pre-oxygenation was only one minute and not so much whether SpO_2, inO_2 or etO_2 was the best indicator.

(ii) Was the plaintiff in fact sufficiently pre-oxygenated?

196 Having clarified the threshold issue of how sufficient pre-oxygenation should be established, I now turn to consider whether the plaintiff was, as a matter of fact, sufficiently pre-oxygenated. The plaintiff's case was that Steps 1 to 6 of Table 1 (at [176] above) started at about 9.59am and was completed just after 10am such that the baby was delivered by 10.06am. Her case was that the intubation process was completed so quickly because the defendant did not pre-oxygenate her sufficiently and therefore had to rush the process. In this regard, the plaintiff relied on the fact that the Vital Signs Report [note: 352] (see Table 2 at [177] above) did not record any baseline readings of inO_2, etO_2 and SpO_2 in the range of 100% which would have indicated that the plaintiff was sufficiently pre-oxygenated.

197 The defendant, on the other hand, asserted that he had sufficiently pre-oxygenated the plaintiff. His position was that: (a) pre-oxygenation (*ie*, Step 1 of Table 1) started just after 10am and ended at around 10.03am; and (b) the entire intubation process (*ie*, Step 6 of Table 1) ended just before 10.05am. He explained that the relevant baseline readings were not recorded in the Vital Signs Report because of the way the Vital Signs Monitor works. The readings of the various

parameters are always *displayed* in real-time on the Vital Signs Monitor and the anaesthetic machine. [note: 353] However, under the default setting of the Vital Signs Monitor, only the readings at fixed five-minute intervals (hereinafter referred to as "the Vital Signs Trend") are *recorded*. The hard copy of the Vital Signs Report, which contains the Vital Signs Trend, is printed out from the Vital Signs Monitor only *after* the end of the operation by the anaesthetic nurse. [note: 354] Although the Vital Signs Trend can be assessed during the operation by entering some commands into the Vital Signs Monitor, [note: 355] it cannot be viewed at the same time as the real-time readings. [note: 356] The defendant's explanation was that he had, at the material time, received real-time visual confirmation that the inO_2 reading was close to 100. [note: 357] While he agreed that it would have been ideal if that figure was captured in the Vital Signs Trend (and consequently also the printed Vital Signs Report), he did not think to ensure that it was indeed captured as he did not anticipate having to face a legal matter. [note: 358] The defendant's anaesthetic expert, Prof Sia, also took the position that a visual confirmation would suffice for him to proceed with the intubation. [note: 359]

198 In coming to his position that pre-oxygenation started just after 10am, the defendant relied on the fact that the inO_2 reading was 21% (*ie*, the concentration of oxygen in room air) at 9.55am and 10am, and 67% at 10.05am. The defendant's anaesthetic expert, Prof Sia, agreed with the defendant's position by relying on the fact that the etO_2 reading was 21% (*ie*, the concentration of oxygen in room air) at 9.55am and 10am, but reached 62% at 10.05am.

199 As for the defendant's position that: (a) pre-oxygenation was completed at around 10.03am; and (b) the entire intubation process was completed just before 10.05am, the defendant relied on the following inferences drawn from the Vital Signs Report:

(a) First, the etCO_2 reading was 0% before 10.05am and 29% at 10.05am. This suggests that the intubation process was completed by 10.05am in order that the carbon dioxide in the expired breath would be detected in the anaesthetic circuit.

(b) Next, the etN_2O (end-tidal nitrous oxide) and inN_2O (inspired nitrous oxide) readings were both 0% before 10.05am, but 19% and 25% respectively at 10.05am. Since nitrous oxide would have been introduced into the circuit only *after* intubation is completed, and the total volume of gases in the circuit is fixed, the inO_2 and etO_2 readings just before 10.05am would have been higher than what they were at 10.05am.

(c) Third, there was a significant drop in the plaintiff's heart rate and blood pressure between 10.10am and 10.15am (see rows 1, 3 and 4 of Table 2 at [177] above). This implied that the plaintiff's baby was delivered sometime between 10.10am and 10.15am (and not 10.06am as recorded in the Infant Examination records). [note: 360] The defendant's estimate of the delivery time is also more consistent with Dr Tham's evidence that he usually takes six to ten minutes to deliver a baby in a normal LSCS. [note: 361]

200 The defendant also explained that the plaintiff's SpO_2 readings at 9.55am and 10am had a "?" sign instead of a numerical figure (see Table 2 at [177] above) because the monitoring probe which would have been attached onto the plaintiff's finger might have been removed to facilitate the insertion of the cannula into the plaintiff's hand before the start of pre-oxygenation. [note: 362] Although the SpO_2 readings were not captured at 9.55am and 10am, the fact that the SpO_2 reading was a full 100% at 10.05am makes it very unlikely that anything untoward had happened to the

plaintiff before 10.05am, including the possibility of insufficient pre-oxygenation. [note: 363] This reading would have been captured *after* intubation. The oxygen input would have resumed, but at a lower level than the 100% required for pre-oxygenation. The vital signs monitor indicated that in$O_2$was at 67%, while et$O_2$was at 62%. This is because after intubation nitrous oxide would have been introduced into the circuit thereby reducing the oxygen concentration (see Prof Sia's evidence [note: 364]). It was undisputed that inO_2 should be close to 100% and needs to be administered for at least three minutes in order to achieve the average 1% to 2% increase in SpO_2 required for the intubation process (see [179] and [185] above). It is thus highly improbable that the SpO_2 reading would have *increased* so rapidly to 100% after intubation when administration of oxygen had just been resumed at a much lower concentration than that required for pre-oxygenation. Instead, it is more likely than not that the SpO_2reading was at 100% during intubation and *prior* to the time the 10.05am reading was captured on the vital signs monitor.

201 The plaintiff and the defendant's respective case theories with respect to the Vital Signs Report were put to the anaesthetic experts for validation. The defendant's expert, Prof Sia, agreed that the defendant's case theory is consistent with the Vital Signs Report. [note: 365] He was of the view that the Vital Signs Report showed that the plaintiff was sufficiently pre-oxygenated, although he conceded that he was unable to tell exactly how long the pre-oxygenation was carried out for. [note: 366] Prof Sia was also of the view that the plaintiff's case theory was not borne out by the Vital Signs Report. [note: 367] The plaintiff's expert, Prof Delilkan, agreed that the defendant's case theory was possible based on the Vital Signs Record. [note: 368] However, Prof Delilkan was of the opinion that the plaintiff's case theory was also possible because there was no data showing the plaintiff's SpO_2 reading before 10.05am in order to make a comparison with the 10.05am reading. [note: 369]

202 Having considered the evidence before me, I accept the defendant's case theory on this issue for the following reasons. First, Prof Delilkan had not been able to sufficiently explain how the Vital Signs Report readings showed that the plaintiff had not been sufficiently pre-oxygenated. It bears reiterating that Prof Delilkan had expressly agreed that the various inferences drawn by the defendant and Prof Sia were valid. Furthermore, apart from the mere reliance on the missing SpO_2 readings at 9.55am and 10am, Prof Delilkan was not able to point to any other inference that could be drawn from the Vital Signs Report to prove that there was insufficient pre-oxygenation. In short, the plaintiff's case fell apart when the other readings in the Vital Signs Report were taken into account.

203 I should also mention that I am not convinced on a balance of probabilities that the defendant, an anaesthetist of 25 years' experience at the time of the LSCS, would have failed to sufficiently pre-oxygenate the plaintiff. This is especially since the importance of pre-oxygenation is something ingrained in all specialists. [note: 370] Moreover, the plaintiff's LSCS was, to all intents and purposes, still an elective surgery for which there was no need for the defendant to rush this vital step and risk a "life or death" situation occurring just for the sake of having the surgery start precisely on time. It also bears noting that Dr Tham, who was called as a witness for the plaintiff and who had previously worked closely with the defendant, testified during cross-examination that the defendant was always competent and responsible. [note: 371]

204 Lastly, I should also mention that I am aware of the fact that based on Nurse Honrado's estimate, Steps 1 to 6 of the intubation process could have taken slightly more than five minutes (see Table 1 at [176] above). This is slightly more time than the defendant's case theory that the entire process took slightly less than five minutes. I am of the view that this slight difference can be safely disregarded since Nurse Honrado was only giving general estimates during cross-examination.

Further, the fact that pre-oxygenation and intubation was completed swiftly in less than five minutes would support the defendant's assertion that the intubation process had actually been a smooth one.

205 For these reasons, I find that the plaintiff has failed to prove on a balance of probabilities that the defendant did not carry out sufficient pre-oxygenation on her.

Whether there was actual difficulty encountered during intubation

206 The next crucial finding of fact is whether the defendant had in fact encountered difficulty intubating the plaintiff. The plaintiff claimed that there was actual difficulty encountered during the intubation process, which the defendant denied.

207 The defendant pointed out that the plaintiff's Cormack and Lehane score was recorded as "2" in the Anaesthetic Record. [note: 372] The Cormack and Lehane scoring is done based on the view of the epiglottis and the opening of the trachea as it is *actually* seen during laryngoscopy. [note: 373] The Cormack and Lehane score is graded on the scale of 1 to 4. [note: 374] A lower score reflects that the intubation was an easy one and the converse is also true. [note: 375] The Cormack and Lehane score is different from the Mallampati score – the former measures difficulty *during* the intubation whereas the latter is a mere *predictive* tool to assess the anticipated difficulty of intubation *before* it occurs. Since the Cormack and Lehane score is the only reference material for what happened during intubation *and* the defendant had recorded the plaintiff's Cormack and Lehane score as "2", it can be inferred that the intubation had proceeded without difficulty.

208 Furthermore, there is no indication on the face of the relevant medical records that the defendant had experienced difficulty during the intubation process. The plaintiff's anaesthetic expert, Prof Delilkan, had initially suggested that the defendant's prescription of Voltaren (as evidenced in the Inpatient Medication Record [note: 376]) could be interpreted to mean that the defendant had anticipated that the plaintiff would have "nerve interference pain (swelling following excessive neck manoeuvres during airway management)". [note: 377] However, at trial, Prof Delilkan conceded that Voltaren is actually frequently used as part of the normal analgesia regime for LSCS. [note: 378]

209 It is also significant to note that the defendant did not use assistive adjuncts such as the stylet and the bougie, which were readily available to him in the event of a difficult intubation. The plaintiff's bare assertion that the defendant did not have these adjuncts readily available in the OT is implausible. This aspect of the plaintiff's case was based wholly on the defendant's testimony in relation to the difficult-intubation cart:

> Q: Can I just understand why there is no check for the fifth point, "difficult-intubation cart available"?
>
> A: The difficult-intubation cart is available in the main corridor outside the operating room, just outside the door of the operating room. And the intubation cart is only brought in if the anaesthetist requests for it in anticipation of a difficult intubation. It is not routinely put inside the operating room at the beginning of every case.
>
> Q: Can I understand the adjuncts that are used for difficult intubation. Are they on this cart?
>
> A: Yes.

Q: This cart I think you said is not routinely put in the OR at the beginning of every case?

A: Yes.

Q: You said it is put at the main corridor just outside the door of the OR?

A: Yes. [note: 379]

210 However, the above exchange must be read in light of the defendant's subsequent clarification when he was cross-examined on the issue of the checking of the anaesthetic equipment:

Court: Your account presupposes that you would be there early enough to tell her what size of tube you want based upon which she then cuts --

A: All these tubes are kept on the anaesthetic trolley. There's a trolley with this endotracheal tube, some face masks, airways, laryngoscopes, there's a bougie and a stylet in an anaesthetic trolley, a standard anaesthetic trolley and this is available in every operating room sitting next to the anaesthetic machine. So when the anaesthetist comes into the operating room, he will just tell the nurse, "I want for example a size 7 tube, cut to 24 cm". So she would do that.

...

Court: Just one or two points. You have just said that the anaesthetic tray, I don't know what you call it, will have the bougie and the stylet.

A: Yes.

Court: But I remember just now earlier on in evidence -- unless I'm mistaken -- you said it was outside the operating room.

A: No, the one outside the operating room refers to the difficult-intubation trolley which has a lot of other adjuncts like different types of laryngoscope with different types of blades, intubating laryngeal masks, *et cetera*, all these other adjuncts. Of all the difficult-intubation aids, the stylet and the bougie are standard equipment which is found on every anaesthetic trolley in every anaesthetic room. I'm sorry if I gave the wrong impression.

Court: I thought you meant otherwise and I was puzzling over this, wondering what if there were two operations in process and some other doctor had already taken -- some other anaesthetist had already taken the bougie and then your nurse came out to look for one and couldn't find it. I was thinking that was unworkable. So every tray would have it.

A: Would have at least one bougie and stylet and stylets of various sizes as well. [note: 380]

211 It is clear to me that the bougie and stylet were readily available in the OT to assist the defendant in the event of a difficult intubation, but he did not use it in the plaintiff's case. This is significant in two ways. First, it corroborates the defendant's claim that the intubation was a smooth one. Second, it shows that even if the defendant had encountered a difficulty during intubation, he could have used the adjuncts to overcome it. While it is still *possible* that the defendant could have disregarded the adjuncts and proceeded to use excessive force and/or hyperextended the plaintiff's neck, it is not *probable* that an anaesthetist with 25 years' experience would choose to ignore useful

tools that were readily available if he did in fact encounter difficulty during intubation just for the sake of having the surgery start on time. Accordingly, I find that the plaintiff has failed to prove on a balance of probabilities that the defendant had actually encountered difficulty during the intubation process.

Whether there was otherwise any need to use excessive force and/or to hyperextend the plaintiff's neck

212 Lastly, I turn to consider the initial placement of the plaintiff's head and neck at the start of the intubation process, as this bears on whether there was any need for the defendant to use excessive force and/or to hyperextend the plaintiff's neck during the intubation process. The defendant's evidence was that he had placed the plaintiff's head in the neutral position at the start of the intubation process. The term "neutral position" refers to the position of the neck and head lying normally on a pillow, in which position the head would have been slightly extended (*ie*, bent backwards), and the neck would have been slightly flexed (*ie*, bent forwards), because of the natural curve in the cervical spine. [note: 381]

213 According to the plaintiff's anaesthetic expert, Prof Delilkan, the plaintiff's head and neck should have been placed in the "sniffing the morning air" position, and not the neutral position. [note: 382] I should mention at the outset that although the strict definition of the term "sniffing the morning air position" refers to the position where a patient's head is extended at an angle of 35 degrees and the neck is flexed at an angle of 15 degrees, [note: 383] Prof Delilkan took the term to describe the position where the head is extended to the maximum possible. [note: 384] Prof Delilkan was of the opinion that his definition of the "sniffing the morning air" position (*ie*, head extended to the maximum) would have been the optimal position to begin with because this position would ensure that the oral, pharyngeal and laryngeal axes were aligned in such a way as to provide the best view of the larynx. According to Prof Delilkan, the need to start with (his definition of) the "sniffing the morning air" position is even more pressing for obstetric patients because their tendency to have fluid retention increases the likelihood of difficult intubation. Since the plaintiff's head should have been extended to the maximum at the beginning, any difficulty in intubation would have required excessive force and/or hyperextension of the plaintiff's neck.

214 The defendant's anaesthetic expert, Prof Sia, agreed that the "sniffing the morning air" position gave the best view of the larynx. He, however, disagreed that such a position was necessarily the optimal starting position. According to Prof Sia, the neutral position is the optimal one, especially for an experienced anaesthetist, as it provides the anaesthetist with a good view of the larynx without having to move the patient's neck too much. His reasoning is that "because anaesthesia is not directly therapeutic ... [he] would want to use the least force to accomplish the greatest effect". [note: 385]

215 Prof Sia's evidence on this issue is significant in two ways. First, since there is medical opinion, defensible in logic, that starting off in the neutral position is regarded as an acceptable practice, the defendant cannot be said to have been in breach of his duty of care in this regard. Second, since the defendant had started off in the neutral position (as opposed to Prof Delilkan's "sniffing the morning air" position in which the head would have already been extended to the maximum) the likelihood of the defendant having used excessive force and/or hyperextended the plaintiff's neck is low even if there were difficulties encountered during intubation. Furthermore, as pointed out by the defendant, an anaesthetist who encounters difficulty during intubation would have further flexed the patient's neck instead of extending it, in an effort to better align the oral, pharyngeal and laryngeal axes so as

to get a better view of the larynx. [note: 386] Prof Sia agreed. [note: 387]

216 I should also mention that even though the defendant had mentioned in his AEIC that he did not "flex, extend, tilt, or in any way manipulate the plaintiff's neck while carrying out the GA procedure", [note: 388] I accept his oral clarification that what he meant was that he did not *further* flex, extend, tilt or in any way manipulate the plaintiff's neck beyond what was required for intubation. [note: 389]

Res ipsa loquitur

217 The last plank to the plaintiff's argument was that the principle of *res ipsa loquitur* applies to shift the burden of proving reasonable care to the defendant. I use the word "principle" instead of "doctrine" as I concur with the views of Megaw LJ in *Lloyde v West Midlands Gas Board* [1971] 1 WLR 749, where he opined (at 755):

> I doubt whether it is right to describe res ipsa loquitur as a "doctrine." I think that it is no more that an exotic, although convenient, phrase to describe what is in essence *no more than a common sense approach*, not limited by technical rules, *to the assessment of the effect of evidence in certain circumstances*. It means that a plaintiff prima facie establishes negligence where: (i) it is not possible for him to prove precisely what was the relevant act or omission which set in train the events leading to the accident; but (ii) on the evidence as it stands at the relevant time it is *more likely than not* that the effective cause of the accident was some act or omission of the defendant or of someone for whom the defendant is responsible, which act or omission constitutes a failure to take proper care for the plaintiff's safety. [emphasis added]

218 The principle of *res ipsa loquitur* is commonly said to apply where the evidence "speaks for itself". What is meant by the phrase "the evidence speaks for itself" is that a *prima facie* case of negligence, if established, is sufficient to discharge the plaintiff's burden of proof. The plaintiff must still establish, or prove, what this case of negligence is; *res ipsa loquitur* may not be used to subvert the ordinary rules of proof. It falls to the plaintiff to prove negligence by leading evidence of some occurrence which, in the ordinary course of things, is *more likely than not* to have been caused by negligence: see *Teng Ah Kow v Ho Sek Chiu* [1993] 3 SLR(R) 43 at [22].

2 1 9 *Res ipsa loquitur* applies where (see *Scott v The London and St Katherine Docks Company* (1865) 3 H&C 596, quoted with approval in *Zweite MS "Philippa Schulte" Shipping GmbH & Co KG v PSA Corporation Ltd* [2012] SGHC 135 at [159]):

(a) the occurrence would not have happened without negligence;

(b) the thing which inflicted the damage was under the sole management and control of the defendant; *and*

(c) there must be no evidence as to why or how the occurrence took place.

220 The plaintiff's case simply does not meet the cumulative three-stage test for the application of *res ipsa loquitur*. The plaintiff relied on *res ipsa loquitur* to prove her case for her. This was, however, a wholly inappropriate use of *res ipsa loquitur*. The occurrence which, by its very nature, suggests negligence on the part of the defendant was, according to the plaintiff, the neck injury itself. The plaintiff argued that because the neck injury was so unusual and manifested itself only after the LSCS, it must have been caused by the defendant's negligence during intubation. This is a leap of logic and mistakes limited circumstantial evidence for a *prima facie* case sufficient to shift the burden

of proof to the defendant. The plaintiff has not shown that the neck injury would not have happened without negligence (see [174]–[216] above). The first limb of the cumulative three-stage test is not fulfilled.

221 The third limb is also not fulfilled. *Res ipsa loquitur* is inapplicable where there is evidence on causation: see also *Tesa Tape Asia Pacific Pte Ltd v Wing Seng Logistics Pte Ltd* [2006] 3 SLR(R) 116 (at [21]). In the present case, there was ample evidence by both parties, the subject of 39 days of trial, as to why and how the neck injury *might have* taken place.

2 2 2 *Mahon v Osborne* [1939] 2 KB 14 ("*Mahon*"), which the plaintiff relied on, does nothing to advance her case. In *Mahon*, a cotton swab was left in the patient's body at the end of an abdominal operation with the result that the patient died three months later. It was undisputed that the defendant had left the cotton swab in the patient's body *and* that his doing so was improper. The court, by a majority of two to one, reasoned that the act of leaving the cotton swab in the patient's body called for an explanation from the defendant and *res ipsa loquitur* thus applied. This is clearly distinguishable from the present case which contains significant factual disputes. The doctrine of *res ipsa loquitur* cannot be applied where there is significant dispute over the facts. Given that I have also found that the intubation was not improperly done, it would be perverse to use *res ipsa loquitur* to contradict that finding.

223 For the reasons given above, I find that the plaintiff's argument on *res ipsa loquitur* is a non-starter and does not affect the analysis in the rest of this judgment.

Decision: No breach of duty of care

224 Having made the necessary preliminary factual findings, I find that the plaintiff has failed to prove that the defendant had conducted the intubation process in a manner which is not accepted as proper by a responsible body of medical men. Even if the defendant had used excessive force and/or hyperextended the plaintiff's neck (which I have not found), Prof Delilkan's evidence is fatal to the plaintiff's case since he testified that even use of "tremendous force" was acceptable practice:

> Mr Lek:… In your testimony just now, you described what you would do when there is a difficulty in intubation. Remember you used the language like they are opposing movements, you push, I lift, two manoeuvres, tug of war and *tremendous force*. You remember that portion where you described what you do?
>
> Prof Delilkan:Yes.
>
> Mr Lek:Would I be correct to assume that what you have described is something that is an appropriate manner to conduct laryngoscopy and intubation?
>
> Prof Delilkan:In a situation where it becomes difficult intubation.
>
> Mr Lek:Yes. So the answer is a yes, right?
>
> Prof Delilkan:Yes.
>
> Mr Lek:Because I started with in a difficult –
>
> Prof Delilkan:I said yes without speaking it loudly. Yes, in a difficult intubation situation.

Mr Lek: *So you would consider this to be a proper standard of care type of conducting a laryngoscopy and intubation, right?*

Prof Delilkan: *Yes.* [note: 390]

[emphasis added]

Direct causation

225 Even if the defendant had breached his duty of care (which I have not found), the plaintiff's case would still fail for lack of causation. I will first set out the case theory of the plaintiff's orthopaedic expert, Dr Singh, as well as my comments on his theory. I will then set out the case theory of the defendant's orthopaedic expert, Dr Li, as well as my comments on his theory. Thereafter, I will explain why I find Dr Singh's case theory to be untenable and why Dr Li's case theory is made out on the evidence.

Dr Singh's case theory

226 Dr Singh's case theory as to the biomechanics of the plaintiff's injury evolved during the course of the proceedings and bears setting out in some detail.

227 In brief, the main points of Dr Singh's initial case theory as gleaned from his AEIC were as follows: (a) the kyphosis (reversal of the natural curvature of the cervical spine) at C4/C5 indicated injury to the cervical spine at that level; [note: 391] (b) the injury was to the C4/C5 disc; [note: 392] and (c) the mechanism of the injury was of a "whiplash"-like mechanism. [note: 393] For ease of reference, I shall refer to this case theory as the "Initial C4/C5 Disc Injury Theory".

228 During the first day of his oral evidence in court, Dr Singh conceded that it would be inaccurate to say that as a general statement, a kyphosis at C4/C5 means that there was trauma suffered at that region. [note: 394] Dr Singh explained that his statement applied specifically to the plaintiff. [note: 395] Dr Singh also said that there was a failing in the tension of the ALL at the C4/C5 level which subsequently started a chain of events. [note: 396] For ease of reference, I shall refer to this as the "ALL Injury Theory". He claimed that para 15 of his report where he said that "the mechanism of injury to the C4/C5 disc ... was of a 'whiplash'-like mechanism" was inaccurately stated. [note: 397] Rather, what he meant to say was that the instantaneous and primary effect of the trauma was the ALL giving way, which only subsequently caused injury to the disc. It bears noting that the idea of the ALL giving way as the primary effect was not stated in Dr Singh's report.

229 Nearing the end of the first day of his testimony, Dr Singh first mentioned that there was a fulcrum at C4, and that the start of the trachea was located near C4. [note: 398] His interpretation was that there had been some force with the fulcrum applied at C4/C5 which corresponds to where a laryngoscope is inserted. [note: 399] When Mr Lek pointed out that the start of the trachea was located at C5/C6 and not C4/C5, Dr Singh responded that he agreed, but the fulcrum is applied higher up. When challenged on the article entitled "Cervical Spine Motion with Direct Laryngoscopy and Orotracheal Intubation" Anaesthesiology 1996; 85(1): 26–36 [note: 400] which concluded that the vast majority of motion produced during intubation is experienced at C0 to C2, Dr Singh said that "the fulcrum had moved from C0/C1 to C3/C4". [note: 401] In fairness to Dr Singh, in this instance, the reference to C3/C4 instead of C4/C5 was probably an innocent slip of the tongue as he had in all

other situations maintained that C4/C5 was the fulcrum, not C3/C4. Dr Singh also said that the movement of the fulcrum was an "abnormality". [note: 402] For ease of reference, I shall refer to this case theory as the "Shift In Fulcrum Theory".

230 The Shift In Fulcrum Theory subsequently evolved when Dr Singh returned to the stand to give concurrent evidence together with Dr Li. Dr Singh said that even though a fulcrum would also have been created at C4/C5 regardless of whether there was cricoid pressure, cricoid pressure aggravated it. [note: 403] According to him, he did not discuss cricoid pressure in his report or in his earlier testimony because it only came about in "a discussion" afterwards and he thought that he had already given an adequate explanation. [note: 404] In the joint statement given by the orthopaedic experts, [note: 405] Dr Singh stated that the left and upward force applied at around the C2 to C4 region during laryngoscopy, together with the presence of cricoid pressure applied at C5/C6, caused "a stress rising at the level of C4/C5". [note: 406] In other words, the opposing forces (*ie*, the cricoid pressure and the laryngoscopy) gave rise to a resultant force which caused the shearing injury at the point of fulcrum. [note: 407] For ease of reference, I shall refer to this theory as the "Resultant Forces About the Fulcrum Theory".

The court's comments on Dr Singh's case theory

231 It is not unacceptable for witnesses to supplement or clarify their evidence as the need arises. However, in the present case, the substantial shifts in Dr Singh's theory, both in form and in substance, make it difficult to accept that the different elements of his theory were mere clarifications. Be that as it may, the final version of Dr Singh's theory, *ie*, The Resultant Forces About the Fulcrum Theory, suffers from many deficiencies. I will address each component of the Resultant Forces About the Fulcrum Theory in turn.

Hyperextension/extension

232 I consider first the issue of whether hyperextension was necessary for the tension force that allegedly caused an injury to the ALL at the C4/C5 level. Question 6 of the orthopaedics' joint statement asked if "the plaintiff [suffered] an [ALL] injury caused by trauma". Dr Singh answered:

> Yes. The Plaintiff had neck strain/injury during the LSCS on 26 Oct 2006. The Plaintiff's neck strain/injury is caused by trauma; (*tension force* in the anterior cervical spine at the levels of the C4/5 disc) which injured the anterior longitudinal ligament ("ALL") at the C4/5 levels of the cervical spine. This tension force was caused by
>
> a. *Hyperextension of the Plaintiff's neck* during the intubation process;
>
> b. This may occur as a result of the upward lifting motion (at around the C2/3 and C3/4, levels) during the laryngoscopy;
>
> c. In an obstetric patient, the upward lifting motion of the laryngoscope blade between C2/3 - C3/4, in the presence of cricoid pressure at C5/6, causes a stress rising at the level of C4/5.
>
> ...
>
> [emphasis added]

233 When Mr Lek and the court sought to clarify Dr Singh's position in relation to part (a) of his answer, specifically on the issue of hyperextension, Dr Singh's evidence was imprecise and inconsistent. He initially referred to hyperextension of the plaintiff's neck mainly at C0/C1 and also all the way until C3/C4 when the laryngoscope is introduced into the patient's larynx. [note: 408] This, quite clearly, was a reference to the movement of the spine. When I asked him specifically if he was referring to an extension or a hyperextension, he said he identified "a hyperextension in the context of an extension". [note: 409] I then pointed out to him that the pictures of X-rays [note: 410] do not show any hyperextension, [note: 411] and Dr Li added that in a patient lying on a pillow, even though there is hyperextension at the C0/C1 and C1/C2 level, there can be no hyperextension at the sub-axial level (*ie*, below C2). [note: 412] According to Dr Li, a hyperextension at the sub-axial level can only happen if a patient's head is hung over the edge of the bed. [note: 413]

234 Thereafter, Dr Singh sought to clarify that he referred to hyperextension in terms of the *forces on the ALL*, and *not in terms of the movement of the spine*. [note: 414] I then emphasised to him that references to terms such as "hyperextension" should be used strictly in reference to the movement of the spine (since that had been the way the term "hyperextension" had been used throughout the proceedings). [note: 415] Dr Singh then admitted that using "hyperextension" might have misled everyone into thinking that he was referring to the movement of the neck. [note: 416] He said that what he was alluding to was the "extensile forces of hyperextension" and the "hyperextension forces on the ligament at the spot, C4/C5". [note: 417] When I again pointed out to him that his use of the term "hyperextension" in the context of forces was confusing, he replied that it was "semantics". [note: 418] Once again I requested Dr Singh to limit his use of the words flexion, extension and hyperextension to movement of the spine only and he agreed. [note: 419] Dr Singh nevertheless continued to stretch the definition and understanding of those terms and caused further confusion. At this juncture, his position changed from previously saying that there must have been "hyperextension forces" to saying that there must have been an "*extension* force on the ligament" in order to cause the injury. [note: 420] It bears emphasising that the difference between hyperextension and extension is material because "hyperextension" involves a bending of the neck backwards *beyond its normal physiological means*, whereas "extension" refers to that which is still *within its normal physiological means*. [note: 421]

235 When I asked Dr Singh if he was actually referring to a force acting on the spine which caused the extension, he agreed and said that it was "well put". [note: 422] Mr Lek then asked him specifically if that force caused an extension or a hyperextension, and Dr Singh confirmed that he was referring to a force causing *extension* of the plaintiff's neck. [note: 423] He also confirmed that the use of the word "extension" "would be exactly accurate as [he] wanted to mean it". [note: 424] When rounding up the discussions on this issue, I checked with Dr Singh once more that he was not saying that there was hyperextension at C4/C5. [note: 425] He admitted that he had used a wrong choice of words and confirmed that he was referring to a *force causing extension at C4/C5*. [note: 426]

236 After I had taken great pains to clarify and get to the bottom of Dr Singh's position, *he withdrew his corrections the very next day*. According to Dr Singh, what he meant was that there was a force causing extension in the ALL and there was still hyperextension in the spine. [note: 427] He then asked for part (a) of his answer to Question 6 of the orthopaedics' joint statement to be amended to read as "a force causing extension (hyperextension) of the plaintiff's neck during the intubation process" to reflect this new position. When Mr Lek asked Dr Singh why he had said the day

before that there was no hyperextension, Dr Singh responded that he had "always maintained that there was hyperextension". [note: 428] He then confirmed that he wished to withdraw his statement the previous day that there had been no hyperextension at C4/C5. His reason for this change was that he was "concentrating on the ligament" the previous day, [note: 429] and was so exhausted after one day of cross-examination that he "was not in a position to be as alert as [he] was". [note: 430]

237 From the above, it is patently clear that Dr Singh's evidence was imprecise and inconsistent. In particular, I find that he sought to muddy the waters by stretching the definitions of precise terms. I do not accept his excuse that he was not very alert towards the end of the day. This was neither a slight error nor one which could reasonably be attributed to exhaustion. The court and Mr Lek had taken great efforts to clarify, re-clarify, confirm, and re-confirm Dr Singh's position when he initially made those corrections. Each time, Dr Singh had agreed to the corrections.

Forces

238 I now proceed to consider the next component of Dr Singh's theory, which is the force that acts on the cervical spine and the ALL. When Dr Singh drew a diagram for the court to understand his theory, he had indicated that 50 Newtons of force, the force estimated to be used when the laryngoscope is lifted, also acts on the cervical spine. Dr Li disagreed. According to Dr Li, the lifting force of the laryngoscope lifts the pharynx up and away from the cervical spine and there is nothing connecting the pharynx and the cervical spine other than loose connective tissues. [note: 431] In response, Dr Singh claimed that the connective tissues connect the pharynx to the ALL and would transmit the forces between these structures. [note: 432] He denied that there was a loose space between the connective tissues and the cervical spine. [note: 433] When Ms Ho asked him if the connective tissues are stronger or weaker than the ALL, Dr Singh replied that "it is the same strength or weaker than the ALL". [note: 434] When I commented that I could not imagine how the connective tissues could be as strong as the ligaments, Dr Singh conceded that they are not as strong as the ALL. [note: 435] Dr Singh then went on to say that although in normal people the connective tissues are weaker than the ALL, the connective tissues in trained athletes might be as strong as the ALL. [note: 436] This was plainly a misleading and untruthful statement because, as Dr Singh had earlier conceded, even a trained athlete can only train his muscles and not his connective tissues. [note: 437]

239 Dr Li then explained that the connective tissues are so loose that during surgery, one can sweep them away with just one finger. [note: 438] He described it as analogous to "breaking a cobweb". [note: 439] In response to this, Dr Singh agreed with Dr Li's position in the context of normal patients. [note: 440] However, Dr Singh proceeded, unhelpfully in my opinion, to talk about how he has seen hard tissues in cadavers, and how for patients with neck problems the loose connective tissues might not be the same as those in normal patients. [note: 441] These were clearly irrelevant exceptions as the plaintiff was a normal patient. Dr Singh was also evasive and refused to give a proper answer on this issue by saying that he wanted to listen to Dr Li's overall opinion first before commenting. [note: 442] It bears emphasising that how loose or strong connective tissues are is a matter of basic human anatomy. On this issue, as well as the others that I have pointed out in the course of this judgment, Dr Singh had shown himself to be misleading and unhelpful.

240 Next, in relation to the amount of force needed to cause the alleged injury to the ALL in view of the fact that the plaintiff had been administered a muscle relaxant, Dr Singh stated in the orthopaedics' joint statement that:

> ... The amount of force required to do this in an awake patient would be an immense force because the *ligament* is a very resilient structure. By comparison, a minimal force would result in significant injury in a paralysed neck. [note: 443] [emphasis added]

In response, Dr Li expressed that since a muscle relaxant works only on the muscles, and not the ligaments, he could not see how the ALL would have been more relaxed and more susceptible to injury just because a patient was under a muscle relaxant. [note: 444] After this point was made by Dr Li, Dr Singh claimed that he had made a typographical error and had instead intended to say that "the amount of force required to do this in an awake patient would be an immense force because the *non-paralysed muscles* is [*sic*] a resilient structure". [note: 445] It goes without saying that this clearly could not have been a typographical error. "Non-paralysed muscles" and "ligaments" are totally different anatomical structures and have very different spelling. I also do not accept Dr Singh's assertion that he had failed to address his "typographical error" earlier because he was so engrossed in his discussions on other issues.

Cricoid pressure

241 I turn now to the last main component of Dr Singh's case theory. According to Dr Singh, the cricoid pressure which is applied at the C5/C6 location fixes the ALL at C5/C6 and transfers the stress to the adjacent moving segment, which is C4/C5. Because of the presence of cricoid pressure, C4/C5 bears "double the tension force", therefore causing the ALL to give way at C4/C5. [note: 446] When the court asked if his conclusion that C4/C5 absorbed *double* the tension force was a matter of mathematical determination, Dr Singh indirectly conceded that it was only accurate to say that C4/C5 bears *more than its usual level* since the stress is transferred both up and down the spine, and not just up the spine to C4/C5. [note: 447] This, to me, was another example of exaggeration on Dr Singh's part.

Dr Li's case theory

242 I now set out Dr Li's case theory. Dr Li disagreed with Dr Singh's view that there would have been a force causing hyperextension or extension at C4/C5. Dr Li's opinion is that the C4/C5 point would have been in a state of *flexion* instead (*ie*, the opposite of an extension). His reasoning was as follows:

(a) When the patient is lying on the pillow, there is a natural tendency for the sub-axial spine (*ie*, the levels below C2) to be in a neutral position or in a slight state of flexion.

(b) When the patient's head is tilted backwards to open the mouth and introduce the laryngoscope, most of the motion is an extension at the C0/C1 and C1/C2, with little change at the sub-axial spine.

(c) Since the pillow supports only the head and the neck is actually not supported, the tendency is for the sub-axial portion of the neck to go into further flexion when cricoid pressure is applied downwards and a little upwards towards the head of the patient at the C5/C6 region.

(d) When the laryngoscope is inserted up to the level of about C3/C4 and lifted upwards and forwards to expose the opening of the larynx, the amount of force that eventually gets transmitted to the spine through the loose connective tissues, while unknown, is definitely not the full 50 Newtons used during laryngoscopy because:

(i) the force is distributed evenly throughout the surface of the laryngoscope blade; and

(ii) other than the loose connective tissues, there is nothing connecting the pharynx to the cervical spine, and the spine would not be directly lifted up with the laryngoscope blade.

(e) Since C5/C6 is pinned down by the cricoid pressure and the laryngoscope is lifting upwards and forward, the resultant force is a rotational one that causes flexion.

(f) If the cervical spine at C4/C5 is in a state of flexion, the ALL would be more relaxed instead of being in a state of tension. Thus, the ALL would not be injured. [note: 448]

243 Dr Li also helpfully highlighted a few important points about the ALL. First, the ALL is a very resilient, three-layered structure with many different points of anchoring to the vertebrae. The deepest layer connects the vertebrae that are adjacent to each other (*ie*, between C2 and C3, between C3 and C4, *etc*). The intermediate layer involves overlapping layers that transverse about two to three vertebrae (*ie*, along C2/C3/C4, along C3/C4/C5, *etc*). The last layer, which is the superficial layer, runs along the whole length of the spine with points of anchoring to each vertebra. [note: 449] The second point that Dr Li highlighted was that the ALL only starts from C2 onwards. [note: 450] As such, even if there was extension at the C0/C1 or C1/C2 levels when the head was tilted backwards, and even if the cricoid pressure at C5/C6 created a "stoppage" point such that the ALL below C5/C6 was immobile, the ALL at the C4/C5 level would not have been in a state of tension and could not have been injured.

The court's comments on Dr Li's case theory

244 I find Dr Li's explanation consistent, clear and logical. It withstood cross-examination. I will elaborate below.

Decision: No direct causation

245 It bears emphasising from the outset that the issues that Dr Singh and Dr Li were called to give expert evidence on are not nebulous in nature. Issues involving forces and motion are in the realm of physical science and within the grasp of a layperson with the benefit of sufficient explanation. The key issue in relation to causation is whether the sub-axial spine (*ie*, the levels below C2), was in a state of extension as Dr Singh claimed, or in a state of flexion as Dr Li claimed. There are no two ways about it.

246 Having heard both experts explain their views through oral testimony aided by drawings on the white board, I invited them to demonstrate how the movement of the laryngoscope caused changes in the curvature of the sub-axial spine. It is, of course, acknowledged that a model can never fully represent the actual human skeletal structure. However, the model that was used served the purpose as it mimicked the jointed connections of the cervical spine and could be moved. A book was placed underneath the occiput of the model to simulate a pillow. Dr Li demonstrated first, and I could see at once that the movement of the laryngoscope caused the sub-axial spine of the model to be in a state of flexion. [note: 451]

247 When it was Dr Singh's turn to demonstrate, he kept starting with the head in a hyperextended position although it was made clear to him that he had to start his demonstration in the neutral position to mimic the defendant's actions during the plaintiff's intubation process. [note: 452] More than once, he tried to move the lower end of the cervical spine model when it was clear that it should

have been fixed to simulate the presence of cricoid pressure. [note: 453] It was clear to me that he contrived to manipulate the cervical spine model so as to show an extension at the sub-axial level. It got to the point that I had to move the model for Dr Singh step by step. Up until the end, Dr Singh insisted that the sub-axial spine was in a state of extension when it was plain for all to see that it was actually in a state of flexion.

248 Given the way that Dr Singh's "demonstration" turned out, it was unsurprising to me that on the last tranche of hearing, which was meant *only* to discuss some of the seven to ten cases of similar injury which Dr Singh claimed to have treated, he asked to try the demonstration again on another model. I did not allow it. He claimed that the model that was used during the demonstration was "flopping" all over the place. [note: 454] This was untrue. Dr Li managed to demonstrate the movements adequately. If the model was moving all over the place when Dr Singh was using it, it was only because he was vainly trying to manipulate the model to twist it into the shape that he wanted. Dr Singh had completely ignored or forgotten that his duty was to the court and this overrode any "obligation" to the plaintiff who called him as her expert witness.

249 On the evidence before me, I can therefore safely disregard Dr Singh's case theory as it does not stand up to scrutiny. It is clear to me that the sub-axial spine would have been in a state of flexion and not extension. I therefore conclude that even if the defendant had breached his duty of care in the manner that he performed the intubation (which I have not found), the plaintiff's case would have failed for lack of causation.

Indirect causation

250 I turn now to address the plaintiff's case on causation at its next highest. The plaintiff argues that even if the defendant did not directly cause the plaintiff's neck injury and she had pre-existing cervical spondylosis at the time of the LSCS (which the defence pointed out was suggested by the X-rays and MRIs), the defendant had triggered her symptoms of neck pain. In this regard, the plaintiff relied on the "eggshell skull" rule that the defendant must take the plaintiff as he finds her. The defendant denied triggering the plaintiff's pre-existing cervical spondylosis.

251 For the plaintiff to establish the causal link between the GA procedure and her neck pain, it is necessary for her to prove that she felt pain immediately or very shortly after the GA procedure. This is because of the nature of cervical spondylosis. Cervical spondylosis refers to the degeneration of the cervical spine. It is usually caused by the natural process of wear and tear, although diseases and injuries can also be a cause. Oftentimes, those who suffer from cervical spondylosis are asymptomatic for many years. However, if and when symptoms do manifest, they manifest over a short period of time, usually within days or weeks. [note: 455] The manifestation of symptoms can be triggered by an injury or by nothing at all. Dr Li estimated that about 90% of cervical spondylosis patients manifest symptoms for no particular reason. [note: 456] To attribute the onset of the plaintiff's symptoms to the specific event of the GA procedure, the plaintiff's own witness, Dr Chang, said that he would expect "pain to be immediate or in the first few hours of the injury". Conversely, he testified that if the pain manifested "two to three days later", he would honestly not think that the GA procedure had anything to do with the manifestation of symptoms. [note: 457] This view was also shared by another of the plaintiff's own witnesses, Dr Yue, as well as Dr Li.

252 Dr Singh agreed that if the pain is to be attributed to a singular event, it must occur immediately after that event. However, his position as to what constitutes "immediate" was different from the other experts. According to Dr Singh, the plaintiff's onset of pain would still be considered to have occurred "immediately" after the GA procedure even if it had happened many days, weeks [note:

458] or even a month [note: 459] after the event. This is because, according to Dr Singh, the GA was a "significant event" and there was no intervening event between that and the onset of pain. [note: 460] Such reasoning lacks cogency as it ignores the fact that the symptoms of cervical spondylosis can, and often do, manifest themselves without a triggering event.

253 As such, I find that to establish a causal link between the GA procedure and the plaintiff's symptoms, the plaintiff must prove that she had suffered neck pain immediately or very shortly after the GA procedure. It is, of course, difficult to state a definitive range of time, especially when one takes into consideration the fact that the plaintiff was on painkillers for her surgical wound which might have had the effect of masking her neck and/or back pains, if any. But as a general proposition, the longer the symptoms take to manifest themselves, the less likely it can be said to have been caused by the GA procedure. The converse would also be true. I turn now to examine the plaintiff's evidence as to the existence and/or extent of neck and/or upper back pains: (a) upon waking up from the LSCS in the OT Recovery Room; and (b) during her hospital stay in the ward.

The existence and/or extent of neck and/or back pains in the OT Recovery Room

254 According to Dr Tham, the plaintiff did not specify that she had pain in her neck and/or back; she only told him that she was in pain. [note: 461] The plaintiff's evidence was inconsistent in several aspects. First, the plaintiff was unclear as to whether she had informed Dr Tham and/or the nurses about the alleged pains in her neck and upper back. In the plaintiff's Amended Reply, she pleaded that she had "immediately informed the recovery room nurses and Dr Tham when she woke up from the general anaesthesia with neck and back pain". [note: 462] Yet, during her oral testimony in court, the plaintiff said that she only remembered telling Dr Tham and/or the nurses that she was in pain, and that she did not specify whether it was at the surgical site or her neck and/or back. [note: 463] Second, the plaintiff's description of the alleged pain in her neck and/or back was also inconsistent. In her AEIC, she had described the pain as "excruciating pain everywhere". [note: 464] However, during her testimony, she agreed that the pain was a sore feeling as opposed to a severe pain. [note: 465] Further into her testimony, she said that she was in "excruciating pain all over" when she woke up from the surgery. [note: 466] When this inconsistency was pointed out to the plaintiff, she attempted to bridge the gap between the words "ache" and "pain" by trying to explain that she was making a distinction between the intensity of pain and the type of pain. [note: 467]

255 It is also significant that the Recovery Room Nursing Record [note: 468] and the Pain Flow Sheet [note: 469] recorded the plaintiff as only complaining of "mild pain" at the material time. I pause to mention that it was only when the plaintiff was mid-way through her testimony that she started to challenge the contents of the medical records by alleging that the nurses had recorded the pain score without her input. This resulted in the introduction of six new witnesses in the middle of the trial (*ie*, five nurses from Gleneagles Hospital and one additional friend of the plaintiff, Ms Sheila). According to the OT Recovery Room nurse, Nurse Khor (who was not the nurse that tended to the plaintiff but who is able to give evidence as to the usual practice of OT Recovery Room nurses), the scoring of "mild pain" in the Recovery Room Nursing Record (Section C) would have been done once the plaintiff arrived at the OT Recovery Room at 11.30am. [note: 470] Thus, it can be inferred that the plaintiff was only suffering from "mild pain" before the Pethidine drip was started at 11.35am. This inference is consistent with the fact that the plaintiff's vital signs were recorded as stable in Section B of the Recovery Room Nursing Record. [note: 471] Nurse Khor further explained that there was a standing order for the OT Recovery Room nurses to start the Pethidine drip after the existing saline drip had finished so as to keep the patient comfortable, and this would be done regardless of whether the

surgeon instructed them to do so. [note: 472]

256 There was no evidence supporting the plaintiff's bare allegation that the pain score was recorded without her input. There was simply no reason why the relevant nurse in charge of the plaintiff (who is no longer in the employment of Gleneagles Hospital and thus was not called as a witness) would put down a false pain score. This is especially so since Gleneagles Hospital is a Joint Commission International ("JCI") accredited hospital, and a heavy emphasis is placed on pain scoring under the JCI accreditation scheme. [note: 473] Furthermore, it bears noting that the plaintiff was recorded as being "comfortable" and drowsy but "responds to voice" upon her arrival in the OT Recovery Room. [note: 474] She would therefore have been in a position to articulate her alleged neck and/or upper back pains to Dr Tham and/or the nurses if she was indeed in such pain.

257 Having considered the evidence before me, I find that the plaintiff has failed to prove on a balance of probabilities that she suffered from severe pain in her neck and/or back upon waking up in the OT Recovery Room. I turn now to consider the plaintiff's account of the existence and/or extent of neck and/or upper back pains during her stay in the hospital ward.

The existence and/or extent of neck and/or back pains in the hospital ward

258 The plaintiff's account of neck and/or back pains whilst in the hospital ward was similarly vague and fraught with inconsistencies. In the plaintiff's AEIC, she said that she was in "so much pain" and "great pain" that she: (a) could not breastfeed; [note: 475] (b) could not look after her child; [note: 476] (c) had to use a bedpan as she could not go to the toilet; [note: 477] (d) could not sleep; [note: 478] and (e) had to ask her husband to bring extra mattresses. [note: 479] However, it is significant that the plaintiff did not specify the *site* of the pain. One would quite reasonably think that the pain, if any, would have been at the surgical site (*ie*, the abdomen). To my mind, the plaintiff failed to be precise in her AEIC so as to create a sweeping impression. When she was cross-examined, the plaintiff eventually conceded that:

(a) her abdominal pain was the hindrance behind her inability to breastfeed her child; [note: 480]

(b) her baby was placed in the room with her on the first night as evidenced by the 0330 hours entry on 27 October 2006 in the Nursing Care Plan; [note: 481] and

(c) she would not have needed to use a bedpan to relieve herself on 26 October 2006 as she had just undergone surgery and a urinary catheter was still in place at that time as evidenced by the 1230 hours entry on 26 October 2006 in the Nursing Care Plan. [note: 482]

Even if plaintiff did use a bedpan for the rest of her hospital stay, this did not necessarily show that she had neck and/or back pains. This could equally have been the result of the surgical wound at the abdomen.

259 The plaintiff described her neck and/or back pains in her AEIC as a "discomfort" on the night of 26 October 2006 [note: 483] which "worsened" on the morning of 27 October 2006. [note: 484] This was substantially different from her oral testimony, wherein she claimed that her pain level on 26 October 2006 until the morning of 27 October 2006 was, on a scale of 1 to 10, a grade of 8. [note: 485] The plaintiff further stated in her AEIC that on 27 October 2006 she asked to be transferred to

another suite as she thought that her condition was due to the hospital bed. [note: 486] However, this could not be arranged and she remained in her original suite. [note: 487] When cross-examined, the plaintiff said that she definitely would have told the ward nurses about the soreness of her neck and back by 27 October 2006 (although she could not remember the precise timing) because that was the date that she asked to be transferred to another suite. [note: 488] The plaintiff also stated in her AEIC that despite the extra mattresses which her husband delivered on the night of 27 October 2006, she woke up on 28 October 2006 feeling as though her "whole neck and back were breaking". [note: 489]

260 The plaintiff's account, however, is not borne out by the medical nursing records. Not a single mention of neck and/or back pains and/or ache was made by the nurses in the Nursing Care Plan or the Pain Flow Sheet throughout the duration of the plaintiff's hospital stay. The relevant entries only showed that the plaintiff complained of mild pain at the surgical site. If the plaintiff was suffering from a grade 8 pain in her neck and/or upper back which subsequently worsened, it is difficult to understand why she did not at least mention this pain to the nurses, particularly since the plaintiff is a well-educated woman well capable of communicating her pain. If indeed the plaintiff had complained to the nurses of severe back and/or neck pains, it is inconceivable that *all* the nurses involved in her care would have disregarded it, particularly in light of the heavy emphasis placed on pain scoring in JCI accredited hospitals like Gleneagles Hospital. The plaintiff pointed out that her gastric pain was not recorded and scored when she was prescribed Losec for gastric at 7pm on 27 October 2006. It was argued that this represented at least one instance in which the plaintiff complained of pain which was not recorded or scored. This, however, was not an egregious omission as the medication prescribed, Losec, would have indicated the presence of gastric pain without more. There is also no indication that the gastric pain was unusual or severe. In contrast, severe pain in the neck and/or back would have been unusual and thus warranted recording, or at least notifying Dr Tham and/or the defendant. To my mind, the fact that none of these things was done demonstrates the implausibility of the plaintiff's claim.

261 Not only is the plaintiff's account not borne out by the nursing records, it is also inconsistent with Dr Tham's records. Dr Tham checked in on the plaintiff the evening after her LSCS, and subsequently at least once a day until she was discharged on 28 October 2006. [note: 490] His evidence was that he only recalled the plaintiff complaining that she was "uncomfortable" and that she had asked to be transferred to another suite. [note: 491] Dr Tham made no reference to the plaintiff's alleged neck and/or back pains. Furthermore, there was also no record of the plaintiff having complained of neck and/or back pains and/or ache in the Clinician's Collaborative Progress Notes. [note: 492] In fact, according to Nurse Lai, Dr Tham had indicated that the plaintiff was to be discharged as early as 27 October 2006 because the word "home" was written in the column under "treatment and investigations", and she had signed off against that entry with her initials. [note: 493] Nurse Lai was sure that the entry said "home" as she recognised Dr Tham's handwriting. I agree that the scribble that Nurse Lai claimed read "home" looked similar to the entry "home" on 28 October 2006. Nurse Lai also explained that since she was only on duty on 27 October 2006 and not on 26 October 2006, the "home" entry was wrongly dated as 26 October 2006, instead of 27 October 2006. Unfortunately, as Dr Tham had already been released as a witness by then, he was not able to verify what Nurse Lai had said. Nevertheless, the other medical records support Nurse Lai's contention that Dr Tham had certified the plaintiff to be fit for discharge as early as 27 October 2006:

(a) the Nursing Care Plan recorded that Dr Tham had ordered "home today with T.T.O" at 1050 hours on 27 October 2006. "T.T.O" refers to the "to take out" package ordered by Dr Tham for the plaintiff to bring home when discharged; and

(b) the Infant Nursing Care Plan recorded that "the mum is discharged but she will stay as a lodger on the 10th floor" and "would like the child to have phototherapy on the 10th floor as well in her room" at 11.50am on 27 October 2010. [note: 494] According to Nurse Lai, what probably happened was that Dr Tham had discharged the plaintiff on 27 October 2006, but the plaintiff did not want to leave because the baby was not yet ready to be discharged. [note: 495]

In any event, even if Dr Tham had found the plaintiff fit to be discharged only on 28 October 2006 and not on 27 October 2006, the fact that he discharged her without any further action in relation to her alleged neck and/or back pains, suggests to me that she had not complained to him about her alleged pain.

262 It will be recalled that the plaintiff and her husband are good friends with Dr Tham. The plaintiff's husband is also a doctor and had shown himself on several occasions to be pro-active in the management of his wife's care. For example, the plaintiff's husband told her to refuse Dr Tham's prescription of Panadeine and Arcoxia, and gave her Panadol and Ponstan instead, since he felt that Panadeine and Arcoxia were not safe for breastfeeding. [note: 496] On another occasion, it was recorded in the Nursing Care Plan at 10.50am on 27 October 2006 that the plaintiff and her husband had raised concerns that the plaintiff's lochia (*ie*, vaginal discharge) was very heavy. [note: 497] If the plaintiff really had such severe neck and/or back pains during her hospital stay, one would have expected either the plaintiff or her husband to have brought it to the attention of the nurses and Dr Tham.

Decision: No indirect causation

263 It seems to me that the plaintiff's unfortunate cervical spondylosis symptoms more likely than not manifested spontaneously (just like 90% of patients with cervical spondylosis do, according to Dr Li) [note: 498] or was caused by some other triggering event after she was discharged and before she went to see Dr Chang on 30 October 2006. Even though the plaintiff's neck and/or upper back pains certainly manifested themselves by 30 October 2006, which is only four days after the LSCS and two days after she was discharged, the medical evidence is that the longer the symptoms take to manifest, the less likely it can be said to have been caused by the GA procedure. Even the plaintiff's own witness, Dr Chang, testified that if the pain manifested "two to three days later", he would not have made any link between the GA procedure and the manifestation of cervical spondylosis symptoms. [note: 499]

264 Accordingly, I find that the plaintiff has failed to prove on a balance of probabilities the requisite causal link between the GA procedure and her neck pain. Her alternative case on indirect causation fails.

Decision: Plaintiff's claim for negligent intubation fails

265 For the reasons given above, I find that the plaintiff failed to prove, on a balance of probabilities, that the defendant breached his duty of care in the manner that he performed the intubation procedure. Even if the defendant had breached his duty of care (which I have not found), the plaintiff's case would still fail on causation, both direct and indirect. Accordingly, I dismiss the plaintiff's claim in this regard. I turn now to address the plaintiff's last main allegation that the defendant had not discharged his duty in relation to the giving of post-operative care.

IX. POST-OPERATIVE CARE

266 The plaintiff alleged that the defendant had breached his duty of post-operative care in the following aspects:

(a) the post-operative orders;

(b) signing off against the plaintiff's discharge from the OT Recovery Room to the ward before reviewing her a final time;

(c) omitting to review her in the ward; and

(d) the telephone conversation on 29 October 2006.

Post-operative orders

267 It was undisputed that save for his name and his mobile phone number, the defendant omitted to fill in the section on post-operative orders in the Anaesthetic Record. [note: 500] However, as the defendant explained, [note: 501] the analgesia and fluid regimen would already have been documented in the Inpatient Medical Records. [note: 502] The redundancy of having to fill in the same information in two medical records is evidenced by the newer version of the Anaesthetic Record [note: 503] which no longer provides for the analgesia regimen to be filled in. Furthermore, the evidence showed that some of the post-operative instructions were given to the nurses verbally. For example, oxygen therapy at five litres per minute for ten minutes was documented in the Recovery Room Nursing Record. [note: 504] This showed that the defendant had given verbal instructions to the Recovery Room nurses without which the nurses would not have known: (a) to give oxygen therapy since it is not a standard post-operative regime and is only given upon the anaesthetist's instructions; and (b) how much and for how long the oxygen should be given. [note: 505]

268 The key issue is whether the defendant had, as a matter of fact, discharged his duty of care with regard to his post-operative orders. Given that there is evidence of verbal post-operative orders, the incompleteness of the defendant's documentation is not material.

Signing off against the discharge from OT Recovery Room to the ward

269 It was undisputed that the defendant had pre-signed the discharge form for the plaintiff to be discharged from the OT Recovery Room to the ward. [note: 506] He had not subsequently reviewed her after handing her over to the care of the OT Recovery Room nurses. The defendant had, however, written his mobile phone number in the Anaesthetic Record and told the nurses that he would be in another OT in the same hospital for another case and could be contacted if necessary. [note: 507] In the plaintiff's closing submissions, it was submitted that since Nurse Khor (the nurse manager in charge of the OT Recovery Room) said that the nurses would usually try to contact the anaesthetist before contacting the primary treating physician if the patient complained of pain, [note: 508] the fact that Dr Tham was called implies that the defendant could not be contacted. The defendant denied being contacted by anybody in relation to the plaintiff's situation in the OT Recovery Room. I am unable to accept the plaintiff's submissions on this point. First, there is no evidence in the medical records that the OT Recovery Room nurse had tried to contact the anaesthetist but could not. [note: 509] Second, Nurse Khor's statement as to the nurse's normal working practice must be read in light of subsequent clarification that they would not contact the anaesthetist if the patient was only complaining of mild pain and her vital signs appeared normal. [note: 510] As discussed earlier, the

Recovery Room Nursing Record showed that the plaintiff had only complained of mild pain [note: 511] and her vital signs were stable. [note: 512] I am therefore unable to find that the defendant was contacted by the nurses and/or Dr Tham when the plaintiff was in the OT Recovery Room.

270 The defendant's anaesthetic expert, Prof Sia, explained that in addition to the anaesthetist, other hospital personnel are also empowered to discharge a patient back to the ward. [note: 513] In a private hospital such as Gleneagles Hospital, this person would be the OT Recovery Room nurse. [note: 514] Dr Sia's explanation was supported by the Recovery Room Nursing Record which contained the following instruction for the nurses:

> When reassessment score is not attained (9 and above), please inform the Attending Anaesthetist/Doctor for further instructions prior [to] patient's transfer to the ward. [note: 515]

By implication, this must mean that in the absence of any complication which causes the patient to be unable to attain a score of 9 and above, the OT Recovery Room nurses in Gleneagles Hospital can discharge a patient to the ward without further reference to the anaesthetist.

271 On the other hand, the plaintiff's anaesthetic expert, Prof Delilkan, insisted that the anaesthetist must personally see the patient and certify that the patient is fit to be discharged to the ward. [note: 516] This, of course, contradicts Prof Sia's position. With respect, given that Prof Delilkan had himself admitted that he was unfamiliar with the practice of anaesthesia in Singapore, [note: 517] I am inclined to accept the views of Prof Sia instead, which I find to be defensible in logic.

272 Since there is a responsible body of medical opinion that regards the defendant's conduct in this regard as proper, the defendant cannot be said to have breached his duty of care in his provision of post-surgical care. I should also mention, for completeness, that even if the defendant was in breach of his duty of care in this regard, the plaintiff has not shown how such a breach led to the injuries for which she is now claiming compensation. In fact, the plaintiff cannot show such causation as her entire case is built on the assertion that she suffered pain *immediately* after the LSCS and before any post-operative care would have been given.

Reviewing the plaintiff in the ward

273 The defendant's evidence was that he was not informed of any alleged complaint of pain in the plaintiff's neck and/or upper back throughout the course of the plaintiff's hospital stay. [note: 518] It will be recalled that the defendant was first notified of the plaintiff's alleged injuries by her husband *via* telephone on 29 October 2006, *after* the plaintiff was discharged from hospital (see [11] above). Dr Tham did not give any evidence to the contrary, while the various ward nurses who took the stand all denied receiving any such complaint in the first place. According to Prof Sia, it is not routine practice for an anaesthetist to pay ward visits to the patient if he was not informed of any reason to do so. [note: 519] Therefore, in the absence of any evidence that the defendant was apprised of the plaintiff's alleged complaints whilst in the ward, the defendant had not breached his duty of care in this regard. Even if the defendant was in breach of his duty of care, the plaintiff has again not shown how such a breach led to the injuries for which she is now claiming compensation.

The telephone call on 29 October 2006

274 The plaintiff argued that the defendant was under a duty to review the plaintiff after he had

the telephone conversation with her husband on 29 October 2006. The defendant denied this. On the evidence, the nature of the phone call was to find out from the defendant if anything had happened during the GA procedure. [note: 520] It was not made with the purpose of seeking a consultation or treatment. The defendant had fulfilled the purpose of the phone call by answering that nothing happened during the intubation process that could have resulted in the plaintiff's complaint. It also bears noting that Dr Tham did not ask the defendant to review the plaintiff together with him. The defendant accepted that he would be under a duty to do so if Dr Tham, as the primary physician, had asked him to review the patient. [note: 521] This view is largely in line with the views of Prof Sia, [note: 522] Dr Rauff [note: 523] and Dr Lai. [note: 524] Differing from the views of the other experts, Prof Delilkan stated that it would have been the "ethical duty" to review a patient who complains of pain. [note: 525]

275 Since there is a responsible body of medical opinion that regards the defendant's conduct as proper, I find that the defendant did not breach his duty of care to the plaintiff omitting to follow-up with the plaintiff after the telephone call on 29 October 2006. I accordingly also reject the plaintiff's submissions that the defendant's conduct is evidence of his guilt. [note: 526] Even if the defendant had breached his duty of care in this respect, the plaintiff has not shown how such a breach led to the injuries for which she is now claiming compensation. As pointed out by the defendant, there was little he could have done even if he had reviewed the plaintiff since his speciality is not relevant to the plaintiff's complaint. The appropriate person to review her would have been a neurologist or orthopaedic surgeon, and such a referral could have been made by Dr Tham as the primary physician who had the point of first contact with the plaintiff.

Decision: The plaintiff's claim for negligent post-operative care fails

276 In conclusion, since there is a responsible body of medical opinion that regards the defendant's post-operative care as proper, there is no basis to say that the defendant had breached his duty of care in the manner in which he provided post-operative care. Even if there was a breach of duty of care, the plaintiff has not shown how such a breach led to the injuries for which she is now claiming compensation.

X. CONCLUSION

277 For the reasons given above, I dismiss the plaintiff's entire claim with costs.

[note: 1] 2 DBA.206 (Defendant's Bundle of AEIC, vol 2).

[note: 2] 1 DBA, Tab 1, p 13 at [44].

[note: 3] 1 DBA, Tab 1, p 13 at [44].

[note: 4] 1 PBA.242 (Plaintiff's Bundle of AEIC, vol 1).

[note: 5] 1 PBA.242.

[note: 6] 1 PBA.242-243.

[note: 7] CT: 4 Aug 2011, pp 134-136 (Certified Transcript).

[note: 8] *Ibid.*

[note: 9] 1 PBA.161.

[note: 10] 1 PBA.243.

[note: 11] 1 PBA.18 at [73].

[note: 12] 1 PBA.285-290.

[note: 13] 2 PBA.717 at [22].

[note: 14] 1 PBA.165.

[note: 15] CT: 5 Aug 2011, pp 19-22.

[note: 16] 1 PBA.166.

[note: 17] CT: 5 Aug 2011, pp 28-30.

[note: 18] 1 PBA.163-164.

[note: 19] 1 PBA.243.

[note: 20] 1 PBA.23 at [88]-[89].

[note: 21] 2 PBA.718 at [24].

[note: 22] 1 PBA.291-311.

[note: 23] 1 PBA.311.

[note: 24] CT: 12 Aug 2011, pp 104-108.

[note: 25] 1 PBA.24 at [93].

[note: 26] 1 PBA.24 at [93].

[note: 27] 1 PBA.24 at [94].

[note: 28] 1 PBA.172.

[note: 29] 1 PBA.173-174.

[note: 30] 4 PBA.1155 at [9].

[note: 31] 4 PBA.1158 at [18].

[note: 32] 4 PBA.1193.

[note: 33] 4 PBA.1193.

[note: 34] 4 PBA.1193.

[note: 35] 4 PBA.1194-1196.

[note: 36] 4 PBA.1194-1195.

[note: 37] 4 PBA.1157 at [12].

[note: 38] 4 PBA.1196.

[note: 39] 4 PBA.1157 at [13].

[note: 40] 4 PBA.1197-1198.

[note: 41] 4 PBA.1158 at [16].

[note: 42] 4 PBA.1159 at [19]; 4 PBA.1191.

[note: 43] 4 PBA.1159 at [19]; 4 PBA.1191.

[note: 44] 1 PBA.26 at [100].

[note: 45] 1 PBA.26 at [100].

[note: 46] 1 PBA.35 at [126].

[note: 47] 1 PBA.312-327.

[note: 48] CT: 12 Aug 2011, pp 102-108.

[note: 49] 1 PBA.26 at [101].

[note: 50] 1 PBA.26 at [101].

[note: 51] 2 PBA.719 at [27].

[note: 52] 2 PBA.719 at [27].

[note: 53] 2 PBA.720 at [28].

[note: 54] 1 PBA.27 at [103].

[note: 55] 1 PBA.27 at [103].

[note: 56] 1 PBA.27 at [103]; 2PBA.720 at [28].

[note: 57] 1 PBA.27 at [104].

[note: 58] 1 PBA.27 at [104].

[note: 59] 1 PBA.268.

[note: 60] 1 PBA.28 at [105].

[note: 61] 1 PBA.28 at [105].

[note: 62] 1 PBA.28 at [1066].

[note: 63] 1 PBA.183.

[note: 64] 1 PBA.183.

[note: 65] 1 PBA.183.

[note: 66] 1 PBA.29 at [107].

[note: 67] 1 PBA.223-224.

[note: 68] 1 PBA.223-224.

[note: 69] 1 PBA.223-224.

[note: 70] 1 PBA.223-224.

[note: 71] 4 PBA.1205 at [9].

[note: 72] 4 PBA.1205 at [10].

[note: 73] 4 PBA.1205 at [11].

[note: 74] 1 PBA.37 at [134].

[note: 75] 1 PBA.37 at [135].

[note: 76] 1 PBA.37 at [135].

[note: 77] 1 PBA.225-228; 1 PBA.229-241.

[note: 78] 1 PBA.29 at [108].

[note: 79] 1 PBA.243-245.

[note: 80] 1 PBA.244.

[note: 81] *Ibid.*

[note: 82] 1 PBA.244-245.

[note: 83] 1 PBA.245.

[note: 84] 4 PBA.312-327.

[note: 85] CT: 12 Aug 2011; pp 102-108.

[note: 86] 1 PBA.29 at [109].

[note: 87] 1 PBA.30 at [110].

[note: 88] 1 PBA.30 at [110].

[note: 89] 1 PBA.268.

[note: 90] 1 PBA.196.

[note: 91] 1 PBA.196.

[note: 92] 1 PBA.196.

[note: 93] 1 PBA.30 at [112].

[note: 94] 1 PBA.30 at [113].

[note: 95] 1 PBA.31 at [114].

[note: 96] 1 PBA.212.

[note: 97] 1 PBA.32 at [116].

[note: 98] 1 PBA.32 at [117].

[note: 99] 2 PBA.721 at [34].

[note: 100] 2 PBA.721 at [34].

[note: 101] 2 PBA.721 at [34].

[note: 102] 1 PBA.32 at [118].

[note: 103] 1 PBA.269-270.

[note: 104] 1 PBA.269-270.

[note: 105] 1 PBA.269-270.

[note: 106] 1 PBA.33 at [119].

[note: 107] 2 PBA.722 at [37].

[note: 108] 1 PBA.33 at [120].

[note: 109] 4 PBA.312-327.

[note: 110] 1 PBA.39 at [138].

[note: 111] 1 PBA.41-42 at [140]-[143].

[note: 112] 1 PBA.42-46 at [144]-[158].

[note: 113] 1 PBA.46-49 at [159]-[166].

[note: 114] 1 PBA.54 at [177].

[note: 115] Exhibit P4.

[note: 116] Plaintiff's Closing Subs, pp 198-200 at [485]-[495].

[note: 117] Plaintiff's Closing Subs, pp 200-204 at [485]-[495].

[note: 118] 1 DBA.9 at [30]-[34].

[note: 119] 1 DBA.9 at [30]-[34].

[note: 120] CT: 31 Jan 2012, p 20.

[note: 121] 1 PBA.99-102.

[note: 122] 1 PBA.99.

[note: 123] CT: 31 Jan 2012, pp 80-81.

[note: 124] Plaintiff's Closing Subs, pp 122-123 at [273].

[note: 125] CT: 31 Jan 2012, pp 79-80.

[note: 126] 1 PBA.99.

[note: 127] Plaintiff's Closing Subs, p 124 at [277].

[note: 128] CT: 31 Jan 2012, pp 78-79.

[note: 129] *Ibid.*

[note: 130] Plaintiff's Closing Subs, p 125 at [279].

[note: 131] 1 PBA.88.

[note: 132] CT: 9 Feb 2012, p 18.

[note: 133] CT: 9 Feb 2012, p 79.

[note: 134] CT: 9 Feb 2012, p 18.

[note: 135] 1 PBA.88.

[note: 136] CT: 4 Aug 2012, p 165.

[note: 137] CT: 9 Feb 2012, pp 77-78.

[note: 138] 1 PBA.9.

[note: 139] 1 PBA.97.

[note: 140] *Ibid.*

[note: 141] 1 PBA.127.

[note: 142] CT: 15 Feb 2012, pp 97-101.

[note: 143] 1 PBA.98.

[note: 144] CT: 9 Feb 2012, p 82.

[note: 145] 1 PBA.89.

[note: 146] CT: 9 Feb 2012, p 132.

[note: 147] CT: 9 Feb 2012, pp 29-33.

[note: 148] CT: 15 Feb 2012, pp 171-173.

[note: 149] *Ibid.*

[note: 150] CT: 1 Feb 2012, pp 16-18.

[note: 151] CT: 1 Feb 2012, pp 13-27.

[note: 152] CT: 1 Feb 2012, pp 21-28.

[note: 153] CT: 1 Feb 2012, pp 30-31.

[note: 154] *Ibid.*

[note: 155] CT: 1 Feb 2012, pp 12-13.

[note: 156] 2 DBA.206.

[note: 157] 1 DBA.8-9 at [35].

[note: 158] CT: 1 Feb 2012, pp 45-46.

[note: 159] CT: 1 Feb 2012, pp 45-46.

[note: 160] CT: 1 Feb 2012, pp 45-46.

[note: 161] CT: 1 Feb 2012, pp 45-46.

[note: 162] CT: 4 Aug 2011, pp 66-67.

[note: 163] CT: 4 Aug 2011, pp 66-67.

[note: 164] Plaintiff's Closing Subs, pp 106-112.

[note: 165] 1 DBA.7 at [25].

[note: 166] CT: 31 Jan 2012, p 99.

[note: 167] PML, Tab 20 at p 6 (Plaintiff's Bundle of Medical Literature).

[note: 168] CT: 13 Feb 2012, pp 55-56.

[note: 169] CT: 31 Jan 2012, p 97.

[note: 170] CT: 31 Jan 2012, p 99.

[note: 171] CT: 31 Jan 2012, pp 107-108.

[note: 172] *Ibid.*

[note: 173] CT: 13 Feb 2012, pp 35-36.

[note: 174] *Ibid.*

[note: 175] CT: 16 Feb 2012, p 106.

[note: 176] PML, Tab 20 at p 7.

[note: 177] CT: 31 Jan 2012, pp 128-129.

[note: 178] CT: 31 Jan 2012, pp 128-129.

[note: 179] CT: 31 Jan 2012, pp 128-129.

[note: 180] CT: 31 Jan 2012, pp 128-129.

[note: 181] CT: 31 Jan 2012, p 134.

[note: 182] CT: 31 Jan 2012, p 130.

[note: 183] CT: 13 Feb 2012, p 40.

[note: 184] CT: 13 Feb 2012, p 39.

[note: 185] CT: 13 Feb 2012, p 48.

[note: 186] CT: 13 Feb 2012, p 49.

[note: 187] *Ibid.*

[note: 188] CT: 28 Jul 2011, pp 37-38.

[note: 189] 1 PBA.4 at [17].

[note: 190] CT: 17 Aug 2011, pp 71-73.

[note: 191] CT: 17 Aug 2011, p 72.

[note: 192] 1 DBA, Tab 2, p 3 at [11].

[note: 193] CT: 4 Aug 2011, p 179.

[note: 194] CT: 4 Aug 2011, pp 40-41, p 69.

[note: 195] CT: 28 Jul 2011, p 35, lines 18-21; p 36, lines 5-8; p 40, lines 9-14.

[note: 196] CT: 28 Jul 2011, p 35, lines 8-10; p 42, lines 17 to p 44 line 19.

[note: 197] CT: 17 Aug 2011, pp 5-25.

[note: 198] 1 PBA.7 at [29].

[note: 199] CT: 16 Feb 2012, pp 10-11.

[note: 200] CT: 4 Aug 2011, p 181.

[note: 201] CT: 17 Aug 2011, pp 24-25.

[note: 202] CT: 28 Jul 2011, p 52.

[note: 203] 1 PBA.4 at [17].

[note: 204] CT: 16 Aug 2011, pp 76-77.

[note: 205] CT: 16 Aug 2011, pp 82-83.

[note: 206] 1 DBA, Tab 1, p 4 at [13].

[note: 207] 3 PBA, Tab 5, p 1022 at [12].

[note: 208] 1 PBA.79.

[note: 209] 1 PBA.9 at [36].

[note: 210] CT: 28 Jul 2011, pp 66-67.

[note: 211] 1 PBA.73.

[note: 212] 1 PBA.88.

[note: 213] 1 PBA.79.

[note: 214] CT: 4 Aug 2011, pp 54-56.

[note: 215] CT: 15 Feb 2012, pp 57-61.

[note: 216] CT: 13 Feb 2012, pp 94-100.

[note: 217] CT: 20 Feb 2012, p 9.

[note: 218] 1 DBA, Tab 1, pp 62-68.

[note: 219] 1 DBA, Tab 1, pp 62-68.

[note: 220] 4 PBA.1242 at [11].

[note: 221] CT: 14 Feb 2012, p 16.

[note: 222] CT: 14 Feb 2012, p 16.

[note: 223] CT: 14 Feb 2012, p 16.

[note: 224] 1 DBA, Tab 5, pp 16-21.

[note: 225] 1 DBA, Tab 5, p 19.

[note: 226] CT: 14 Feb 2012, pp 6-12.

[note: 227] CT: 15 Feb 2012, pp 189-190.

[note: 228] CT: 15 Feb 2012, pp 189-190.

[note: 229] CT: 15 Feb 2012, p 187.

[note: 230] CT: 15 Feb 2012, pp 188-189.

[note: 231] CT: 15 Feb 2012, pp 189-190.

[note: 232] CT: 15 Feb 2012, pp 190-191.

[note: 233] 1 PBA.606A.

[note: 234] CT: 15 Feb 2012, p 191.

[note: 235] CT: 15 Feb 2012, p 193.

[note: 236] CT: 15 Feb 2012, p 194.

[note: 237] CT: 13 Feb 2012, p 94.

[note: 238] Exhibit P43.

[note: 239] Exhibit P44.

[note: 240] CT: 13 Mar 2012, p 22.

[note: 241] CT: 13 Mar 2012, p 22.

[note: 242] CT: 13 Mar 2012, p 23.

[note: 243] CT: 13 Mar 2012, p 13.

[note: 244] CT: 13 Mar 2012, p 13.

[note: 245] CT: 13 Mar 2012, p 22.

[note: 246] CT: 13 Mar 2012, p 22.

[note: 247] CT: 13 Mar 2012, p 15.

[note: 248] CT: 13 Mar 2012, p 17.

[note: 249] CT: 13 Mar 2012, p 18.

[note: 250] CT: 13 Mar 2012, pp 18-19.

[note: 251] CT: 13 Mar 2012, pp 49-50.

[note: 252] *Ibid.*

[note: 253] *Ibid.*

[note: 254] CT: 13 Mar 2012, pp 51-52.

[note: 255] CT: 13 Mar 2012 at pp 52-53.

[note: 256] CT: 13 Mar 2012, p 53.

[note: 257] Plaintiff's Closing Subs, p 33 at [73].

[note: 258] CT: 15 Feb 2012, pp 57-61.

[note: 259] CT: 20 Feb 2012, p 82.

[note: 260] PML, Tab 9.

[note: 261] PML, Tab 9.

[note: 262] CT: 20 Feb 2012, pp 74-75.

[note: 263] CT: 20 Feb 2012, pp 75-76.

[note: 264] *Ibid.*

[note: 265] PML, Tab 10.

[note: 266] CT: 20 Feb 2012, p 77.

[note: 267] CT: 21 Feb 2012, p 43.

[note: 268] PML, Tab 11.

[note: 269] CT: 15 Feb 2012, p 23.

[note: 270] CT: 15 Feb 2012, pp 19-20.

[note: 271] Exhibit P45.

[note: 272] CT: 13 Mar 2012, p 73.

[note: 273] CT: 13 Mar 2012, pp 73-79.

[note: 274] Exhibit P45 at p 865.

[note: 275] Exhibit P46.

[note: 276] CT: 13 Mar 2012, p 90.

[note: 277] Exhibit P46 at p 232.

[note: 278] Exhibit P46 at p 230.

[note: 279] Exhibit P46 at p 230.

[note: 280] CT: 13 Mar 2012, p 96.

[note: 281] Exhibit P46 at p 230.

[note: 282] Exhibit P47.

[note: 283] Exhibit P47 at p 785 at Table 3.

[note: 284] Exhibit P47 at p 792.

[note: 285] Exhibit P47 at p 793.

[note: 286] CT: 4 Aug 2011, pp 16-17.

[note: 287] CT: 4 Aug 2011, pp 16-17.

[note: 288] CT: 4 Aug 2011, pp 16-17.

[note: 289] CT: 4 Aug 2011, pp 16-17.

[note: 290] CT: 31 Jan 2012, pp 111-112.

[note: 291] CT: 31 Jan 2012, pp 111-112.

[note: 292] CT: 31 Jan 2012, pp 111-112.

[note: 293] CT: 16 Feb 2012, pp 106-107.

[note: 294] CT: 16 Feb 2012, pp 98-99.

[note: 295] CT: 16 Feb 2012, pp 111-112.

[note: 296] CT: 16 Feb 2012, p 96.

[note: 297] CT: 16 Feb 2012, pp 101-102.

[note: 298] CT: 16 Feb 2012, p 101.

[note: 299] CT: 16 Feb 2012, p 102.

[note: 300] CT: 16 Feb 2012, pp 103-104.

[note: 301] CT: 4 Aug 2011, pp 19-21.

[note: 302] CT: 4 Aug 2011, pp 18-19.

[note: 303] CT: 4 Aug 2011, p 20.

[note: 304] CT: 4 Aug 2011, pp 20-21.

[note: 305] CT: 16 Feb 2012, p 85-86.

[note: 306] CT: 16 Feb 2012, p 87.

[note: 307] CT: 4 Aug 2011, pp 19-21.

[note: 308] CT: 4 Aug 2011, pp 23-27.

[note: 309] CT: 4 Aug 2011, pp 23-24.

[note: 310] CT: 4 Aug 2011, p 27.

[note: 311] CT: 13 Feb 2012, pp 75-79, p 90.

[note: 312] CT: 14 Feb 2012, pp 42-43.

[note: 313] CT: 13 Feb 2012, p 90.

[note: 314] CT: 13 Feb 2012, pp 122-123.

[note: 315] CT: 13 Feb 2012, pp 125-126.

[note: 316] CT: 13 Feb 2012, pp 125-126.

[note: 317] CT: 13 Feb 2012, p 156.

[note: 318] CT: 13 Feb 2012, p 149.

[note: 319] CT: 13 Feb 2012, pp 130-140.

[note: 320] CT: 28 Jul 2011, p 51.

[note: 321] CT: 9 Feb 2012, pp 47-60.

[note: 322] 1 PBA.97.

[note: 323] Plaintiff's Closing Subs, p 143 at [337]; CT: 15 Feb 2012, pp 103-104.

[note: 324] CT: 31 Jan 2012, pp 48-49.

[note: 325] CT: 31 Jan 2012, p 57.

[note: 326] CT: 31 Jan 2012, p 64.

[note: 327] CT: 15 Feb 2012, p 115.

[note: 328] CT: 15 Feb 2012, pp 66-67.

[note: 329] CT: 15 Feb 2012, p 68.

[note: 330] CT: 15 Feb 2012, p 63.

[note: 331] CT: 31 Jan 2012 at p 57.

[note: 332] CT: 1 Feb 2012, p 107.

[note: 333] *Ibid.*

[note: 334] CT: 15 Feb 2012, p 68.

[note: 335] CT: 1 Feb 2012, p 107; 15 Feb 2012, p 120.

[note: 336] CT: 31 Jan 2012, p 69.

[note: 337] CT: 31 Jan 2012, p 65.

[note: 338] CT: 31 Jan 2012, p 57.

[note: 339] CT: 31 Jan 2012, pp 70-71.

[note: 340] CT: 31 Jan 2012 at p 59.

[note: 341] PML, Tab 17, p 454.

[note: 342] CT: 31 Jan 2012, p 68.

[note: 343] CT: 15 Feb 2012, p 66.

[note: 344] CT: 15 Feb 2012, p 96.

[note: 345] CT: 31 Jan 2012, p 67.

[note: 346] CT: 15 Feb 2012, p 96.

[note: 347] CT: 15 Feb 2012, p 103.

[note: 348] CT: 15 Feb 2012, pp 103-104.

[note: 349] CT: 15 Feb 2012, pp 120-121.

[note: 350] CT: 15 Feb 2012, p 121.

[note: 351] CT: 15 Feb 2012, p 120.

[note: 352] 1 PBA.97.

[note: 353] CT: 31 Jan 2012, p 60.

[note: 354] CT: 2 Feb 2012, p 109.

[note: 355] CT: 9 Feb 2012, pp 43-44.

[note: 356] CT: 9 Feb 2012, p 130.

[note: 357] CT: 31 Jan 2012, p 61.

[note: 358] *Ibid.*

[note: 359] CT: 15 Feb 2012, pp 67-68.

[note: 360] 1 PBA.127.

[note: 361] CT: 4 Aug 2011, p 164.

[note: 362] CT: 30 Jan 2012, p 6.

[note: 363] CT: 30 Jan 2012, p 7.

[note: 364] CT: 15 Feb 2012, p 98.

[note: 365] CT: 15 Feb 2012, pp 96-100.

[note: 366] CT: 15 Feb 2012, p 138.

[note: 367] *Ibid.*

[note: 368] CT: 15 Feb 2012, pp 100-101.

[note: 369] CT: 15 Feb 2012, pp 141-142.

[note: 370] CT: 15 Feb 2012, p 135.

[note: 371] CT: 4 Aug 2011, p 54.

[note: 372] 1 PBA.102.

[note: 373] CT: 1 Feb 2012, pp 123-124.

[note: 374] CT: 1 Feb 2012, pp 123-124.

[note: 375] CT: 1 Feb 2012, pp 123-124.

[note: 376] 1 PBA.107.

[note: 377] 5 PBA, Tab 23, p 1419 at [34].

[note: 378] CT: 15 Feb 2012, pp 150-58.

[note: 379] CT: 2 Feb 2012, pp 2-3.

[note: 380] CT: 2 Feb 2012, pp 97-98.

[note: 381] CT: 14 Feb 2012, pp 69-70.

[note: 382] CT: 14 Feb 2012, pp 71-72.

[note: 383] CT: 14 Feb 2012, p 71.

[note: 384] CT: 14 Feb 2012, p 71.

[note: 385] CT: 14 Feb 2012, p 72.

[note: 386] CT: 2 Feb 2012, pp 117-118.

[note: 387] 1 DBA, Tab 5, p 9 at [vii].

[note: 388] 1 DBA.12 at [38(h)].

[note: 389] CT: 30 Jan 2012, p 132.

[note: 390] CT: 14 Feb 2012, pp 126-127.

[note: 391] 5 PBA.1702 at [11].

[note: 392] 5 PBA.1703 at [15].

[note: 393] 5 PBA.1703 at [15].

[note: 394] CT: 3 Aug 2011, p 40.

[note: 395] CT: 3 Aug 2011, p 40.

[note: 396] CT: 3 Aug 2011, p 128.

[note: 397] CT: 3 Aug 2011, p 150.

[note: 398] CT: 3 Aug 2011, p 153.

[note: 399] CT: 3 Aug 2011, p 153.

[note: 400] 1 DBA, Tab 5, p 22.

[note: 401] CT: 3 Aug 2011, p 159.

[note: 402] *Ibid.*

[note: 403] CT: 21 Feb 2012, p 126.

[note: 404] CT: 21 Feb 2012, p 129.

[note: 405] Orthopaedics' Joint Statement, Issue 6.

[note: 406] CT: 21 Feb 2012, p 125.

[note: 407] CT: 21 Feb 2012, p 125.

[note: 408] CT: 20 Feb 2012, pp 157-158.

[note: 409] CT: 20 Feb 2012, p 159.

[note: 410] Exhibit D16.

[note: 411] CT: 20 Feb 2012, p 159.

[note: 412] CT: 20 Feb 2012, pp 159-160.

[note: 413] CT: 20 Feb 2012, pp 159-160.

[note: 414] CT: 20 Feb 2012, p 160.

[note: 415] CT: 20 Feb 2012, p 161.

[note: 416] CT: 20 Feb 2012, p 161.

[note: 417] CT: 20 Feb 2012, p 161.

[note: 418] CT: 20 Feb 2012, p 161.

[note: 419] CT: 20 Feb 2012, p 162.

[note: 420] CT: 20 Feb 2012, p 162.

[note: 421] CT: 20 Feb 2012, p 159.

[note: 422] CT: 20 Feb 2012, p 163.

[note: 423] CT: 20 Feb 2012, p 163.

[note: 424] CT: 20 Feb 2012, p 163.

[note: 425] CT: 20 Feb 2012, p 164.

[note: 426] CT: 20 Feb 2012, p 164.

[note: 427] CT: 21 Feb 2012, p 118.

[note: 428] CT: 21 Feb 2012, p 121.

[note: 429] CT: 21 Feb 2012, p 122.

[note: 430] CT: 21 Feb 2012, p 118.

[note: 431] CT: 21 Feb 2012, pp 27-28.

[note: 432] CT: 21 Feb 2012, p 34.

[note: 433] CT: 21 Feb 2012, p 34.

[note: 434] CT: 21 Feb 2012, p 36.

[note: 435] CT: 21 Feb 2012, p 36.

[note: 436] CT: 21 Feb 2012, p 36.

[note: 437] CT: 21 Feb 2012, p 36.

[note: 438] CT: 21 Feb 2012, p 45.

[note: 439] CT: 21 Feb 2012, p 45.

[note: 440] CT: 21 Feb 2012, p 48.

[note: 441] CT: 21 Feb 2012, p 48.

[note: 442] CT: 21 Feb 2012, p 48.

[note: 443] Orthopaedics' Joint Statement, Issue 8.

[note: 444] CT: 21 Feb 2012, p 113.

[note: 445] CT: 21 Feb 2012, p 114.

[note: 446] CT: 21 Feb 2012, pp 21-22.

[note: 447] CT: 21 Feb 2012, pp 21-22.

[note: 448] CT: 21 Feb 2012, pp 48-51.

[note: 449] CT: 22 Feb 2012, pp 78-85.

[note: 450] CT: 22 Feb 2012, pp 78-85.

[note: 451] CT: 22 Feb 2012, pp 70-73.

[note: 452] CT: 22 Feb 2012, pp 74-75.

[note: 453] CT: 22 Feb 2012, pp 75-78.

[note: 454] CT: 13 Mar 2012, p 78.

[note: 455] CT: 10 Aug 2011, pp 87-90.

[note: 456] CT: 20 Feb 2012, pp 64-65.

[note: 457] CT: 10 Aug 2011, pp 83-84.

[note: 458] CT: 3 Aug 2011, pp 57-59.

[note: 459] CT: 3 Aug 2011, pp 123-124.

[note: 460] CT: 3 Aug 2011, pp 123-124.

[note: 461] CT: 4 Aug 2011, p 149.

[note: 462] BP.66 at [10(i)] (Bundle of Pleadings, Reply).

[note: 463] CT: 28 Jul 2011, pp 88-89; 15 Aug 2011, p 17.

[note: 464] 1 PBA.10 at [42].

[note: 465] CT: 1 Aug 2011, p 11.

[note: 466] CT: 15 Aug 2011, pp 3-5.

[note: 467] CT: 15 Aug 2011, pp 3-5.

[note: 468] 1 PBA.94.

[note: 469] 1 PBA.104.

[note: 470] CT: 3 Feb 2012, pp 54-55.

[note: 471] 1 PBA.93.

[note: 472] CT: 3 Feb 2012, pp 63-64.

[note: 473] CT: 20 Feb 2012, p 66.

[note: 474] 1 PBA.92.

[note: 475] 1 PBA.11 at [44].

[note: 476] 1 PBA.11 at [45].

[note: 477] 1 PBA.11 at [46].

[note: 478] 1 PBA.11 at [48].

[note: 479] 1 PBA.11 at [51].

[note: 480] CT: 1 Aug 2011, pp 96-99.

[note: 481] 1 PBA.75; CT: 1 Aug 2011, pp 100-101.

[note: 482] 1 PBA.74.

[note: 483] 1 PBA.12 at [48].

[note: 484] 1 PBA.12 at [49].

[note: 485] CT: 15 Aug 2011, pp 7-8, p 14.

[note: 486] *Ibid.*

[note: 487] *Ibid.*

[note: 488] CT: 1 Aug 2011, p 57.

[note: 489] 1 PBA.13 at [52].

[note: 490] 3 PBA, Tab 5, p 1026 at [28].

[note: 491] 3 PBA, Tab 5, p 1027 at [29].

[note: 492] 1 PBA.84-85.

[note: 493] CT: 3 Feb 2012, pp 121-127.

[note: 494] 1 PBA.134.

[note: 495] CT: 3 Feb 2012, p 152.

[note: 496] 1 PBA.12 at [50].

[note: 497] 1 PBA.76.

[note: 498] CT: 20 Feb 2012, pp 64-65.

[note: 499] CT: 10 Aug 2011, pp 83-84.

[note: 500] 1 PBA.100.

[note: 501] CT: 2 Feb 2012, pp 20-30.

[note: 502] 1 PBA.109.

[note: 503] Exhibit D18.

[note: 504] 1 PBA.93.

[note: 505] CT: 2 Feb 2012, pp 89-90.

[note: 506] 1 PBA.100.

[note: 507] 1 DBA, Tab 1, p 13 at [46].

[note: 508] CT: 3 Feb 2012, pp 88-89.

[note: 509] CT: 3 Feb 2012, p 92.

[note: 510] *Ibid.*

[note: 511] 1 PBA.94.

[note: 512] 1 PBA.93.

[note: 513] CT: 15 Feb 2012, pp 165-167.

[note: 514] *Ibid.*

[note: 515] 1 PBA.95.

[note: 516] CT: 15 Feb 2012, p 163.

[note: 517] CT: 13 Feb 2012, pp 88-89.

[note: 518] BP.51-52 at [12].

[note: 519] CT: 15 Feb 2012, p 169.

[note: 520] 3 PBA, Tab 3, p 762 at [47].

[note: 521] CT: 2 Feb 2012, pp 52-53.

[note: 522] CT: 15 Feb 2012, pp 179-183.

[note: 523] CT: 16 Feb 2012, pp 114-119.

[note: 524] *Ibid.*

[note: 525] CT: 15 Feb 2012, pp 183-184.

[note: 526] Plaintiff's Closing Subs, pp 156-158 at [371]-[374].