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ORIGINAL ARTICLE

Chronic pain after open inguinal hernia repair: a longitudinal self-assessment study

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Abstract
Introduction The aim of the present study was to assess the variation of self-reported pain over a period of 2 years in three groups of patients with no, moderate and severe pain at 3 months after primary open inguinal hernia repair.
Methods In two cohorts of patients from 2004 ($n = 272$) and 2005 ($n = 292$) who had given a self-report of postoperative pain at 3 months, 79 randomly selected patients without pain (box visual analogue scale [VAS] level 10) and all patients with moderate (Box VAS level 7–9) and severe pain (Box VAS level 1–6), 91 and 9, respectively, were included in the case series. The self-assessments were repeated for all patients 1–1.5 and 2–2.5 years after surgery (November 2006).
Results It was observed that moderate pain reappeared among the pain-free patients in 28 and 23% after 1–1.5 and 2–2.5 years, respectively. Of those patients with moderate pain at 3 months, 39 and 49% reported 'no pain' at 1–1.5 and 2–2.5 years, respectively, after surgery. A worsening from moderate pain to severe pain was reported by 22% of patients after 1–1.5 years and by 15% of patients after 2–2.5 years. Hernia recurrence ($n = 3$) was observed only in patients with increased pain. All nine patients with severe pain at 3 months reported less pain, but only one was pain-free at 2–2.5 years after surgery.
Conclusion The study shows that a significant proportion of the patients developed pain later than 3 months after the operation. It further points to a difference in pain evolvement in patients with moderate pain and those with severe postoperative pain at 3 months. Pain can increase in intensity from moderate to severe, both with and without the presence of a clinical recurrence.

Keywords Inguinal hernia · Surgery · Postoperative pain · Open herniorraphy

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Introduction

Pain of varying intensity is present in the groin after inguinal hernia repair for differing lengths of time [1–6]. Currently, pain lasting longer than 3 months is referred to as 'chronic' [7]. By 3 months after surgery, it can be assumed that most nociceptive pain signals from normal wound healing have subsided. Consequently, pain lasting longer than 3 months may indicate a pathological prolongation of the nociceptive pain reaction or neuropathic influences [8].

Although most of the patients who have undergone hernia repair are pain-free within 3 months after surgery, a significant proportion has discomfort or more pronounced pain several years after their hernia operation. The wide variation of reported frequencies of discomfort and pain, which range from zero to more than 50%, reflect different intervals after surgery at which measurements are made and differing methods of assessment [1, 9]. It is not known to what extent this variation in reported pain frequencies can be attributed to the a mix of a prolonged tapering of initial postoperative pain and reappearing groin pain after an

initial pain-free postoperative period. It is, further, not known if moderate and severe pain follows the same clinical course. The present paper describes the change of postoperative outcome during the first 2.5 years after surgery, focussing on patients who have no pain, moderate pain and severe pain at 3 months after surgery.

Materials and methods

Surgery was performed on a day-care basis under general intravenous anaesthesia and assisted ventilation. One surgeon performed approximately 80% of the operations. All patients were given the same pre-, peri- and postoperative oral and written information and pre-medication before the operation. Local anaesthetics were administered during surgery and a standardised postoperative pain relief (paracetamol [acetaminophen] and dexibuprofen) was recommended, if needed.

Two cohorts of patients were assessed: those undergoing primary hernia repair during March–October 2004 (2004 cohort) and those undergoing primary hernia repair during the same months in 2005 (2005 cohort). Patients rated the degree of groin pain they experienced using a box visual analogue scale (VAS), in which box 1 represents the worst pain imaginable and box 10 indicates no pain. The same VAS instrument was used for all patient assessments, both before and after the operation.

In each cohort, patients were split into three groups according to the level of pain they reported 3 months after surgery: those with no pain (Group A), those with moderate pain (Group B) and those with severe pain (Group C). 'No pain' was defined by a VAS score of 10; moderate pain was defined as a VAS score of 7–9; severe pain was defined as a VAS score of 1–6.

In November 2006 (i.e. 12–18 months after surgery for patients in the 2005 cohort and 24–32 months after surgery for patients in the 2004 cohort), patients in Group B (moderate pain) were sent a follow-up questionnaire and asked to report the degree of pain using the same box VAS scale. The same questionnaire was sent to 79 patients in Group A (no pain). These patients were randomly selected; 40 patients from the 2004 cohort and 39 from the 2005 cohort. Patients in Group C (severe pain) also received the follow-up questionnaire.

Results

Patients

A total of 564 patients undergoing primary hernia repair during 2004 and 2005 were included in the study. Of these, 272 were in the 2004 cohort and 292 were in the 2005 cohort. The cohorts were almost identical with respect to gender, bilateral hernias, type of hernia repair and preoperative pain assessment (Table 1).

Table 1 Patient characteristics before surgery

Characteristic	Cohort	
	2004	2005
Male, % patients	96	95
Female, % patients	4	5
Number of patients with bilateral hernia	6	7
Surgery technique used, % patients		
Mesh	74	76
Plug	12	12
Marcy	14	12
Mean age, years	62.5	64.1
Box visual analogue scale (VAS) score, % patients		
10 (no pain)	4	2
7, 8, 9	26	22
4, 5, 6	39	46
1, 2, 3 (severe pain)	31	30

Of the total number of patients included in the study ($n = 564$), 464 (82%) were free of pain at 3 months (Group A). Group B (moderate pain) comprised 42/272 (15%) patients from the 2004 cohort and 49/292 (17%) patients from the 2005 cohort. Across both cohorts ($n = 564$), a total of nine (1.6%) patients reported severe pain (Group C).

Due to the small number of patients with severe pain, Group C from the two cohorts were combined and treated as a single group for analysis.

A total of 179 follow-up questionnaires were issued in November 2007. The response rates in Group A were 31/39 (79%) and 39/40 (98%) for the 2004 and 2005 cohorts, respectively. In Group B, the questionnaire was completed by 39/42 (93%) and 41/49 (84%) patients in the 2004 and 2005 cohorts, respectively. All nine patients with severe pain returned their questionnaire.

Group A: patients with no pain at 3 months

Of the patients from Group A (no pain 3 months after surgery) who completed a follow-up questionnaire ($n = 71$), a recurrence of pain with a box VAS rating of 7–9 was reported by 11/39 (28%) patients in the 2005 cohort (1–1.5 years after surgery) and 7/31 (23%) patients in the 2004 cohort (2–2.5 years after surgery). No patients reported severe pain (box VAS score 1–6).

Group B: patients with moderate pain at 3 months

A follow-up questionnaire was completed by 80 patients in Group B (moderate pain 3 months after surgery). Of these

patients, 16/41 (39%) in the 2005 cohort (1–1.5 years after surgery) and 19/39 (49%) in the 2004 cohort (2–2.5 years after surgery) reported that they were free from discomfort. The total number of patients that reported either any degree of improvement in their pain or were completely without discomfort was 20/41 (49%) in the 2005 cohort and 27/39 (69%) in the 2004 cohort.

A worsening of pain to a box VAS score of 1–6 was reported by 9/41 (22%) patients in the 2005 cohort and 6/39 (15%) patients in the 2004 cohort. A clinically significant recurrence was found in three of the 15 patients who experienced an increase in pain from the level at 3 months.

Group C: patients with severe pain at 3 months

All nine patients in Group C returned their questionnaires and all reported an improvement in their pain, irrespective of level on the scale at 3 months post-surgery. However, only one patient was without pain at the end of the study period and one patient still reported severe pain (level 6).

Discussion

This single-centre observational study shows the variation of self-assessed postoperative pain during the first 32 months after open inguinal hernia repair. The homogeneity of the patient populations in the two cohorts (2004 and 2005) allows the change in self-reported pain over time to be compared across the two cohorts. A study of pain over a prolonged period of time after open inguinal hernia surgery is of importance, since it is not known how self-assessed pain will vary in patients with different intensities of postoperative pain. Three groups of patients with arbitrarily chosen levels of pain, as defined by VAS self-registration, were analysed at three periods after surgery, namely, at 3 months (when postoperative pain, by definition, is becoming chronic), at 12–18 months (‘1 year’) and at 24–32 months (‘2 years’) after the operation. This has a clinical relevance, since ‘chronic pain’ may indicate a continuation of pain problems for a non-defined extension of time which encounters neither a retarded disappearance or reappearance of postoperative pain. It is also of importance to study how pain at 3 months develops in order to form a basis for information on individual patients and postoperative follow-up.

The study design makes it possible to analyse two time periods after surgery and focus on the relatively small number of patients who reported postoperative pain 3 months after surgery. Furthermore, the large number of operations was performed in the same clinic using identical procedures for pre-, peri- and postoperative routines. In addition, 80% of the operations were performed by one surgeon, further ensuring consistency in the surgical procedure and limiting the risk of differences in reported pain arising as a consequence of surgical technique.

Three different methods for hernia repair were used since the patients were selected by time of operation rather than by the precise type of surgery which they required. The study design did not allow for the effect of the different methods of herniorraphy on postoperative pain to be assessed. The scope of interest was set on the variation of pain after surgery and not on the influence of different methods for hernia repair on pain levels.

It was observed that some patients who were free from pain at 3 months after surgery then reported pain at 1 and 2 years after surgery. The majority of patients with moderate pain at 3 months reported an ongoing improvement 1 and 2 years after surgery. However, in contrast, some patients reported a worsening towards more severe pain. Thus, among patients with moderate discomfort, both improvement and impairment were observed. The first 2 years of the postoperative period after open hernia repair seems, therefore, to be characterised by an obvious risk for impairment and that a patient with moderate or severe pain at 1 and 2 years after surgery may either belong to a group with slowly resolving pain problems or to a group of patients with reappearing pain.

This dualism of pain impairment and improvement after hernia repair points to the problem of identifying a clinically relevant time for the definition of ‘chronic’ postoperative pain. Assessing pain at two time points after surgery may identify both patients in whom the healing process is slow and those with re-emergent pain. This study indicates that, at a time point later than 3 months after surgery, for example at 1 year after surgery, a one-point postoperative pain assessment will add a number of pain patients who were initially free of pain and reduce the number of slowly healing patients with 3-month chronic pain.

The reason for discomfort or pain recurring is not known. It may be due to the returning function of afferent sensory nerves that have been injured during surgery by stretching [10], in analogy with returning voice function after stretching of the recurrent laryngeal nerve during thyroid surgery. Alternatively, it may be a consequence of ongoing connective tissue ingrowths into a mesh or plug, as this may result in an increased foreign-body sensation. It is interesting that none of the initially pain-free patients who later reported pain indicated severe pain on the VAS scale (according to the arbitrary definition). This is in contrast to a number of patients who had moderate pain at 3 months and later reported more severe pain. Apart from those with clinical recurrence, the reason for this impairment is not known. Moderate pain at 3 months after surgery seems, however, to indicate a risk for more serious complications within 2 years, in contrast to those initially pain-free

patients who developed moderate pain during the same observation time.

Severe pain at 3 months post-surgery carries a more serious clinical implication, since these patients have not become free of pain during the 2-year observation period (except one) and that the worsening of pain from moderate to severe correlated with recurrent hernias.

The number of patients with severe pain who did not experience recurrence (2.5%) was comparable to the relative number of patients with severe pain (3.6%) reported by Courtney et al. [11]. Effort should be directed towards understanding the reasons for the pronounced problems that these relatively few patients experience. Apart from a reduction of their quality of life, they carry additional costs for revisits, referral to pain clinics and the requirement for further surgery [12, 13]. In our clinic, we routinely use the ten-box self-assessment instrument at 3 months to select patients within the box levels 1–7 for an invited recall to the clinic.

In conclusion, postoperative pain after open inguinal hernia repair can either be improved or reappear during the period between 3 months and 2 years after surgery. The study also shows that patients with moderate pain carry a risk for developing severe postoperative pain symptoms, which was not observed among patients who were initially pain-free but later developed moderate pain. Finally, the majority of patients with severe postoperative pain at 3 months do not become pain-free during the first 2 years after surgery.

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