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Bruce Campbell, Series Editor

Technical Section

TECHNICAL NOTES AND TIPS

Three ways to avoid incorrect-level lumbar spine surgery

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BACKGROUND

Wrong level spine surgery dominates malpractice claims.[1] In one series, the wrong level was approached in 15% of cases undergoing a lumbar discectomy.[2] We report three steps to avoid incorrect level surgery and litigation.

TECHNIQUE

Prior to skin incision, lateral fluoroscopy is performed with the patient prone. A radiopaque pointer is used to identify the level of the disc being approached (Fig 1) and this level is marked on the skin. The surgical approach is centred on the skin mark and once the laminae have been exposed, a radiopaque instrument is inserted below the inferior border of the upper lamina, at the level of the disc. Further fluoroscopy is used to confirm correct positioning (Fig 2). A final image is taken following discectomy with an instrument in the disc space, thereby confirming correct level surgery (Fig 3).

DISCUSSION

In 2010 a retrospective study by Irace and Corona reported the use of a pre-incision wire marker inserted to the spinous process using radiography for patients undergoing microlumbar discectomies.[3] They described one case of incorrect approach. We have defined a reliable technique that confirms with absolute certainty the correct level for discectomy before, during and after the procedure. We have performed 64 open lumbar discectomies using this technique with no cases of incorrect level discectomy.

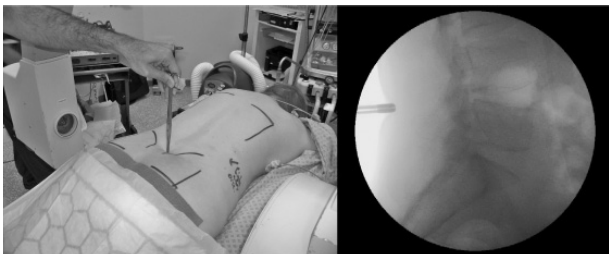

Figure 1 Radiopaque marker used to confirm disc level

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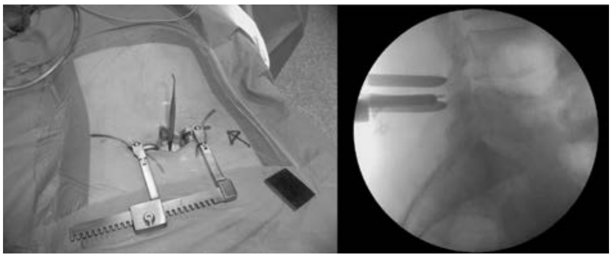

Figure 2 Confirmation of level prior to discectomy

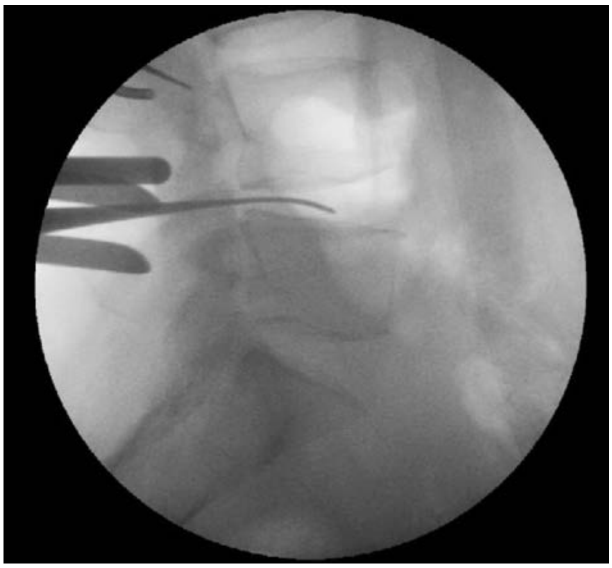

Figure 3 Correct level discectomy performed

Use of a sharps bin to provide lower limb traction

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Many lower extremity, pelvic and acetabular fractures require traction as first aid management prior to definitive fixation. While skin traction and Thomas splints are generally available, weights to provide counter-traction are often missing or in parts of the hospital remote to the emergency department. A sharps bin (Sharpsguard® orange 11.5; Daniels, Oxford, UK) filled two-thirds with tap water and tied via its bucket handle to skin traction (Fig 1) provides approx 8kg of traction. This can effect reduction and temporary traction until weights are available.

Figure 1 Sharps bin providing traction

Laparoscopic hepatic flexure mobilisation

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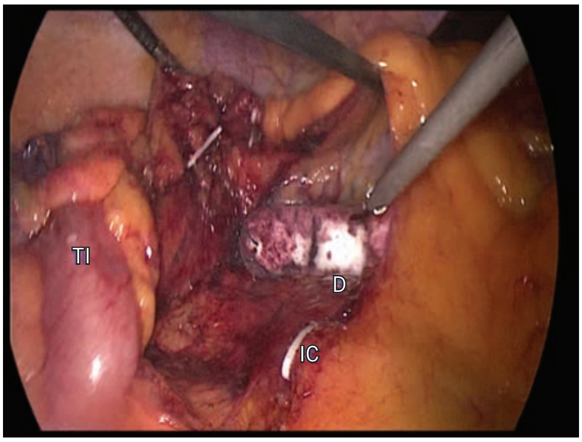
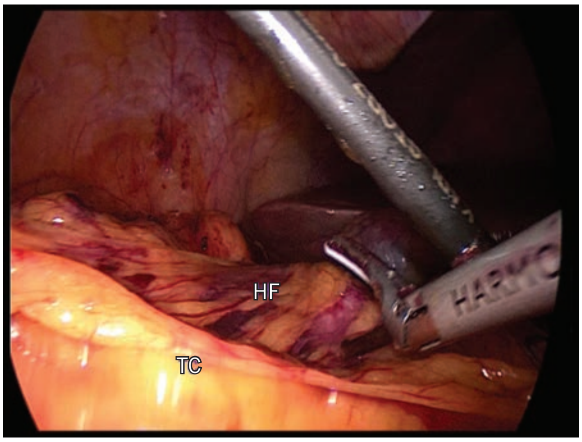
We describe a simple method to help identify the correct plane for hepatic flexure mobilisation while simultaneously protecting the duodenum during a laparoscopic right hemicolectomy. The placement of a swab or nasal pack on top of the duodenum after medial to lateral dissection below the ileocolic pedicle and right mesocolon (Fig 1) allows clear identification of the hepatic flexure from above. This can then be divided safely with the Harmonic® scalpel (Ethicon Endo-Surgery, Cincinnati, OH, US) protecting the duodenum from thermal injury (Fig 2).



TI = terminal ileum; D = duodenum; IC = ileocolic pedicle

Figure 1 Placement of swab in front of duodenum



HF = hepatic flexure; TC = transverse colon

Figure 2 Identification of swab from above at hepatic flexure

Pelvic collection drainage by Heald anal stent

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BACKGROUND

The use of the Heald anal stent (Basingstoke Surgical Technology Ltd, Pinner, UK) has been described previously in the successful therapeutic decompression of the rectum following a leaking ileorectal anastomosis.[1] The novel technique of using the Heald stent to drain a pelvic collection following ultra low Hartmann's operation is presented.

Figure 1 The hollow silicone elastomer Heald anal stent is flanged at both ends to prevent dislodgement in the anus.

Figure 2 Computed tomography demonstrating pelvic fluid and gas collection incompletely drained by a rectal Foley catheter

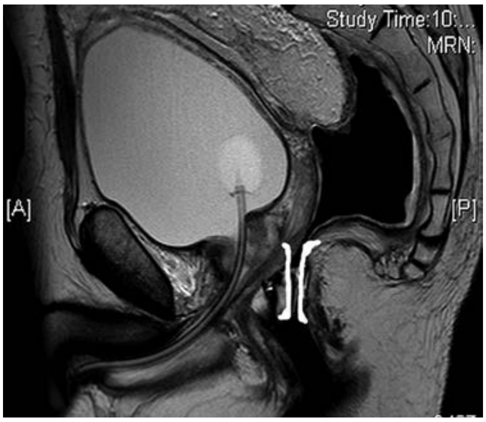

Figure 3 Sagittal magnetic resonance imaging of pelvis five days after the insertion of the Heald stent (highlighted) showing urinary catheter in the bladder and complete drainage of the presacral collection, now seen as air

TECHNIQUE

The Heald anal stent (Fig 1) can be used to drain pelvic collections on the ward after any surgery that leaves a short rectal stump. The stent is inserted through the rectal cross-staples after the instillation of local anaesthetic gel. After several days, once drainage is complete, the stent is removed painlessly.

We have used this technique successfully on patients with pelvic collections (Fig 2) who have failed Foley catheter drainage. The stent may be left for a few days until drainage is complete. (Pelvic magnetic resonance imaging may be used to confirm this [Fig 3].) The stent can then be removed on the ward.

DISCUSSION

Pelvic sepsis is a common complication after colorectal surgery such as Hartmann's operation. The risk is increased following neoadjuvant chemoradiotherapy, particularly in the presence of a suture or staple line.[2] Foley catheters may be used to decompress pelvic collections but become blocked frequently. Being shorter and having a wider lumen, the Heald stent provides more effective drainage and is easy to irrigate if necessary. It has been previously demonstrated to be an alternative, albeit not certain, method of avoiding a defunctioning stoma in low rectal anastomoses.[3] We recommend this technique as a possible method to allow free rectal drainage of a pelvic collection.

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A technique to maintain pneumoperitoneum and allow easy inspection of the abdomen after specimen delivery in laparoscopic colorectal surgery

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BACKGROUND

The majority of laparoscopic colorectal procedures require utility incisions to be made for specimen delivery. Resealing this incision to allow further inspection of the abdominal cavity can be problematic. This simple technique allows a good seal and facilitates insertion of single or multiple ports.

TECHNIQUE

A small Alexis® retractor (Applied Medical, Rancho Santa Margarita, CA, US) is placed in the extended port site incision prior to specimen removal (Fig 1). This technique can also be used at a stoma site. Once the specimen is removed, stretch a sterile size 6½ glove over the retractor and re-establish pneumoperitoneum. A perfect seal will be obtained (Fig 2). If the port is still required, cut the tip off any finger of the glove and reinsert the trocar, placing a tie on the glove to maintain the seal around the trocar. The trocar can be used as normal (Fig 3).

Figure 1 Alexis® retractor in extended port site incision

Figure 2 Glove stretched over the retractor, providing a seal

DISCUSSION

This technique is the best we have used for reinsufflation and reinsertion of ports. It allows a port site incision to be extended for specimen delivery and prevents the need for further incisions/port sites as often required. The seal obtained establishes pneumoperitoneum easily, allowing adequate visualisation of the peritoneal cavity either for inspection or further procedures such as forming anastomoses. It can also be used as a primary port site, particularly in procedures where a stoma has had to be mobilised as the first part of a procedure. The use of this technique minimises the number of incisions required while maintaining adequate and safe visualisation and access.

Figure 3 Glove port with camera inserted

A feasible and effective method for restoring patency of a biliary T-tube sinus tract

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BACKGROUND

T-tube placement following bile duct exploration remains commonplace.[1] Via an unobstructed T-tube tract, choledochoscopic removal of retained biliary stones has become a well established mode of treatment, having been used as early as 1982.[2] However, T-tubes or re-inserted straight drainage tubes after choledochoscopy are displaced frequently by accident, which results in sinus tract occlusion.[3] Generally, an emergency reoperation or endoscopic retrograde cholangiopancreatography (ERCP) may be necessary if the T-tube tract cannot be recanalised promptly. We describe a new technique to reinsert the drainage tube and recanalise the T-tube sinus tract before its complete closure.

TECHNIQUE

Iohexol contrast media is injected with pressure through the cutaneous opening of the T-tube sinus tract. Post-contrast imaging helps to identify the location of T-tube tract (Fig 1). Using x-ray fluoroscopy, a soft guidewire is inserted into the sinus track until it reaches the common bile duct (Fig 2). A biliary balloon dilator is introduced along the guidewire and dilation is then performed. A 16F stomach tube is passed along the fistula into the common bile duct with the guidewire (Fig 3). Residual stones in the bile duct can be removed in the following 1–2 weeks using choledochoscopy.

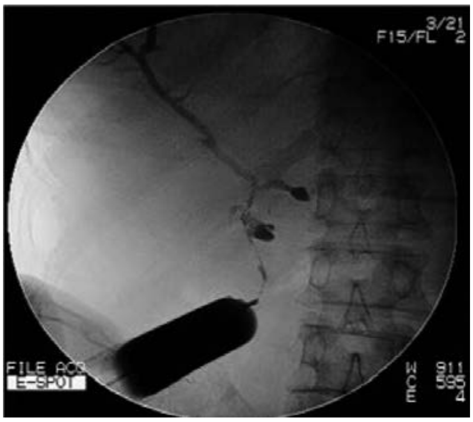

Figure 1 Iohexol contrast media is injected with pressure through the narrow opening of the sinus on the skin to identify the location of the T-tube tract.

DISCUSSION

The technique of drainage tube reinsertion using x-ray fluoroscopy is a safe and effective method for restoring the patency of a T-tube sinus tract and may avoid reoperation or ERCP.

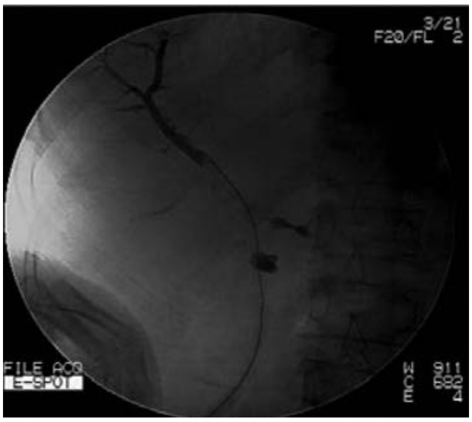

Figure 2 A soft guidewire is inserted into the sinus tract until it reaches the common bile duct.

Figure 3 The T-tube sinus tract, intrahepatic ducts and common bile duct following fistula dilation and insertion of a stomach tube along the guidewire.

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A pure dermal sling for implant reconstruction after mastectomy in the generous breast

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BACKGROUND

Skin reducing mastectomy is a useful technique in immediate implant-based reconstruction. The implant is usually covered by muscle and a dermal flap.[1] We describe a modification to this technique for generous breasts involving the creation of a pure dermal sling.

Figure 1 Pre-operative marking for Wise pattern incisions

TECHNIQUE

A skin reducing mastectomy is performed via Wise pattern incisions, retaining an extensive inferior dermal sling of de-epithelialised tissue. A sizer is used to ensure the skin envelope meets the inframammary fold before an anatomical implant is placed on the pectoralis major. Complete coverage is achieved with the inferior dermal sling, which is sutured to the pectoralis superiorly. The superior skin can then be draped to the inframammary fold and sutured in the usual manner.

DISCUSSION

The benefits of a pure dermal sling include complete coverage of the implant and the preservation of an intact pectoralis major. This technique has been trialled successfully in two patients with generous ptotic breasts.

Figure 2 Pure dermal sling

Figure 3 After reconstruction using pure dermal sling

Figure 4 Results at four-month follow-up appointment

Reference

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A technique to aid the insertion of distal locking screws

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BACKGROUND

The insertion of distal locking screws on an intramedullary nail can be problematic as there is no hardware such as a jig to aid insertion. Newly developed computer aided techniques are available but the cost can be prohibitive. Insertion of distal screws usually relies wholly on image intensifier guided positioning. This can be time consuming and requires many x-rays to be taken in order to create the 'perfect circles' on the image intensifier that demonstrate satisfactory alignment. We propose a technique that decreases insertion time and requires fewer image intensifier images to be taken while inserting a distal locking screw.

TECHNIQUE
Pass a drill guide through the jig used for inserting proximal screws. Leave the drill guide in position against the limb. This can now be used to align the C-arm. Position the C-arm distally and adjust its position until it is parallel to the drill guide in its orbital and swivel axis. This will give near perfect alignment to the distal locking holes. Finer adjustments may be needed under image intensifier guidance to gain the final position. Once satisfactory alignment is achieved, insert the distal screws as usual.

DISCUSSION
This simple technique is effective, saves time and reduces radiation exposure to both the patient and surgeon. This technique is free as it uses standard equipment that comes with the nail.

Explantation of aortic infrarenal stent graft

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This technique has helped us to achieve proximal control during stent graft explantation. A large Foley catheter is inserted through a disconnected limb of stent graft and placed in the suprarenal aorta. Inflation of the balloon provides proximal control (Fig 1). The proximal end of the stent graft is extracted from the aorta. If another graft is used, proximal anastomosis is carried out with the balloon inflated. To complete the anastomosis a second Foley catheter is passed through a limb of the new graft (Fig 2). While the original catheter is deflated and removed, the second balloon is inflated in the suprarenal aorta (Fig 3) and the anastomosis completed.

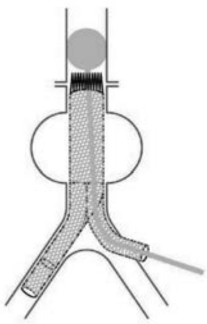

Figure 1 A Foley catheter is inserted through the stent graft and placed in the suprarenal aorta, after which the balloon is inflated.

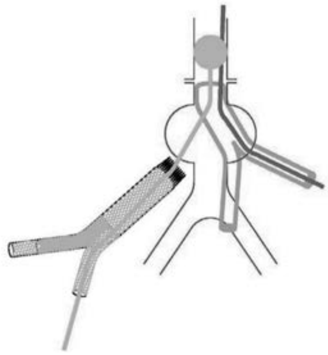

Figure 2 A second Foley catheter is passed through a limb of the new graft.

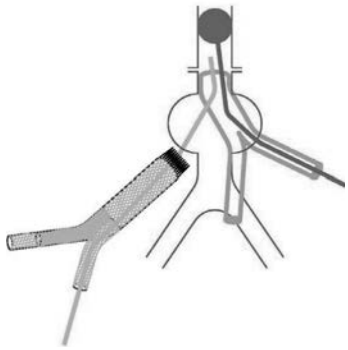

Figure 3 The original catheter is deflated and removed, and the second balloon is inflated in the suprarenal aorta.

ACKNOWLEDGEMENT
We would like to thank James Clark for his help with the drawings.

A technique for optimal manipulation of rotation of the flexible ureterorenoscope

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BACKGROUND
Three different types of movement are required to perform flexible ureterorenoscopy: insertion/retraction, rotation and deflection of the tip. Many trainee urologists struggle to manipulate the rotation of the scope. We describe a technique for optimally controlling this rotation.

TECHNIQUE
When performing ureterorenoscopy, the scope is extended in a straight line (Fig 1) rather than held in a curved position (Fig 2). By applying

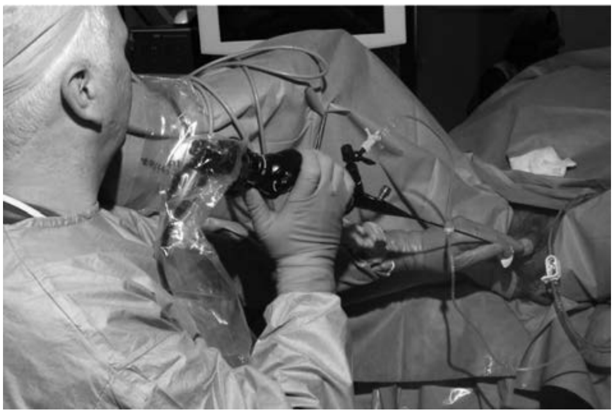

Figure 1 Holding the flexible ureterorenoscope extended in a straight line, gentle traction is applied at opposing ends of the scope in a 'Christmas cracker' motion.

Figure 2 Holding the flexible ureterorenoscope in a curved position

gentle opposing traction with each hand in a 'Christmas cracker' motion this can be optimally achieved.

DISCUSSION

Many surgeons default to holding the scope in a curved position. Due to the length and the ever decreasing calibre of modern scopes, the transmission of torque is reduced, resulting in decreased rotation of the tip in response to movements of the hand. Consequently, the operator resorts to excessive movements in a 'windscreen wiper' motion. Using this technique improves the ability of the surgeon to control the rotation of the scope and to perform flexible ureterorenoscopy with economy of movement in a safe and efficient fashion.

Modified mattress suture

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Traditional mattress sutures prove difficult to remove when the knot becomes buried in swollen tissue. We describe a suture with the benefits of a mattress suture that can be removed more easily:

1. Starting on the 'near-side', cross the wound twice as per a regular horizontal mattress suture, leaving the loop proud.
2. Pass one free end through the loop and pull to the near-side of the wound.
3. Tie on the near-side, ensuring suture material of the loop bridges the outside of the wound.
4. This will remain easily accessible for removal regardless of swelling (Fig 1).

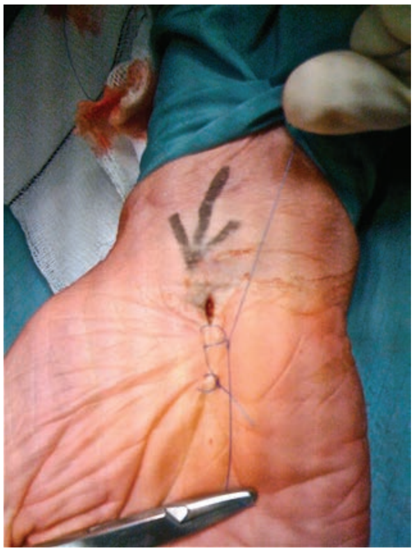

Figure 1 Modified mattress suture

A 'homemade' snare for endovascular procedures

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BACKGROUND

Snares have considerable utility during elective and urgent endovascular procedures.[1] Endovascular snares are expensive, costing be-

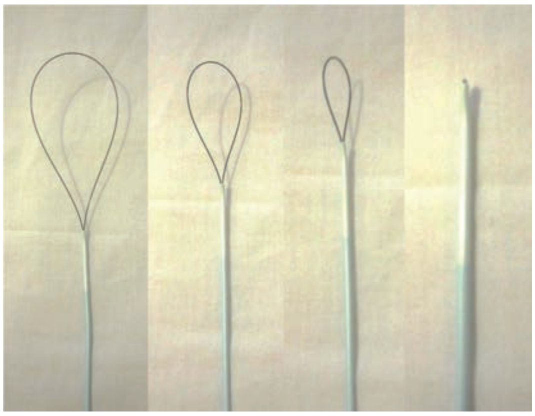

Figure 1 The 'homemade' endovascular snare, shown from open (left) to closed (right)

tween £150–£200 per unit, and may not always be readily available when required, particularly in an urgent setting.

TECHNIQUE

A 'homemade' snare can be fashioned using a 0.018" (0.46mm; external diameter) hydrophilic guidewire (eg ZIPwire®; Boston Scientific, Natick, MA, US; unit cost £18) and a 0.038" (0.97mm; internal diameter) endovascular catheter (eg Torcon NB®; Cook Medical, Bloomington, IN, US; unit cost £10). The stiff end of the guidewire is passed into the catheter until it emerges at the tip. It is then reversed and passed back into the tip to re-emerge at the catheter hub (Fig 1). The size of the snare is controlled by pulling on the two ends of the catheter at the hub.

DISCUSSION

A 0.038" catheter accommodates a 0.038" guidewire snugly. The two ends of the 0.018" guidewire amount to 0.036", allowing 0.002" (0.05mm) for ease of movement in the catheter. This approach may be used with a straight or curved-tipped catheter, the latter allowing the snare to be more easily 'directed' in the vessel. At a total cost of less than £30, this inexpensive snare is a helpful option during endovascular procedures.

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A knot quicker and easier than Whip stitching in anterior cruciate ligament reconstruction

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We describe a method for tying a self-locking knot to apply tension to a free tendon end for hamstring graft anterior cruciate ligament reconstruction. This is faster, safer and easier than Whip stitching and is secure enough to feed the graft through bone tunnels.

The suture is folded and the tendon is laid on top (Fig 1a). The suture ends are then fed over the tendon and through the loop (Fig 1b). This is repeated (Fig 1c). The end result is shown in Figure 1d. The knot is pulled tight and a square knot is tied around the tendon to secure it.

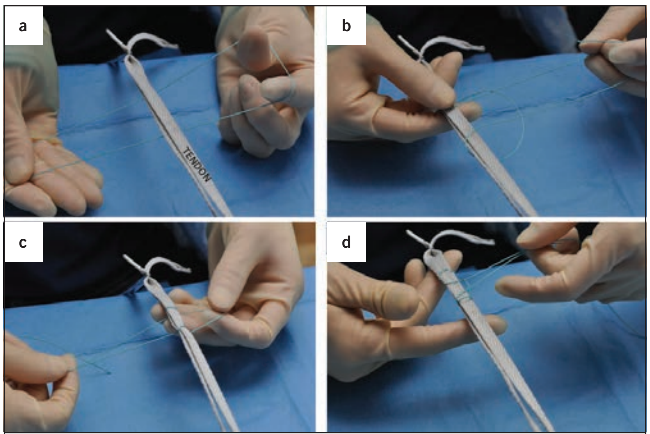

Figure 1 Method for tying a self-locking knot

Prevention of extension lag using a sling attachment for Ligamentotaxor® devices in complex proximal interphalangeal joint injuries

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BACKGROUND

Fracture subluxations at the proximal interphalangeal joint can be difficult to treat and variable in their outcome.[1,2] A number of devices have been described that provide dynamic external fixation, allowing rehabilitation during the period of stabilisation.[3,4] The Ligamentotaxor® device (Arex, Palaiseau, France) has been in use at our institution since 2008 and good results have been achieved. It was recognised that a small number of patients develop an extension lag at the distal interphalangeal joint while a Ligamentotaxor® device is in situ during treatment of fractures in the proximity of the proximal interphalangeal joint.

TECHNIQUE

The sling attachment shown was devised in our unit. It is quick and simple to apply to the frame. It is manufactured from Velcro® and Orfit thermoplastic (Wijnegem, Belgium), and is easy to remove for exercise (if appropriate). It does not affect the normal functioning of the frame.

1. Warmed Orfit thermoplastic is bonded onto 'loop' Velcro® approximately 2cm from one end.
2. The Velcro® strip is secured around one of the distal portions of the spring at the level of the distal phalanx (Fig 1).

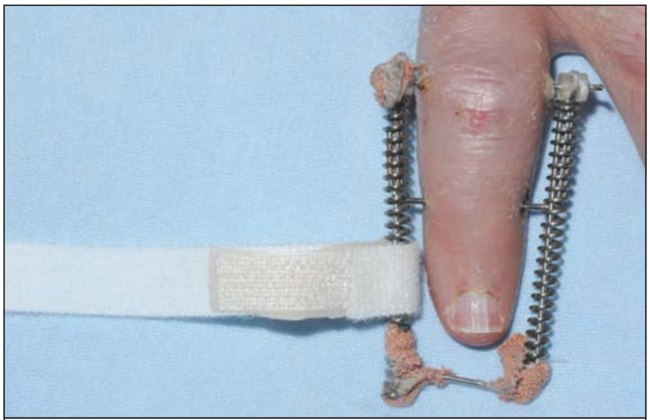

Figure 1 Velcro® is bonded to Orfit thermoplastic and attached to Ligamentotaxor® device.

3. The adhesive backed 'hook' Velcro® is adhered to the thermoplastic, passed under the distal phalanx and wrapped around the spring on the other side of the Ligamentotaxor® device, fastening to the loop Velcro® underneath, thereby supporting the distal phalanx (Fig 2).

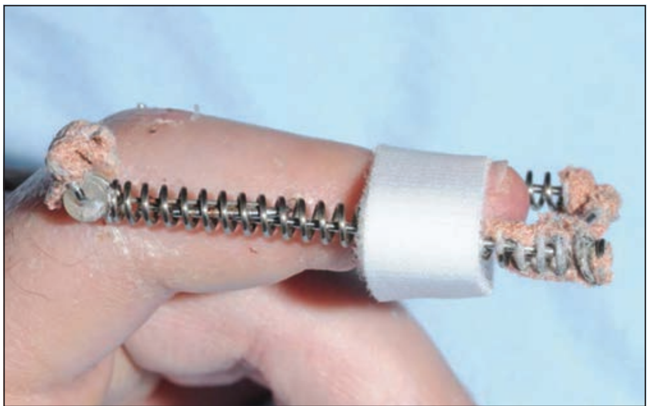

Figure 2 Sling is passed under distal phalanx, looped around device and fastened.

DISCUSSION

Prompt recognition of extensor lag and treatment using this frame modification arrests progression of the problem and facilitates its resolution. We recommend use of the Ligamentotaxor® sling in all cases complicated by extension lag.

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A low cost model for teaching tendon repair

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BACKGROUND

A recent technical note suggested that a drinking straw is a suitable model for the teaching of tendon repair and offered advantages over silicone rods.[1] We have developed an alternative model based on the drinking straw using silicone sealant.

TECHNIQUE

Easily available commercial silicone sealant is used to create the model (No Nonsense® Sanitary Silicone Clear; Screwfix, Yeovil, UK). A standard drinking straw is filled from one end with silicone sealant. Under pressure, the sealant will flow to the opposite end of the straw. The sealant is then left to cure for two weeks. The model should be left in a well ventilated area as acetic acid is produced during the curing process. Once set, the drinking straw can be cut away from the model (Fig 1).

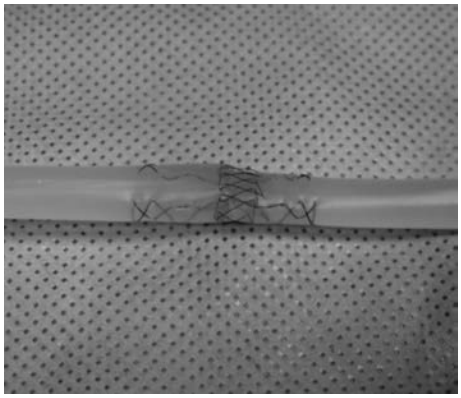

Figure 1 Silicone model for the teaching of tendon repair

DISCUSSION

We have found this model provides better suture handling feedback than the drinking straw model described previously.[1] The silicone model maintains the position of inserted suture material and the accuracy of insertion can be assessed by a trainer as the model is transparent. The 'feel' of the model imitates that of a human tendon more realistically and marks made by the injudicious use of forceps during tendon handling are also seen easily. Different sizes of model can be made to replicate biological structures of differing diameters by using straws of varying size. A 310ml cartridge of sealant can be purchased for £2.89. This will produce over 30 lengths of the model. This is in comparison with commercially available medical grade silicone rods that cost over £150 for a 5cm length.

Reference

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A simple manoeuvre to minimise bladder injury during laparoscopic incisional hernia repair

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BACKGROUND

Bladder injury during laparoscopic incisional hernia repair has a reported incidence of 0.5%.[1] Mesh placement during repair may be difficult when the fascial defect extends towards the pubis. The bladder may need to be separated from the peritoneum in order to place the mesh safely and achieve adequate mesh overlap.[2] We propose a simple intra-operative technique to help identify bladder position and better define the plane for dissection.

TECHNIQUE

A transurethral Foley catheter is inserted. Prior to pelvic dissection, the bladder is filled with 400ml of normal saline via the catheter. As the bladder fills, it projects upward out of the pelvis into the abdomen and defines the plane for dissection. The bladder should now be within the surgical field and easily identifiable.

DISCUSSION

The above technique provides a simple way to confirm bladder position laparoscopically. Once visualised within the surgical field, further dissection, mesh placement and safe mesh fixation avoiding the bladder can proceed. Furthermore, where iatrogenic bladder injury is suspected, the technique also provides direct visualisation of any leak through retrograde methylene blue dye instillation.[3]

References

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A simple aid to fracture reduction in the digit

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BACKGROUND

We describe a simple method enabling traction to be applied to a digit and providing control of rotation, alignment and length while avoiding inadvertent radiation to the surgeon's or assistant's fingers. Furthermore, it provides excellent exposure to the digit, alleviating difficulties in fixation of complex fractures.

TECHNIQUE

A 1.1mm K-wire is inserted under fluoroscopic guidance transversely across the base of the distal phalanx of the injured digit. The wire is then bent on either side and the sharp ends trimmed. A Rampley sponge holder is used to hold the wire (Figs 1 and 2). Traction is

Figure 1 Anteroposterior photograph

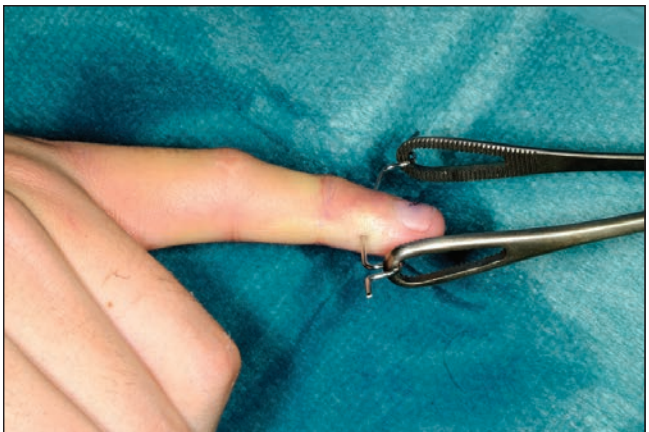

Figure 2 Lateral photograph

applied by holding on to the sponge holder to enable ligamentotaxis to reduce the fracture (Figs 3 and 4). Rotational deformity, angulation, length and radial/ulnar deviation can be corrected by applying varying forces. The standard method of fracture fixation can then be performed.

DISCUSSION

We have found this method extremely useful when fixing fractures of the digits where optimal access to the fracture site is required while continued traction is necessary to maintain reduction. This is particularly the case in fractures of the middle phalanx where alternative methods of applying traction may interfere with access to the fracture site. Although it is not an original principle, we believe that this technique has not been described previously in the literature. We strongly recommend this technique to those involved in the treatment of fractures of the hand.

Figure 3 Pre-reduction x-ray

Figure 4 Post-reduction x-ray (with traction)

A simple exercise to encourage precise suture placement

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Surgical simulation is becoming increasingly important due to a reduction in operative exposure during surgical training. We describe a method to encourage precise suture placement using simple equipment that can be practised outside the skills laboratory.

Affix a Post-it® note to a table with its adhesive edge lying to your left. Using an ‘inside to outside, outside to inside’ technique, suture along the free edge of the Post-it® note (Fig 1). Now, pull out

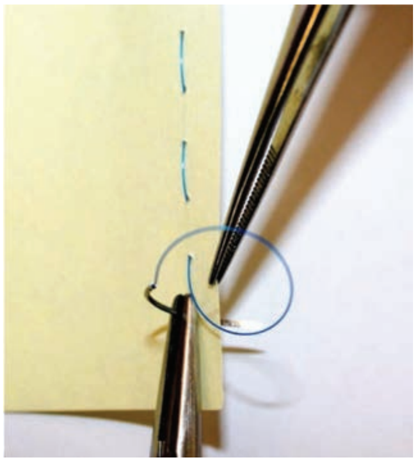

Figure 1 Initial suture placement

the stitch and resuture through the prior made perforations (Fig 2). This simple exercise encourages delicate handling to minimise tissue trauma and a good needle holder technique to facilitate the placement of precise stitches under direct vision.

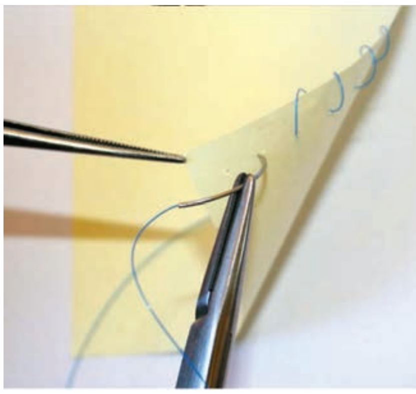

Figure 2 Accurate continuous suture practice

Use a ball-ended anterior cruciate ligament reamer to protect patella tendon during minimal access tibial nailing

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Minimal access tibial nailing is popular. After entry point identification and guidewire placement, a cannulated entry reamer is used to 'open' the medullary canal. Rather than using the manufacturer's guidewire and bulky 12mm reamer, we recommend using the anterior cruciate ligament tibial guidewire and the 10mm ball-ended reamer (Fig 1).

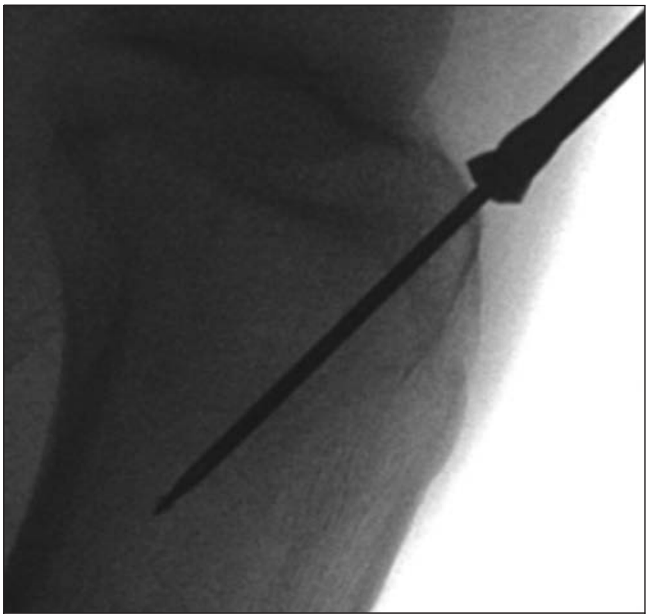

Figure 1 Ball-ended 10mm anterior cruciate ligament reamer

This reamer's short cutting length minimises damage during reaming of proximal tibial metaphysis as the reamer can be pushed gently through the incised tendon before it is activated. The 10mm hole in metaphyseal bone allows easy passage of subsequent canal reamers and the tibial nail.

Akin osteotomy: good staple positioning

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Akin osteotomy is a common component of hallux valgus surgery. Holding the osteotomy in good position with a well placed staple can prove difficult. To aid this, a marker pen is used to apply ink to the tip of the proximal limb of the staple (Fig 1). A hole is drilled in the distal bone and the non-inked staple limb is inserted while the osteotomy is held in the desired position. This causes transfer of ink from staple to bone surface (Fig 2), thereby marking the appropriate site to drill and insert the proximal staple limb.

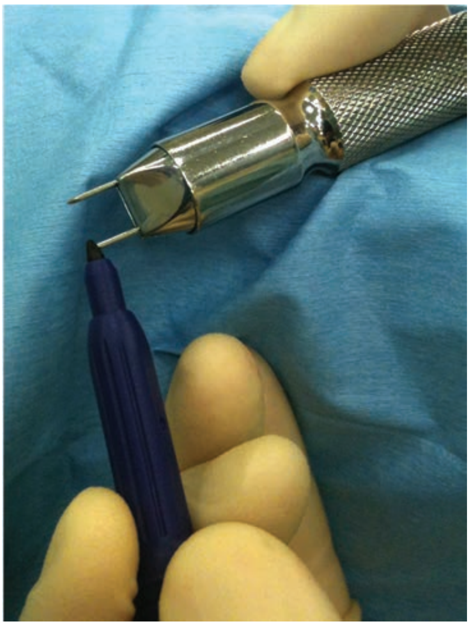

Figure 1 A marker pen is used to apply ink to the staple tip.

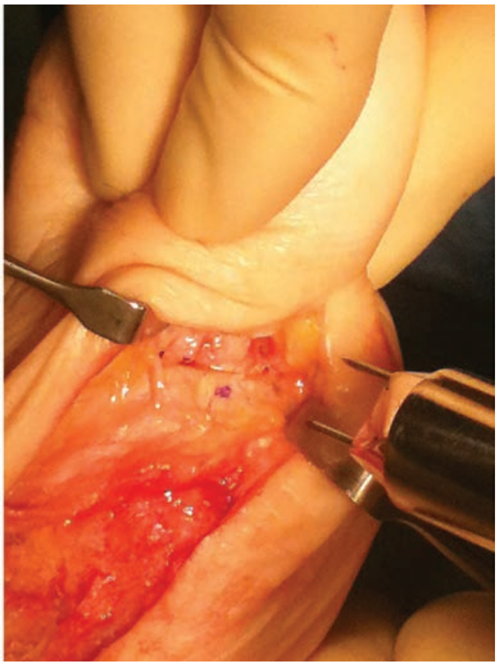

Figure 2 The proximal hole has been marked and drilled ready for staple insertion.

Soft tissue protection from exposed K-wires

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K-wires may be used to maintain fracture reduction for several weeks in orthopaedic surgery. Exposed sharp ends are a potential risk to the surgeon and patient. Covering the exposed wire end with a 1ml syringe gasket (black bung located at plunger tip) provides secure protection (Fig 1). This is a cheap and effective method of preventing drape perforation and soft tissue injury.

Figure 1 Exposed K-wires covered with a syringe gasket

Novel use of a single port laparoscopic surgery device for minimally invasive pancreatic necrosectomy

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BACKGROUND

The development of pancreatic necrosis is a significant complication of acute pancreatitis and can result in progressive multiple organ failure and death. Recently, in an attempt to reduce the high morbidity and mortality from open necrosectomy, minimal access techniques have been developed.[1]

TECHNIQUE

With the recent advent of single port laparoscopic surgery, a single access port (SILS™; Covidien, Mansfield, MA, US) can be used to gain retroperitoneal access (Fig 1) and allow necrosectomy to be performed. During the procedure, irrigation with warmed 0.9% saline or low CO_2 pressure (8mmHg) permits visualisation of the retroperitoneum, and standard laparoscopic graspers and a suction device can be placed through additional port sites in the unit to allow removal of necrotic tissue (Fig 2). Post-operatively, continued irrigation of the

Figure 1 SILS™ port allowing access to the retroperitoneum

retroperitoneum is maintained at 100ml/hr with 0.9% saline. We have used this technique successfully in three patients.

DISCUSSION

The technique of minimally invasive necrosectomy has been well described previously[2] and has been shown in certain situations to have advantages over the traditional open approach.[3] This relatively standard technique employs the use of an operating nephroscope. The advantage of the SILS™ port is that standard laparoscopic instruments can be used and if the retroperitoneal cavity is large, two laparoscopic graspers can be used simultaneously for tissue debridement.

Figure 2 Placement of laparoscopic grasper and suction device in the single access port

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