Novel treatment (new drug/intervention; established drug/procedure in new situation)

A laparoscopic high anterior resection for sigmoid cancer with extraction through incarcerated left inguinal hernia repaired with Permacol mesh

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Summary

A 65-year-old man presented to the general surgical outpatients with an incarcerated left inguinal hernia. Initial investigations revealed an iron deficiency anaemia that was investigated with a colonoscopy and gastroscopy. This revealed a sigmoid cancer and the staging CT scan confirmed a tumour incarcerated in the sac of the left inguinal hernia. We proceeded with a laparoscopic high anterior resection using the inguinal hernia as the extraction site. The hernia was repaired using Permacol mesh. No postoperative complications occurred.

BACKGROUND

Bowel cancer and inguinal hernias are common surgical pathologies that can present simultaneously but treating both pathologies at the same time presents several issues. Surgical wounds can be classified into four types depending on the degree of contamination of the wound. The numbers shown in brackets represent the associated infection risk: clean (<2%), clean contaminated (1–5%), contaminated (5–25%) or dirty (50%). Bowel resections create a clean-contaminated wound and any spillage of bowel content converts this to a contaminated wound with an associated increased risk of infection. Repairing an inguinal hernia with a prosthetic mesh should only be considered when the wound is clean. The risk using a prosthetic mesh at the time of sigmoid resection would be unacceptably high and increased further in a patient with impaired glucose tolerance or diabetes.

A staged approach beginning with a laparoscopic sigmoid resection followed by a second procedure to repair the hernia would enable the hernia to be repaired through a clean wound. It would necessitate the need for an additional lower abdominal incision for specimen extraction that could be avoided by removing the specimen through the hernia. The hernia repair could be performed under the same anaesthetic after re-preparing the patient or at a later date requiring a second anaesthetic. Two lower abdominal incisions would, however, negate many of the benefits of laparoscopic surgery related to postoperative pain and early ambulation. The options were discussed with the patient who was keen to have both procedures at the same time.

A Medline search was performed using the terms 'bowel resection', 'inguinal hernia' and 'extraction site'. One case report was identified that used an inguinal hernia as the extraction site but this did not state the type of mesh used to repair the hernia defect.¹

Owing to concerns over the risk of mesh infection, we decided to use Permacol (Covidien Plc, Dublin, Ireland)

that has been used successfully for hernia repair in contaminated wounds, especially complex midline incisions.^{2–4}

This approach was felt to minimise the risk of infection, to avoid the need for a second procedure or the need for a second extraction site incision with associated pain, infection and herniation risk.

CASE PRESENTATION

A 65-year-old gentleman was referred to the outpatient department from his general practitioner with an incarcerated left inguinal hernia. The hernia had been present for several months and the associated discomfort was preventing him from participating in his hobbies of martial arts and hill walking.

His medical history included hypertension, hypercholesterolaemia and impaired glucose tolerance. Current medication included simvastatin and bendroflumethiazide.

There was no relevant family history. He was a non-smoker with occasional alcohol intake.

INVESTIGATIONS

Clinical examination revealed a soft and non-tender abdomen with a soft incarcerated left inguinal hernia. His body mass index (BMI) was 24 kg/m². Rectal examination was unremarkable.

Routine blood investigations demonstrated haemoglobin of 8.8 g/dl with an iron-deficient picture. Gastroscopy was normal and colonoscopy revealed a circumferential sigmoid tumour at 18 cm from the recto-anal margin. Biopsies confirmed adenocarcinoma. CT scan of abdomen and chest confirmed the findings of a bulky sigmoid tumour within the sac of a left inguinal hernia with no evidence of metastatic disease or local invasion/peritoneal spread (figures 1 and 2).

TREATMENT

After multidisciplinary discussion, we proceeded with a laparoscopic high anterior resection. A right lateral position

Figure 1 Preoperative CT scan showing sigmoid tumour at the neck of inguinal hernia.

was used initially to aid splenic flexure mobilisation. Access was obtained in the left iliac fossa using visiport technique with further ports inserted supra-umbilically, in the right iliac fossa and suprapubically. After insufflation, the bulky sigmoid tumour was readily identified and easily reduced from the inguinal sac after which the splenic flexure was mobilised. The patient was then placed into the lithotomy position. After dissection of the sigmoid mesocolon and division using a linear stapler, the rectum was divided at the level of the peritoneal reflection.

A further incision was then made in the left groin and dissection made down to external oblique, which was opened and the cord structures identified. A large direct inguinal hernia sac was identified and opened, gaining access to the peritoneal cavity. After insertion of a wound protector the

specimen was extracted and left colon was divided proximal to the tumour. The anvil was inserted into the proximal end and secured with a purse string suture.

Pneumoperitoneum was re-established by twisting the wound protector to create an airtight seal and a stapled end-to-end colorectal anastomosis was performed under laparoscopic guidance. After a leak test the pneumoperitoneum was released and the hernia sac transfixed and excised. The posterior wall of the inguinal canal was plicated and a piece of Permacol mesh was cut to size secured along the inferior edge of the inguinal ligament. The wound was irrigated with saline.

External oblique aponeurosis and Scarpa's fascia were closed followed by subcuticular skin closure. About 20 ml 0.5% chirocaine was infiltrated into the skin and inguinal canal as well the port sites.

OUTCOME AND FOLLOW-UP

Following the procedure, the patient made an excellent recovery and was discharged home 4 days postoperatively after opening his bowels. Histology confirmed a pT3 N0 M0 adenocarcinoma with 0 of 39 nodes positive (figures 3 and 4).

A follow-up CT at 1 year showed no evidence of recurrent or metastatic disease and clinical examination revealed a well-healed scar in the groin with no evidence of recurrent herniation. Carcinoembryonic antigen levels remained normal.

DISCUSSION

Laparoscopic-assisted colectomy has become common practice since its introduction in the early 1990s and the advantages include decreased postoperative pain with reduction in narcotic usage, earlier ambulation, faster return to bowel function and oral intake and earlier hospital discharge. The position of the extraction site for removal of the tumour is subject to debate due to concerns over wound infection rates, postoperative pain, port site recurrences and development of incisional hernias.

Figure 2 Preoperative CT scan showing the size of left inguinal hernia.

Figure 3 Postoperative CT at 1 year showing a repaired left inguinal hernia.

Figure 4 Postoperative wounds prior to discharge.

Wounds created while performing resection of the lower gastrointestinal tract are classified as clean contaminated while any macroscopic spillage of bowel contents would convert this to a contaminated wound with an increased risk of wound infection. Wound infection rates are reduced with laparoscopic surgery but when performing an extracorporeal anastomosis meticulous care is needed to minimise contamination of the wound. Wound infection following laparoscopic surgery occurs in around 6% of patients with up to 50% of these being at the extraction site. The use of a plastic wound protector has not been shown to reduce wound infection rates at the extraction/anastomosis site.⁵ While mesh repair of inguinal hernia has become common practice, in the setting of a potentially contaminated wound the use of a prosthetic mesh (eg, Prolene) may be a significant infection risk. Permacol (a biosynthetic porcine collagen mesh) has been used successfully in the closure of complex midline, incisional and parastomal hernia in the presence of contamination.^{2–4} By using Permacol the risk of significant wound infection was minimised. Repairing the hernia without a mesh using the Shouldice technique would have been a possible alternative but significant experience with the technique is necessary to ensure equivocal results to a more routinely performed mesh repair.

An alternative approach would have been to perform a laparoscopic transabdominal pre-peritoneal mesh repair at the same time as the bowel resection. However, we were concerned over the implications of anastomotic leak in the setting of a recently inserted prosthetic mesh which would only be covered by a layer of recently divided peritoneum from the anastomotic line and again a second abdominal incision would be needed.

While laparoscopic techniques are thought to reduce incisional hernia rates when compared with open techniques,⁶ incisional hernias have been documented in as many of 17% of midline extraction sites^{7–8} leading many surgeons to use an off-midline muscle splitting extraction site. There are concerns regarding the use of this technique in patients with a high BMI. Regardless of the choice of extraction site, the risk of morbidity related to incisional hernias remains. Our approach enabled a simultaneous repair of the inguinal hernia, avoiding the need for an additional incision for specimen extraction associated with increased postoperative pain or morbidity from an incisional hernia at the traditional extraction site.

Port site/extraction site recurrence is a genuine concern with laparoscopic surgery but the literature suggests that this is related to advanced disease at the time of surgery rather than the laparoscopic technique itself.^{9–10} While we used a plastic wound protector, this does not eradicate the possibility of recurrence at the site.¹¹ At 1-year follow-up there were no clinical or radiological signs of this.

We believe this to be the first published case to present the use of Permacol mesh to repair the inguinal canal after using the hernial defect as the extraction site for removal of a specimen following laparoscopic bowel resection.

Learning points

- ▶ A full history and clinical examination of patients presenting with an inguinal hernia often reveals an underlying pathology.
- ▶ Extraction site following laparoscopic surgery is associated with risks of incisional herniation, infection and tumour recurrence.
- ▶ Wound classification into clean, clean contaminated, contaminated and dirty enables assessment of the risk of wound infection.
- ▶ Use of a prosthetic mesh for repair of a hernia in a clean contaminated or contaminated wound should be avoided. The use of a biosynthetic mesh should be considered to reduce the incidence of mesh infection in this setting.
- ▶ Specimen extraction through a coincidental inguinal hernia avoids the need for separate incision usually required for specimen extraction.

Competing interests None.

Patient consent Obtained.

REFERENCES

1. **Suzuki T**, Kawahara H, Lida N, *et al.* Anastomosis procedure through an inguinal hernia incision in simultaneous laparoscopic anterior resection and inguinal hernia repair. *J Surg Tech Case Rep* 2011;**3**:31–3.
2. **Loganathan A**, Ainslie WG, Wedgwood KR. Initial evaluation of Permacol bioprosthesis for the repair of complex incisional and parastomal hernias. *Surgeon* 2010;**8**:202–5.
3. **Hiles M**, Record Ritchie RD, Altizer AM. Are biologic grafts effective for hernia repair? A systematic review of the literature. *Surg Innov* 2009;**16**:26–37.
4. **Parker DM**, Armstrong PJ, Frizzi JD, *et al.* Porcine dermal collagen (Permacol) for abdominal wall reconstruction. *Curr Surg* 2006;**63**:255–8.
5. **Kercher KW**, Nguyen TH, Harold KL, *et al.* Plastic wound protectors do not affect wound infection rates following laparoscopic-assisted colectomy. *Surg Endosc* 2004;**18**:148–51.
6. **Laurent C**, Leblanc F, Bretagnol F, *et al.* Long-term wound advantages of the laparoscopic approach in rectal cancer. *Br J Surg* 2008;**95**:903–8.
7. **Singh R**, Omiccioli A, Hegge S, *et al.* Does the extraction-site location in laparoscopic colorectal surgery have an impact on incisional hernia rates? *Surg Endosc* 2008;**22**:2596–600.
8. **Moreira ADL**, Rottoli M, Geisler DP, *et al.* Laparoscopic colectomy: does the location of the specimen extraction site matter? *Poster Society for Surgery of the Alimentary Tract* 2009. www.ssat.com/cgi-bin/abstracts/09ddw/P15.cgi (accessed 15 August 2012).
9. **Ramos JM**, Gupta S, Anthone GJ, *et al.* Laparoscopy and colon cancer. Is the port site at risk? A preliminary report. *Arch Surg* 1994;**129**:897–9; discussion 900.
10. **Ankem MK**, Hedican SP, Pareek G, *et al.* Examination of laparoscopic retrieval bag washings for malignant cells after hand-assisted laparoscopic radical nephrectomy and intact specimen removal. *Urology* 2006; **68**:50–2.
11. **Paolucci V**, Schaeff B, Schneider M, *et al.* Tumor seeding following laparoscopy: international survey. *World J Surg* 1999;**23**:989–95; discussion 996–7.

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Please cite this article as follows (you will need to access the article online to obtain the date of publication).

Carr WRJ, O'Dair G. A laparoscopic high anterior resection for sigmoid cancer with extraction through incarcerated left inguinal hernia repaired with Permacol mesh. *BMJ Case Reports* 2012;10.1136/bcr.02.2012.5788, Published XXX

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