



Incisional hernia appendicitis: A report of two unique cases and literature review

Conor Sugrue, Aisling Hogan, Ian Robertson, Akhtar Mahmood, Waqar H. Khan, Kevin Barry*

Department of Surgery, Mayo General Hospital, Castlebar, Co Mayo, Ireland

ARTICLE INFO

Article history:

Received 3 December 2012

Received in revised form 6 December 2012

Accepted 12 December 2012

Available online 25 December 2012

Keywords:

Acute appendicitis

Incisional hernia

Port site hernia

ABSTRACT

INTRODUCTION: Acute appendicitis is a common surgical emergency. The presence of an inflamed appendix in an incisional hernia is rare. Incisional hernias complicate both open and laparoscopic surgery. **PRESENTATION OF CASE:** We describe two unique cases of acute appendicitis within incisional hernias following an open cholecystectomy and a diagnostic laparoscopy. Acute appendicitis was diagnosed intraoperatively and a formal appendectomy was performed with subsequent primary repair of the hernial defect in each case.

DISCUSSION: The method chosen for primary repair of an incisional hernia containing an acutely inflamed appendix depends on a number of factors including size of hernial defect and degree of contamination. Closure of 5 mm port sites is not routine in current surgical practice. Herniation of intra-abdominal contents through such defects can occur rarely. The repair of an incisional hernia using mesh in a contaminated surgical field is controversial. There may be advantages in the use of biological meshes.

CONCLUSION: Surgical awareness of potential complications relating to the management of incisional hernia appendicitis is of primary importance in determining intraoperative strategy.

© 2012 Surgical Associates Ltd. Published by Elsevier Ltd. All rights reserved.

1. Introduction

Incisional hernias continue to be a major burden on health care services. These hernias are the commonest long-term complication following laparotomies, with incidences ranging from 3.8 to 20%.¹ The avoidance of incisional hernias is a proposed benefit of the laparoscopic technique. Port site hernias (PSH) are the laparoscopic equivalent of open incisional hernias and comparatively have a reduced incidence.²

The incidence of acute appendicitis in a hernial sac is reported at 0.008%.³ The presence of a normal appendix in an incisional hernia is extremely rare.⁴ Acute appendicitis in incisional hernias has been described sporadically in the literature. In this case series, we report the first case of acute appendicitis presenting in a 5 mm port site hernia and the first case of acute appendicitis in an upper midline incisional hernia.

2. Presentation of cases

2.1. Case report 1

A 78 year-old male presented with a three day history of central abdominal pain associated with one episode of vomiting. The patient presented with a large upper midline incisional hernia following a previous open cholecystectomy. The incisional hernia was tender and irreducible. A plain film of the abdomen demonstrated

dilated loops of small bowel. Based on clinical and radiological findings, the diagnosis of incarcerated incisional hernia was made. At operation, an incision was made through the previous midline incision revealing a lattice type hernia. Small bowel loops were located in the left sided hernial sac and to the right of the midline, the hernial sac contained the caecum and a macroscopically inflamed appendix. The sac was opened and appendectomy performed. The small bowel and caecum were visibly normal with no evidence of congenital malrotation. Abdominal wall closure was achieved using an inlay biological mesh technique. The patient made an uneventful recovery and histology confirmed acute appendicitis.

2.2. Case report 2

An 81 year-old male presented with a one-day history of abdominal pain associated with bilious vomiting. Computerised tomography (CT) demonstrated free fluid in the abdominal cavity. An emergency diagnostic laparoscopy was performed utilising a 10 mm sub-umbilical camera port and two 5 mm ports in the right and left iliac fossae. A substantial volume of purulent fluid was evident, originating from a recently perforated duodenal ulcer, which had sealed itself. Following laparoscopic lavage, a suction drain was placed in the right paracolic gutter and brought through the 5 mm port site in the right iliac fossa. The patient made an uneventful recovery, with the suction drain removed on the first post-operative day.

Five weeks later, the patient was reviewed complaining of swelling and tenderness in the right iliac fossa. On examination, there was a tender, irreducible mass present at the 5 mm port site in the right iliac fossa. An ultrasound scan was performed and the

* Corresponding author. Tel.: +353 861727509; fax: +353 949021454.

E-mail address: kbarsurg@eircom.net (K. Barry).

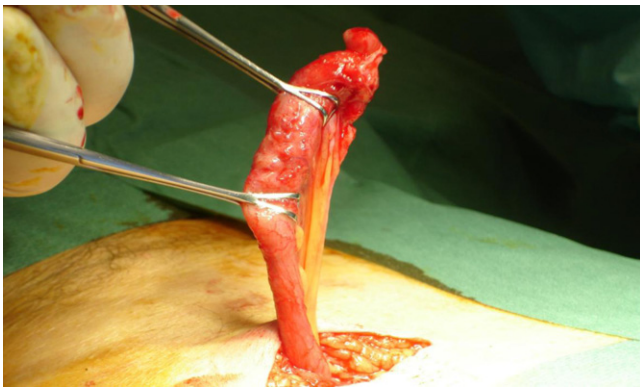


Fig. 1. Appendicitis in 5 mm port site hernia.

relevant images were considered to represent a hernial sac containing the apex of a loop of small bowel. At surgery, the 5 mm port site incision was extended medially and laterally (Fig. 1). The hernial sac contained the distal portion of an inflamed appendix. An open appendicectomy was performed by extending the hernial defect. This defect was then closed and the patient made an uneventful recovery.

3. Discussion

The position of the vermiform appendix in relation to the caecum is varied, with a pelvic orientation the most commonly noted. The appendix may be located in all forms of external hernias.⁵ The two most frequently documented locations are inguinal and femoral, eponymously known as Amyand's and de Garengeot's hernias respectively. Additionally, the appendix has been reported in left-sided inguinal, umbilical and Spigelian hernias.⁶ Hypotheses for these unusual anatomical locations include malrotation during embryonic development, previous surgery and hypermobility of the caecum.⁷ Unlike routine appendicitis, extraluminal compression has been proposed as the explanation for acute inflammation in hernial appendicitis. The cause of extraluminal compression varies from a narrowed hernial neck causing direct ischaemia to repeated trauma creating inflammatory adhesions.

Almost all intra-abdominal organs have been described in incisional hernias, including stomach, small bowel, colon, ovaries and fallopian tube. To the best of our knowledge, Case 1 is the first reported case of acute appendicitis in an upper midline incisional hernia. We speculate that the patient's previous surgery created inflammatory adhesions of the small bowel leading to the midline location of the appendix. Pre-operative diagnosis of hernial appendicitis is difficult to establish. This difficulty arises as the classic symptoms of acute appendicitis are not apparent due to the entrapment of the appendix in the hernial sac. Pre-operative CT may be of benefit in demonstrating the presence of the appendix within unusual incisional hernias. The complexity of the surgical background may influence the decision to request pre-operative imaging. CT diagnosis of a vermiform appendix in a right transverse incisional hernia has been reported in two cases.⁷ In each of these cases, the patient had undergone renal transplantation. Of interest, incisional hernia formation following renal transplantation poses a unique problem as the defect tends to lie deep within the abdominal wall musculature rather than through the external oblique aponeurosis.⁸

Laparoscopic surgery has several well documented advantages over open surgery including shorter hospital admission, decreased analgesia requirements and improved cosmesis. The advent of laparoscopic surgery has resulted in newly described surgical complications including port-site hernia formation. PSH formation is

the most common complication following laparoscopic surgery, with a reported incidence of 0.8–2.8%.⁹ PSH arise from fascial defects originating at trocar entry sites. Risk factors for PSH formation include trocar size, incomplete closure of fascial defects and organ retrieval through the port. To the best of our knowledge, Case 2 is the first reported case of acute appendicitis within a 5 mm port site hernia.

It is routine surgical practice to close fascial defects in port sizes ≥ 10 mm as the port size correlates directly with the incidence of hernia formation.¹⁰ A recent systematic review of 118 PSH identified that 96% arose in port sites of a minimum size of 10 mm.¹¹ There is no published evidence for routine closure of 5 mm port sites in adults.⁹ Nevertheless, identified risk factors for PSH in 5 mm port sites include age greater than 60 years, prolonged trocar manipulation and surgery greater than 90 min in duration.⁹ In Case 2, a Redivac® suction drain was placed and externalised through a 5 mm port in the right iliac fossa. This drain was removed two days later. We postulate that the combination of negative suction pressure and the partial vacuum created by removal of the drain made the appendix more susceptible to herniation. Herniation of a non-inflamed appendix following the removal of a drain through a 5 mm port site has been described. It was hypothesised that the appendix was directly adherent to the intra-abdominal component of the suction drain.¹² Interestingly, the use of a drain placed through a 5 mm port site has been suggested as a risk factor for PSH and the practice of externalising the drain through a 5 mm port site is controversial.¹³

The appearance of an inflamed appendix within an incisional hernia potentiates the complexity of two routinely performed surgical procedures. Difficulty relates to potential violation of aseptic principles by excision of a faecally contaminated organ in a clean contaminated wound. The treatment of hernial appendicitis consists of immediate appendicectomy through the herniotomy with subsequent primary hernia repair.¹⁴ The macroscopic inflammatory appearance of both appendices in Cases 1 and 2 was a clear indication for appendicectomy. Conversely, incidental appendicectomy in the case of a non-inflamed appendix within a hernial sac is not recommended.¹⁵ The method of primary repair of an incisional hernia containing an inflamed appendix is debatable and is determined by the extent of the underlying inflammatory process. Utilisation of synthetic mesh for incisional hernia repair decreases recurrence rates, but increases the risk of wound infection when compared to open suture repair.¹⁶ Considering the rarity of incisional hernia appendicitis, most clinical experience arises from the management of Amyand's hernia. Several authors state that a prosthetic mesh should not be used to repair contaminated defects within the abdominal wall with an increase in recurrence rates observed when compared to clean wounds.¹⁷ Prosthetic mesh can be used safely in the absence of gross contamination or perforation following hernial appendicitis.¹⁸ Synthetic biological mesh was utilised in Case 1, as the size of the hernial defect made it impossible to achieve primary closure otherwise. Mesh repair to close a large right inguinal incisional hernial defect in the presence of an inflamed appendix has been reported.¹⁹ New biological meshes, such as human acellular dermal matix, have been evaluated in contaminated surgical fields with promising results.²⁰ However, the expense and limited international experience with the use of biological meshes may restrict their use in clinical practice.

4. Conclusion

Incisional hernia appendicitis remains a rare entity. Awareness of potential complications relating to the management of this condition determines the appropriate intraoperative strategy.

Biological meshes may have an increasing role in the closure of contaminated incisional hernias.

Conflict of interest statement

None.

Funding

None.

Ethical approval

Written informed consent was obtained from the patients for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contributions

C. Sugrue, A. Hogan and I. Robertson collected the data and prepared the manuscript. Drafting and revision of article and study design were performed by A Mahmood. Critical revision was done and final approval was given by W Khan and K Barry.

References

- O'Dwyer PJ, Courtney CA. Factors involved in abdominal wall closure and subsequent incisional hernia. *Surgeon* 2003;**1**:17–22.
- Latyf R, Slater R, Garner JP. The vermiform appendix presenting in a laparoscopic port site hernia. *Journal of Minimal Access Surgery* 2011;**7**:181–3.
- Carey LC. Acute appendicitis occurring in hernias: a report of 10 cases. *Surgery* 1967;**61**:236–8.
- Horgan PG, O'Donoghue J, Courtney D. Perforated appendicitis in an incisional hernia. *Irish Journal of Medical Science* 1991;**160**:350–1.
- Ash L, Hatem S, Ramirez GA, Veniero J. Amyand's hernia: a case report of prospective ct diagnosis in the emergency department. *Emergency Radiology* 2005;**11**:231–2.
- Thomasset SC, Villatoro E, Wood S, Martin A, Finlay K, Patterson JE. An unusual Spigelian hernia involving the appendix: a case report. *Cases Journal* 2010;**3**:22.
- Dittmar Y, Scheuerlein H, Gotz M, Settmacher U. Adherent appendix vermiformis within an incisional hernia after kidney transplantation mimicking acute appendicitis: report of a case. *Hernia* 2012;**16**:359–61.
- Biolini C, Mazzucchi E, Utiyama EM. Prosthetic repair of incisional hernia in kidney transplant patients. A technique with onlay polypropylene mesh. *Hernia* 2001;**5**:31–5.
- Yamamoto M, Minikel L, Zaritsky E. Laparoscopic 5-mm trocar site herniation and literature review. *Journal of the Society of Laparoendoscopic Surgeons* 2011;**15**:122–6.
- Owens M, Barry M, Janjua AZ, Winter DC. A systematic review of laparoscopic port site hernias in gastrointestinal surgery. *Surgeon* 2011;**9**:218–24.
- Helgstrand F, Rosenberg J, Bisgaard T. Trocar site hernia after laparoscopic surgery: a qualitative systematic review. *Hernia* 2011;**15**:113–21.
- Shaban F, Sewpaul A, Varma J. Port site herniation of the appendix—an unusual complication of laparoscopic surgery. *Darlington and County Durham Medical Journal* 2011;**5**:40–3.
- Bunting DM. Port-site hernia following laparoscopic cholecystectomy. *Journal of the Society of Laparoendoscopic Surgeons* 2010;**14**:490–7.
- Logan MT, Nottingham JM. Amyand's hernia: a case report of an incarcerated and perforated appendix within an inguinal hernia and review of the literature. *American Surgeon* 2001;**67**:628–9.
- Sharma H, Gupta A, Shekhawat NS, Memon B, Memon MA. Amyand's hernia: a report of 18 consecutive patients over a 15-year period. *Hernia* 2007;**11**:31–5.
- den Hartog D, Dur AH, Tuinebreijer WE, Kreis RW. Open surgical procedures for incisional hernias. *Cochrane Database of Systematic Reviews* 2008:CD006438.
- Choi JJ, Palaniappa NC, Dallas KB, Rudich TB, Colon MJ, Divino CM. Use of mesh during ventral hernia repair in clean-contaminated and contaminated cases: outcomes of 33,832 cases. *Annals of Surgery* 2012;**255**:176–80.
- Olsha O, Korotchenko I, Dagan A. Prosthetic mesh repair for incarcerated recurrent inguinal hernia repair containing an acutely inflamed appendix. *The Internet Journal of Surgery* 2010;**22**, <http://dx.doi.org/10.5580/275>.
- Al-Hadithy N, Erotocritou P, Portou MJ, Hamilton H. Appendicitis in an incisional hernia after radical nephrectomy: a case report. *Annals of the Royal College of Surgeons of England* 2010;**92**:23–4.
- Candage R, Jones K, Luchette FA, Sinacore JM, Vandevender D, Reed RL. Use of human acellular dermal matrix for hernia repair: friend or foe? *Surgery* 2008;**144**:703–9.

Open Access

This article is published Open Access at sciedirect.com. It is distributed under the [IJSCR Supplemental terms and conditions](#), which permits unrestricted non commercial use, distribution, and reproduction in any medium, provided the original authors and source are credited.