CASE REPORT

Occult bladder injury after laparoscopic appendicectomy

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SUMMARY

Minimally invasive procedures have revolutionised surgery by reducing pain and the length of hospital stay for patients. These are not simple procedures and training in laparoscopic surgery is an arduous process. Meticulous preparation prior to surgery is paramount to prevent complications.

We report a rare complication involving a 35-year-old patient who underwent a laparoscopic appendicectomy for a perforated appendix. Two days after surgery the patient experienced redness and swelling in the lower abdominal region and oliguria. A delayed computer tomography (CT) scan revealed contrast leakage around the bladder spreading within the peritoneal cavity consistent with an intraperitoneal bladder perforation. She underwent urinary catheterisation for 6 days. A follow-up CT cystogram showed no evidence of leakage into the peritoneal cavity. This case highlights the need for thorough preparation prior to laparoscopic surgery and careful manipulation of instruments during routine procedures to minimise the risk of serious patient complications such as the aforementioned.

BACKGROUND

With the advent of minimally invasive surgical techniques such as laparoscopy, there is tremendous benefit for patients in terms of postoperative pain and length of stay. However, laparoscopic surgery brings new dilemmas and pitfalls to a surgeon. Complications are potentially serious and the instruments used can cause visceral organ injury, including perforation, and damage to deep structures.

The National Patient Safety Association (NPSA) reported in 2010 that there were 48 serious incidents in the preceding 7 years and 11 deaths relating to deterioration of patients postoperatively.¹ We report an unrecognised complication that occurred after a routine laparoscopic procedure for a perforated appendix and discuss the measures that can be taken to minimise risk of iatrogenic visceral injury.

CASE PRESENTATION

A previously well young woman presented to the accident and emergency department with a day history of lower abdominal pain. She had no fevers, diarrhoea, dysuria, vomiting or vaginal discharge and her last menstrual period was 3 weeks before admission. A urinalysis was negative for β -human chorionic gonadotrophin, nitrites and leucocytes. Blood tests were largely normal apart from a raised white cell count of $12.3 \times 10^9/L$. A pelvic ultrasound scan revealed no gynaecological pathology and the appendix was not visualised. However, due

to persistent pain and guarding in the right-iliac fossa a diagnostic laparoscopy was performed.

Prior to the laparoscopy, intravenous co-amoxiclav was administered prophylactically and a temporary 'in-out' urinary catheterisation was performed to empty the bladder of urine. A 10 mm umbilical port (blunt trocar; open technique) was inserted to use the laparoscopic camera and a 5 mm port (bladed trocar) was sited in the left iliac fossa (LIF). The laparoscopy showed a grossly inflamed and oedematous appendix, perforated near the base, abutting the terminal ileum. Despite perforation at the proximal aspect of the appendix, there was minimal secondary intra-abdominal pus contamination. However, free fluid was visualised in the pelvis. A decision was made to proceed to laparoscopic appendicectomy and a third port 10 mm was placed in the midline suprapubic region. Meticulous dissection of the appendix from surrounding structures was carried out using the laparoscopic Maryland grasper, which was also used to haemostatically dissect and strip the mesoappendix from the appendix.

Following application of two endoloops at the base, the appendix was excised using laparoscopic scissors and removed through the suprapubic port which was re-inserted to assist in abdominal washout. Owing to the fact that intrabdominal contamination was minimal, a drain was not left in situ following washout. No additional haemostasis was required and the abdominal wall fascia from the umbilical and suprapubic ports sites were closed with 2-0 Vicryl and 3-0 Monocryl was used for skin closure for all three port sites using subcuticular technique. There were no complications noted during the operation and a decision was made to continue intravenous dosing of co-amoxiclav, three times a day, for 48 h (due to the perforated appendix) after which the patient would be reviewed for hospital discharge.

The following day, the patient noticed swelling and erythema of her lower abdomen. This was compounded by the oliguria and 'cystitis-like' burning of the urethra before her first void. Moreover, she was only able to pass small amounts of urine. The patient remained afebrile and it was noted that clear yellow fluid was discharging from the LIF port-site. A sample of this fluid was sent for analysis and a stoma bag was placed over the LIF port site to facilitate capturing of this fluid to measure output quantities. On examination the abdomen was mildly distended with marked tenderness in the LIF, right iliac fossa and suprapubic regions with no evidence of peritonism. Furthermore, the patient was opening her bowels normally and eating with no discomfort. The

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erythematous area of skin (10 cm×10 cm) surrounding the LIF port was warm and tender with induration, in keeping with cellulitis.

INVESTIGATIONS

- ▶ Blood tests: Full blood count was within normal limits. Her creatinine had increased from 51 to 124 $\mu\text{mol/L}$ with other electrolytes being normal. C reactive protein (CRP) was elevated at 54 mg/L but there was a downward trend from 172 mg/L postsurgery.
- ▶ Drain fluid and wound swab analysis showed an elevated urea level at 84 mmol/L consistent with that of urine. There were no organisms present on Gram stain or culture. The wound swab was reported as sterile.
- ▶ CT of the abdomen and pelvis with contrast was carried out following discussion with the on-call consultant radiologist. This showed evidence of leakage of contrast around the bladder into the peritoneal cavity and retroperitoneal space (figure 1).

DIFFERENTIAL DIAGNOSIS

- ▶ Bladder injury secondary to instrument manipulation
- ▶ Coagulation lesion of bladder with rupture after voiding urine
- ▶ Secondary wound infection
- ▶ Oedema and washout from the operation

TREATMENT

The diagnosis of a bladder injury was made after the delayed contrast CT scan demonstrated intraperitoneal leakage of contrast originating from the bladder. Following discussion of this case with the urology team, the patient underwent urinary catheterisation for 6 days and in light of the bladder injury and unresolving

cellulitis, the microbiology team advised a change of antibiotic regimen to intravenous Tazocin and Teicoplanin for 4 days which was converted to oral co-Amoxiclav as prophylaxis while the urinary catheter was in situ. Her observations, urine output and renal function were monitored throughout her time in hospital, and were within normal limits.

OUTCOME AND FOLLOW-UP

Urinary catheterisation resulted in a resolution of the patient's symptoms over time. On the second day postsurgery, she developed a creatinine rise from 51 (eGFR >90) to 124 mg/L (eGFR 43). This was thought to be due to absorption of urinary contents in the peritoneal cavity and re-circulation leading to an increased serum creatinine. However, this reduced along with the lower abdominal swelling and erythema. Her urine output was also within normal limits and the 'cystitis-like' symptoms resolved.

Six days after urinary catheter insertion, the patient's pelvic swelling completely resolved. Following senior urology review, a CT cystogram was conducted, which showed no evidence of contrast in the peritoneal cavity after insertion of 300 mL of diluted contrast into the bladder through the sited urinary catheter. Thus, the latter was removed and the patient was discharged from hospital. The patient had no pelvic pain or urinary discomfort at a 4 week follow-up in clinic.

DISCUSSION

Bladder injury is a rare complication of laparoscopic surgery; it is estimated to occur in 0.5% of all general surgery laparoscopic procedures.² Often these are diagnosed intraoperatively and a bladder suture is performed however there has been a report of a delayed diagnosis of bladder injury after gynaecological surgery.³

Hollow organs should be decompressed to minimise damage to these structures as per surgical guidelines.⁴ Although in our patient, the bladder was deemed decompressed prior to surgery, it was clear from the nature of the injury that within a short space of time the bladder volume had increased to a size extending beyond the pelvic brim, owing to rapid re-accumulation of urine, in order for the iatrogenic injury to have occurred.

Laparoscopic surgeons have been a target for litigation with the increase in day-case or short-stay procedures.⁵ These patients are rarely monitored in the postoperative period to identify signs of deterioration and occult injuries can be easily missed. One US study showed that two-thirds of laparoscopic injuries were initially missed.⁶

We recommend using a checklist for routine surgical procedures such as laparoscopic appendicectomies and cholecystectomies to minimise the risks of injuries to patients. Additionally, this case also has implications for patient consent and the potential for bladder injury should be mentioned to all patients undergoing these procedures.

Figure 1 (A) A delayed CT scan of the pelvis with contrast showing leakage into the peritoneal cavity. A bladder defect can be visualised (black arrow). (B) The corresponding level from the CT cystogram showing no contrast in the peritoneal cavity.

Learning points

- ▶ During a laparoscopic appendicectomy, the bladder should remain decompressed with the use of a urinary catheter for the duration of the procedure.
- ▶ A rise in serum creatinine after abdominal surgery can be an indication for a urine leak.
- ▶ A relatively small intraperitoneal bladder injury can be managed conservatively with urinary catheterisation for 5–7 days if detected postoperatively.

Competing interests None.

Patient consent Obtained.

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