Systematic review of internal hernia formation following laparoscopic left nephrectomy

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ABSTRACT

This is the first identifiable description where internal herniation following laparoscopic left nephrectomy necessitated gangrenous small intestinal resection; similar cases and prevention are discussed.

KEYWORDS

Hernia – Laparoscopy – Left nephrectomy – Small intestine resection

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Case report

A 45-year-old woman presented with worsening, constant, left-sided abdominal pain and distension, having experienced pain following laparoscopic left nephrectomy for benign renal oncocytoma 9 weeks previously. Whilst diet had exacerbated this pain, it usually settled spontaneously. Computed tomography (CT) scanning 4 weeks previously was normal. Her temperature was 37.5°C, pulse 120/min, with dyspnoea, abdominal distension, left upper quadrant guarding. Tests included raised white cells (12.6 x10), C-reactive protein (45 mg/l), urea (10.4 mmol/l), creatinine (168 µmol/l), normal erect chest, abdominal X-ray, lactate (4.6 mmol/l) and haemoglobin (8.7 g/dl). Urgent contrast-enhanced CT revealed dilated, left-sided small bowel; venous congestion suggested closed loop obstruction with ischaemia.

At emergency laparotomy, 150 cm of gangrenous small intestine was retrieved from a narrow internal hernial orifice in the upper descending colonic mesentery, resected with anastomosis, and the hernial orifice repaired.

Postoperative recovery was uncomplicated, with discharge on day 6. A further episode of adhesive obstruction 4 weeks later resolved conservatively. No nutritional sequelae have manifested.

Systematic review

A literature search using 'laparoscopic nephrectomy' and either 'hernia' or 'bowel obstruction', for 'title and text'

using the National Library for Health included the following sources: Bandolier, Cochrane Library, DARE, HTA Database, NHS EED, CICS, National Library of Guidelines, NICE Guidance, Protocols and Care Pathways, AMED, British Nursing Index, CINAHL, E-Books, EMBASE, HMIC, MEDLINE, My Journals, PsycINFO, PubMed, Databases from Dialog. Reference lists of all relevant papers were also searched; only papers relating to adults were included.

Six articles detailing eight cases of bowel obstruction due to internal hernia were identified. All were following left laparoscopic nephrectomy. Two articles were deemed unsuitable as whilst they mention 'bowel herniation through a mesenteric hole that occurred 17 months following the (surgery)',¹ and one 'developed bowel obstruction secondary to entanglement of a loop of small bowel in the fascial closure',² no further specific details were given. The seven cases, including ours, are documented in this review (Table 1).^{3–6}

Results

There were five men and two women, median age 44 years. Significant history included cholecystectomy and hysterectomy in one patient.⁴ Four were cases of donor nephrectomy,^{5,5} one was for a hydronephrotic non-functioning kidney⁴ and two were suspicious renal masses (including our case).⁶

Mean time between initial nephrectomy and emergency presentation was 20 days. Whilst six of seven cases underwent imaging (five CT abdomen and pelvis, one small

Table 1 Summary of cases: patient characteristics, details of initial operation and management

Reference	Age (years)	Sex	Time from first operation	Reason for nephrectomy	Management of obstruction	Days to discharge
Knoepp <i>et al.</i> (1999) ³	25	M	1 month	Donor nephrectomy	Laparotomy, reduction of herniated bowel and repair of mesenteric hernia	4
Regan <i>et al.</i> (2002) ⁵	23	M	5 days	Donor nephrectomy	Laparotomy, reduction of herniated bowel and repair of mesenteric hernia	1
Regan <i>et al.</i> (2002) ⁵	46	M	1 week	Donor nephrectomy	Laparoscopy, reduction of herniated bowel and repair of mesenteric hernia	37
Regan <i>et al.</i> (2002) ⁵	59	M	5 days	Donor nephrectomy	Laparotomy, reduction of herniated bowel and repair of mesenteric hernia	6
Letourneux <i>et al.</i> (2006) ⁴	69	F	3 weeks	Atrophic kidney	Laparotomy, reduction of herniated bowel and repair of mesenteric hernia	12
Wong <i>et al.</i> (2007) ⁶	43	M	11 days	Renal carcinoma	Laparotomy, reduction of herniated bowel and repair of mesenteric hernia	4
This study	45	F	9 weeks	Oncocytoma	Laparotomy, reduction and resection of ischaemic bowel, repair of mesenteric hernia	6

bowel series) demonstrating small bowel obstruction, only one CT and the small bowel series suggested an internal hernia as aetiological.

One case failed conservative management,⁵ and all required surgery. Six underwent laparotomy and one laparoscopy. In all cases previously reported, small bowel herniating through a left colon mesenteric defect was successfully reduced without resection, and the defect closed; our case required resection. Patients were discharged at a median of day 6; one prolonged stay was due to a further laparotomy and cholecystectomy for worsening abdominal pain and sepsis.⁵

Discussion

Whilst this case is the first reporting gangrenous bowel after internal hernia following laparoscopic left nephrectomy, ischaemia complicates 22–64% of internal hernias.^{7,8} Mortality following strangulated small bowel obstruction is 3–44%,^{9,10} 10-fold higher than in non-strangulation.¹¹ Increased morbidity relates to reperfusion injury, which can precipitate septic shock. Extensive resection (usually loss of 50% of small intestine, a figure approached in our case) risks short bowel syndrome, and is characterised by malabsorption, diarrhoea, steatorrhea, fluid and electrolyte disturbances, and malnutrition. Parenteral nutrition is sometimes required. Furthermore, cases of gangrenous bowel are also associated with increased postoperative stay,^{10,12} morbidity and cost.

Internal hernias only account for 1.9–3% of cases of small bowel obstruction.¹³ Presentation can be non-specific and, after surgery, the onset of symptoms is variable, from hours to months or even years.⁸ Tachycardia, focal tenderness and presence of the systemic inflammatory response syndrome (SIRS) suggests ischaemia.^{14–16} Given the high morbidity and mortality, it is important to minimise internal hernia occurrence where possible. Large internal hernias are, however, less likely to cause strangulation, as they have a wide neck.

The mechanism of the defect leading to internal hernia in laparoscopic left nephrectomy is established: on left colonic mobilisation to provide access to the kidney, a defect is accidentally made in the mesentery, which is usually very thin at this point where it has been loosely attached to Gerota's fascia. It has been suggested that formation of this defect can sometimes be avoided by dissecting close to Gerota's fascia medially, and staying lateral to the gonadal vein.⁵ However, in nephrectomies undertaken for renal malignancy, the gonadal vein is often dissected, making it impossible to stay lateral to it. Moreover, even with optimal surgical technique, these defects may occur, especially in thin patients whose mesentery contains little fat. Whether these defects are less likely with extraperitoneal approaches is unclear. It would seem prudent that, during the initial operation, the mesentery is specifically checked for defects, which could then be repaired simultaneously. During this repair, care must be taken to avoid the marginal vessels supplying the colon which can, along with

their branches, descend low into the colonic mesentery at this point close to the splenic flexure (Griffith point). In this manner, later presentation with internal hernia might be avoided.

In addition, where patients subsequently present with unexplained pain after laparoscopic left nephrectomy, even where imaging does not visualise a mesenteric hernia, this diagnosis ought to be entertained and re-laparoscopy considered to repair any visible defects.

Conclusions

Internal hernias are a rare cause of obstruction following laparoscopic nephrectomy; however, as they are commonly complicated by ischaemic bowel, the mesentery should be inspected during laparoscopic nephrectomy, and visible defects closed.

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