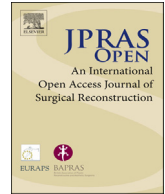




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Case Report

Loss of domain leading to intra-operative cardiorespiratory arrest during open repair of a giant inguinoscrotal hernia and hydrocele

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ABSTRACT

We present the case of a 73-year-old man with a longstanding, giant inguinoscrotal hernia and hydrocele treated by an open approach, complicated intra-operatively by loss of domain leading to cardiorespiratory arrest. Surgery involved a midline approach by the general surgeons. Protruding viscera were mobilised, freed from adhesions, and returned to the abdominal cavity with closure of the internal ring, followed by reconstruction of the penis and scrotum by the plastic surgery and urology teams. Following abdominal closure, the patient developed severe cardiorespiratory instability attributed to large fluid shifts and increased intra-abdominal pressure due to loss of domain. The abdomen was therefore left open, and an ABThera negative pressure therapy system was employed. Two days later the abdomen was closed without tension. The remainder of the patient's post-operative recovery was unremarkable.

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Introduction

Giant inguinoscrotal hernias are uncommon in developed countries, though may present after years of neglect. Generally defined as a hernia which extends below the mid-thigh on standing, they are notoriously difficult to manage, with significant morbidity and mortality associated with corrective surgery due to a phenomenon known as loss of domain. We present the case of a 73-year-old man with a longstanding, giant inguinoscrotal hernia and hydrocele treated by an open approach, complicated intra-operatively by loss of domain leading to an abdominal compartment syndrome-like picture.

Case presentation

A 73-year-old man was admitted to A&E with acute bleeding from the scrotal skin on a background of a 4-year history of a giant inguinoscrotal hernia and hydrocele. He had no other significant past medical or surgical history. The patient lived alone and was independently self-caring. His only other complaint was urinary incontinence as a result of his penis being hidden within his enlarged scrotum.

Physical examination revealed a large, irreducible inguinoscrotal hernia and hydrocele, extending to the mid-calf. Testes were non-palpable, and penis retracted (Figure 1). Bowel sounds could be auscultated within the hernia mass. Source of bleeding was from dilated scrotal surface veins. He was mildly tachycardic, though haemodynamically stable. The patient received two units of packed red cells and a CT scan was requested. This demonstrated an extensive right-sided inguinal hernia containing normal small and large bowel loops, with no evidence of intestinal ischaemia. There was a large volume of free fluid along with an organising haematoma visualised within the right hemiscrotum. Testes were atrophic bilaterally (Figure 2a and b).

The patient's haemoglobin continued to drop—59 g/L at its lowest—despite receiving a total of 6 units of packed red cells. He underwent a gastroscopy to rule out any other sources of bleeding, which was negative for any acute findings. The need for surgery to prevent deterioration and/or perforation was re-discussed with the patient, and despite previous refusals, he agreed to go ahead with surgery.

Surgery involved a midline approach. Protruding viscera were mobilised, freed from adhesions, and returned to the abdominal cavity with closure of the internal ring. This was followed by reconstruction of the penis and scrotum using fasciocutaneous flaps by the plastic surgery and urology teams. A total of 3 kg of lymphoedematous scrotal tissue was excised (Figure 3a–c). The right testis was non-viable, and so was excised.

Intra-operatively he developed severe cardiovascular instability with atrial fibrillation (AF) with rapid ventricular response. This was attributed to large fluid shifts—a total of 12 litres of fluid drained from the scrotum, and increased intra-abdominal pressure secondary to loss of domain. He was



Figure 1. Clinical examination findings.

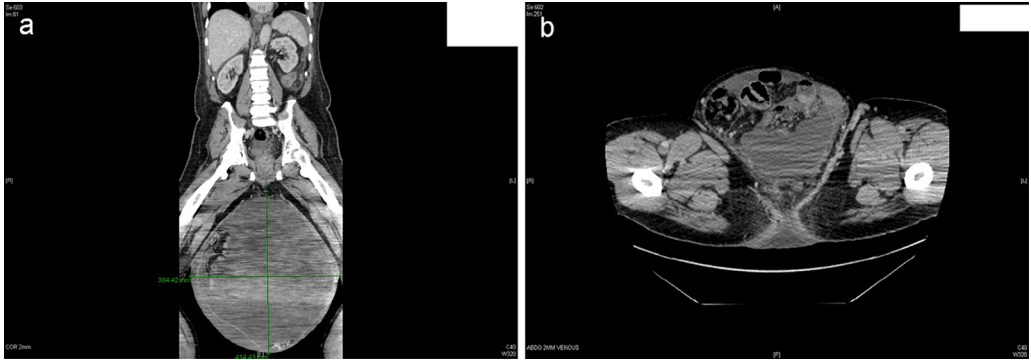


Figure 2. (a and b) CT of abdomen/pelvis with contrast images. a) Coronal and b) sagittal slices demonstrating a large indirect inguinal hernia of 38.4 × 41.4 cm width/length, containing multiple loops of non-dilated large and small bowel, and large amounts of free fluid. No evidence of obstruction/ischaemia is reported.

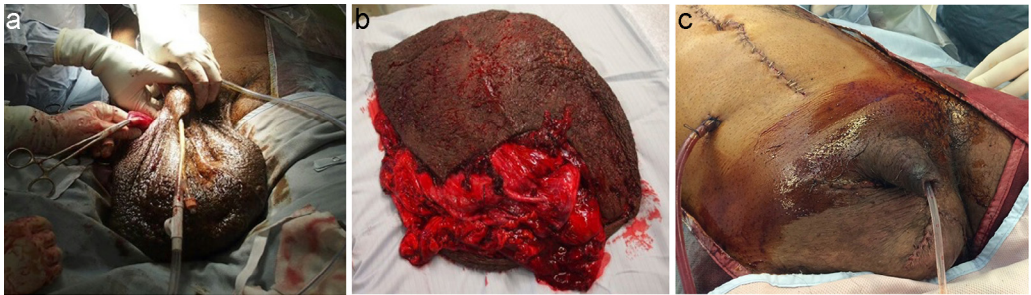


Figure 3. (a–c) peri-operative images detailing reconstruction of the penis/scrotum. a) Mobilisation of the hernia sac, b) excised scrotal tissue, and c) final operative result.

cardioverted twice, and started on an amiodarone infusion. A laparostomy was performed, and an ABThera open abdomen negative pressure therapy system was employed (Figure 4).

The patient was transferred to ITU post-operatively for inotropic support with noradrenaline. He remained intubated and was started on aggressive antibiotic therapy with IV metronidazole and vancomycin as guided by microbiology advice. During the first few days of his admission there were concerns regarding shocked bowel and so a repeat CT was performed, which was suspicious for bowel ischaemia. He was subsequently taken to theatre for a re-look, at which point the patient's abdomen was closed without tension. There was no evidence of bowel ischaemia intra-operatively.

The rest of the patient's hospital stay was unremarkable. He was extubated on day 2 following his second theatre visit, and was stepped down to the ward 2 days later. The catheter was removed successfully. He was referred to social services for assessment owing to safeguarding concerns surrounding his delayed presentation, and was reviewed daily by the inpatient rehabilitation team for assessment of ongoing care needs. No further safeguarding concerns were raised and the patient was discharged home with an enablement package of care 18 days post-operatively.

Discussion

Most reports define a giant inguinal hernia as that which extends beyond the mid-point of the thigh on standing.¹ Presenting symptoms include voiding difficulty, urinary retention and pressure sores, as well as scrotal skin excoriation, infection, and bleeding from congested veins as reported in our



Figure 4. ABThera open abdomen negative pressure therapy system employed post-laparostomy.

case.² They are known to be significantly challenging in terms of surgical management, with intra-abdominal hypertension as known complication, and a high rate of mortality associated with forced reduction.³ This occurs due to loss of domain—a phenomenon whereby the abdominal cavity is no longer able to accommodate the herniated contents within its fascial boundaries.

In our literature review, the main risk factor identified was neglect and, unsurprisingly, giant inguinal hernias are of rare occurrence in the developed and modern era of medical practice. A recent case was reported in Italy however, of a right-sided giant inguinal hernia developing over 10 years, measuring 20 × 18 cm.⁴ Old age and rural setting were reported as the main risk factors in this case, consistent with reports from the US.⁵

There is little evidence to support a single “best” surgical approach towards this rare condition and as such decisions regarding repair technique are often made intra-operatively. A paper published in 2014 described a new classification for giant inguinal hernia, which discussed evidence-based recommendations for recommended surgical procedure according to this classification.⁶ The authors classified inguinal hernias into three types according to the anatomical locations to which they extend. This paper recommends that “Type III” hernias—those which extend beyond the mid-calf on standing—should utilise increased intra-abdominal volume procedures such as pre-operative progressive pneumoperitoneum or lengthening of the abdominal wall using rotational flaps before forced reduction and hernioplasty are attempted. Other techniques described to overcome loss of domain include extensive bowel resections in the form of total colectomy or hemicolectomy, omentectomy, splenectomy, and even small bowel resections.^{2,7} A case published in Malaysia recently, however, reported successful reduction of a giant inguinoscrotal hernia via an inguinoscrotal approach, avoiding the need for midline laparotomy completely.⁸ Although the patient developed an element of increased abdominal pressure, he did not develop organ failure and recovered eventually with conservative management. This report highlights that in some cases, a more modest surgical approach may be utilised successfully without significant peri- or post-operative complication, and therefore such approaches are worth considering as an alternative to extensive surgery.

In summary, our report highlights some of the risks associated with surgical management of massive inguinoscrotal hernia, and some of the advantages of a multidisciplinary approach. Such hernias pose a formidable challenge to the surgeon, although surgery represents the only mode of treatment that can offer satisfactory improvement in quality-of-life. Following our literature review we recognise that it is difficult to suggest a single, best management approach as most papers reviewed describe individual case reports and operative techniques are likely to be influenced by intra-operative findings. We therefore suggest that the risks/benefits of several surgical techniques are carefully balanced with

the comorbidities of the patient, as well as the experience of the operating surgeons, to determine the best approach. Moreover, we reinforce the fact that the careful monitoring of abdominal pressure post-giant inguinal hernia repair in an intensive care setting is integral in detecting and managing potential post-operative complications early, and thereby improving outcomes.

Conflict of interest

None to declare.

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