Extra-abdominal manifestations of retroperitoneal infection: a case of popliteal sinus secondary to duodenal ulcer

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ABSTRACT

Retroperitoneal abscesses can be gastrointestinal, urological or vascular in origin, and can spread via the retrofascial compartment through the psoas muscle to the lower limb. We describe the case of a 73-year-old woman with right knee pain for three weeks, a cellulitic right thigh and cholestatic liver function tests. A purulent sinus developed in the popliteal fossa and computed tomography of the abdomen revealed a right-sided retroperitoneal collection with gas, extending to the right pelvis and inguinal region. The popliteal fossa sinus and retroperitoneal collection were identified as a single pathology through computed tomography, magnetic resonance imaging and culture of identical organisms. At laparotomy, perforated duodenal ulcer disease was identified as the cause of the retroperitoneal abscess. Clinicians should seek to exclude retroperitoneal sources of infection in cases of lower leg infection, including perforated duodenal ulcer, caecal adenocarcinoma and appendicitis.

KEYWORDS

Lower extremity surgery – Retroperitoneal space – Duodenal ulcer surgery – Abdominal abscess

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Background

The retroperitoneum is a potential space in the posterior abdomen bounded by the peritoneum anteriorly and the transversalis fascia posteriorly.¹ Infection in the retroperitoneum often presents with vague, non-specific symptoms that can lead to delayed presentation. As a result, outcomes can be poor, with high morbidity and mortality.² Infection originating in the retroperitoneum can spread to the lower limb via the muscle sheaths of psoas major and iliacus (and more distally in the pelvis piriformis and obturator internus). In extremely rare instances, infection via this pathway tracks below the knee.

We describe a case of retroperitoneal abscess, secondary to a perforated duodenal ulcer, tracking via the psoas muscle to the mid-calf; initially presenting as a discharging popliteal fossa sinus. This is the first report of a perforated duodenal ulcer as the cause for a discharging popliteal sinus.

Case history

A 73-year-old woman presented to the emergency department with right knee pain for three weeks, for which she had been taking naproxen. On examination, the knee was hot

and the thigh cellulitic. The abdomen was soft and non-tender. The patient was hypotensive, with white cell count $9.8 \times 10^9/l$; C-reactive protein 376mg/l; creatinine 132µmol/l (baseline 53µmol/l) and cholestatic liver function tests (bilirubin 54µmol/l; alkaline phosphatase 239u/l; alanine transferase 52u/l).

Knee aspiration, ultrasound of the abdomen and ultrasound of the lower limb to exclude deep venous thrombosis were unremarkable on admission. Two days after admission, the patient had coffee-ground vomiting with a drop in haemoglobin from 114g/l to 99g/l, but an endoscopy could not be performed due to her deteriorating condition and sepsis. A purulent discharge from the right popliteal fossa from a 20 × 10mm sinus was then noted. Surgical exploration and washout revealed that it tracked proximally into the thigh and distally into the calf. *Escherichia coli* and *Enterococcus* spp were isolated from intraoperative pus and blood cultures.

Owing to continuing epigastric abdominal pain, further investigations were done. Non-contrast computed tomography (CT) of the abdomen and pelvis demonstrated a retroperitoneal collection containing gas, extending along the right paracolic gutter to the right pelvis and inguinal region, 17 × 9 × 3cm in size (Figures 1 and 2). A magnetic resonance image of the thigh demonstrated continuity of the retroperitoneal abscess and soft tissue oedema along

the length of the thigh posteriorly (Figures 3 and 4). An ultrasound-guided retroperitoneal drain was inserted, removing 25ml of pus. Culture of the pus grew *E. coli* and *Enterococcus* spp identical to those found in the popliteal fossa and blood samples.

The popliteal fossa sinus failed to heal with debridement, vacuum-assisted therapy and antibiotics. It enlarged to a 10 × 6cm cutaneous defect with exposed tendon and fascia, and undermined the skin at least 10cm proximal and distal to the popliteal skin fold.

Figure 1 Axial computed tomography of the abdomen with contrast at L4 level showing an abscess in the right paracolic gutter in retroperitoneum with gas

Figure 2 Coronal computed tomography of the abdomen and pelvis with contrast; gas and abscess visualised in the right paracolic gutter in retroperitoneum

Five weeks into admission, routine flexible sigmoidoscopy was performed to investigate bowel wall thickening seen on CT. The patient complained of epigastric pain post-procedure and a repeat CT suggested perforation with free gas and fluid. Open laparotomy revealed the cause of acute deterioration as a pre-pyloric, perforated gastric ulcer, which was sutured with 2-0 vicryl and covered with omental patch.

A second ulcer at the retroperitoneal duodenum was identified but was not amenable to surgical repair. Significant adhesions and inflammation were present and extensive lavage was performed. Pre-pyloric ulcer biopsy was negative for *Helicobacter pylori* but *H. pylori* eradication therapy was still given in addition to a proton pump inhibitor.

After six days the patient started a soft diet and after 17 days (54 days from admission) she was safely discharged. The popliteal sinus healed rapidly following the laparotomy and peritoneal lavage. Three months after discharge, the defect was grafted using a gastrocnemius pedicle flap and split skin graft (Fig 5). A follow-up endoscopy was also performed at three months and demonstrated healed ulcers in the pre-pylorus and duodenum. At one year follow up, the patient remained fully recovered.

Discussion

Anatomically, the psoas (and more distally the iliopsoas) muscle can transmit infection from its origin in the

Figure 3 Sagittal magnetic resonance imaging of the femur with gadolinium contrast showing subcutaneous oedema in right thigh and collection in posterior thigh

Figure 4 Axial magnetic resonance imaging of the femur with gadolinium contrast showing subcutaneous oedema and collection in right posterior thigh

Figure 5 Posterior view of the knee at one-year follow-up. Donor site of split skin graft (white arrow). Site of initial discharging sinus and resultant recipient graft site (black arrow). Healed site of a second sinus (red arrow).

thoracic and lumbar spine to its insertion on the lesser trochanter of the hip. In this case, a retroperitoneal collection was shown to be in continuity with a popliteal sinus via the psoas muscle radiologically and through a culture of identical organisms. Acute deterioration of the patient five weeks into admission led to a laparotomy and repair of an anterior, pre-pyloric gastric ulcer as the cause for this.

However, this also unexpectedly demonstrated a retroperitoneal duodenal ulcer as the cause of the original retroperitoneal collection. A definitive cause for the ulcers could not be identified. However, the patient had been taking naproxen prior to admission and samples from the pre-pyloric ulcer were negative for *H pylori*.

Several case reports exist of infection spreading from the retroperitoneal space into the psoas muscle, groin or gluteal region and in rarer instances the thigh and calf. The majority of these reports are secondary to caecal cancer fistulating through the retroperitoneum.

Das *et al* and Timbrell *et al* previously describe 69-year-old men with a cellulitic right thigh and calf.^{3,4} Further imaging demonstrated iliopsoas abscesses secondary to perforated caecal cancer in both cases. In the report by Das *et al*, the iliopsoas abscess tracked to the medial adductor compartment of the thigh and medial calf.³ In contrast, Timbrell *et al* describe spread into the lateral thigh and calf.⁴ Both patients received extensive debridement and vacuum-assisted therapy at the thigh and calf without skin grafting, and without evidence of sinus in the lower limb.

Hsieh *et al*, on the other hand, report a retroperitoneal abscess from perforated appendicitis.⁵ Infection spread to the lower limb via the psoas muscle but not beyond the distal thigh. The patient successfully recovered after open appendicectomy, washout of the retroperitoneum and drainage of the thigh abscess through a separate incision.

Conclusion

This case is the first to describe a discharging sinus in the popliteal fossa from a retroperitoneal source, and the first to report lower limb infection from a duodenal ulcer. Clinicians should be alert to the infrequent possibility of abdominal sources of lower limb infection and seek to

exclude this clinically. When this does occur, it is most frequently secondary to a perforated caecal adenocarcinoma but can be due to a perforated duodenal ulcer or appendicitis. Treatment must involve drainage of the retroperitoneal abscess and limb abscesses through separate approaches.

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