International Journal of Research in Medical Sciences
Kumar D et al. Int J Res Med Sci. 2023 Dec;11(12):4481-4487
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20233718

Case Series

Retroperitoneal abscesses: a diagnostic dilemma – case series, review of the literature and practical guide for the management of iliopsoas abscessess

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Received: 27 September 2023
Revised: 02 November 2023
Accepted: 06 November 2023

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ABSTRACT

Retroperitoneal abscesses are uncommon clinical conditions which can pose a notoriously difficult diagnostic dilemma. This paper focuses on the management of secondary iliopsoas abscesses (IPA). We aim to review the literature for the diagnosis and management of IPA, as well as present our IPA pathway, which we believe will reduce the difficulties clinicians may encounter when treating patients with IPA. Our three IPA cases are of colorectal, orthopaedic and urological origin. All patients underwent percutaneous drainage of the IPA, with one proceeding to open drainage. No mortalities were reported. IPA is a condition that presents diagnostic and therapeutic challenges to clinicians. The classical triad of IPA comprising of fever, abdominal/back pain and a limp is reported in just 5 – 30% of cases. Computed tomography remains the gold standard for diagnosis and radiologically guided drainage should be attempted in the first instance. The literature emphasizes the importance of maintaining a high index of suspicion for IPA, as it can be easily misdiagnosed within a wide range of differentials. Empirical treatment consists of broad-spectrum antibiotics, which should be adjusted when blood/aspirate cultures are available. Open drainage should be reserved for cases where percutaneous attempts are not appropriate, unsuccessful, or a patient clinically deteriorates. In a practical sense there is often confusion as to which specialties should best manage IPA. In recognising these difficulties, an IPA pathway would act as a concise guide for clinicians and ultimately optimise patient care.

Keywords: Retroperitoneal abscess, Iliopsoas abscess, Iliopsoas abscess management

INTRODUCTION

Retroperitoneal abscesses (RPA) are uncommon clinical conditions which pose a notoriously difficult diagnostic dilemma for clinicians, due to their insidious onset and wide array of presenting signs and symptoms. There are many descriptions of the anatomical boundaries of the extraperitoneal space, however when attempting to define retroperitoneal abscess positions we favour the classifications described by Crepps et al, perinephric, upper retroperitoneal, pelvic, combined upper retroperitoneal and pelvic and localized musculoskeletal.[1] The localized musculoskeletal retroperitoneal space can also be referred to as the iliopsoas compartment and it is these types of retroperitoneal abscesses we will be focusing on in this article.

First reported in 1881, an iliopsoas abscess (IPA) is defined as a collection of pus within the iliopsoas compartment.[2] Historically and in the developing world, IPA are associated with tuberculosis of the spine. However, in modern medicine and since the introduction of tuberculosis vaccines, alternative causes of IPA have been identified. The aetiology of IPA can be categorised into either primary or secondary origin (Table 1), with each being directly linked to iliopsoas anatomy.

Located within the extraperitoneal space, the iliopsoas compartment comprises of the iliacus muscle, along with the psoas major muscle. The iliopsoas compartment forms part of the posterior abdominal wall, lying posteriorly at the retroperitoneal level. Anteriorly the iliopsoas compartment's fascia is contiguous with that of the kidneys, pancreas, descending aorta, inferior vena cava, duodenum, as well as ascending and descending colon. Inferiorly the fascia unites with that of the pelvic floor and fascia lata of the thigh. Arterial blood supply to the iliopsoas compartment is primarily from branches of the external iliac artery, with venous drainage via the external iliac vein. Lymphatic drainage of the iliopsoas compartment is via the external iliac lymphatic plexus, which feeds into the common iliac plexus.

The anatomy of the iliopsoas compartment (Figure 1) is key in the development of IPA. Primary causes are due to haematogenous or lymphatic spread from a distant pyogenic source, whereas secondary causes are attributable to a neighbouring infectious/inflammatory process, directly invading the iliopsoas compartment.[2] Due to the various different aetiologies of IPA, presenting symptoms can be vague and vary greatly – which can make identifying and treating IPA challenging.

Table 1: Aetiology of iliopsoas abscess.

Primary iliopsoas abscess	Secondary iliopsoas abscess
Haematological/ lymphatic spread to the iliopsoas compartment from a distant pyogenic site	Direct invasion of nearby inflammatory/ infectious process into the iliopsoas compartment
Diabetes mellitus	Crohn's disease
Intravenous drug abuse	Vertebral osteomyelitis
Acquired immunodeficiency syndrome	Diverticulitis
Renal failure	Infectious sacroiliitis
Immunosuppression	Appendicitis
	Septic arthritis
	Colorectal carcinoma
	Orthopaedic intervention
	General surgical intervention
	Mycotic abdominal aortic aneurysm
	Urinary tract infection
	Endocarditis
	Urological carcinoma
	Suppurative lymphadenitis
	Urological intervention

Our case series of IPA focuses on three types of secondary IPA and highlights the diversity in patient presentation, the difficulty in making the correct diagnosis, as well as the lack in clarity in which specialty should lead patient care.

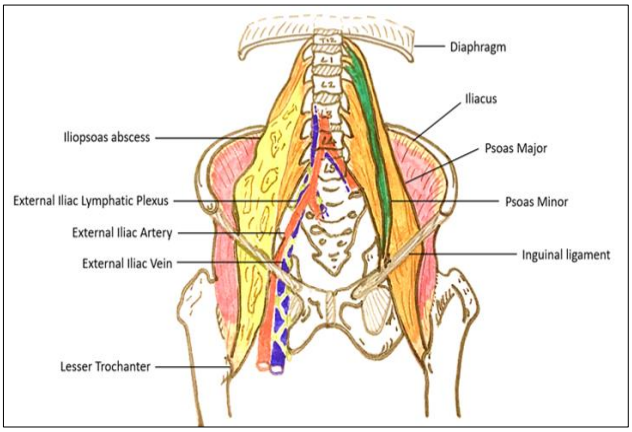

Figure 1: The anatomy of iliopsoas compartment.

CASE SERIES

Case 1: colorectal origin

This 71-year-old lady presented to hospital with a fever and left groin swelling, which had been increasing in size and pain over a 2-week period. She had no significant past medical history. On examination she was found to have a tender lump in the left inguinal region, with overlying erythema and her left leg was held in a flexed and externally rotated position. Admission bloods revealed: C – reactive protein 362, white cell count 11.9, electrolytes and renal function were normal. The patient was admitted under the general surgical team and a computed tomography (CT) scan was arranged to investigate the contents of a presumed incarcerated left inguinal hernia.

The CT scan reported a large left IPA with extensive gas and fluid. The abscess was seen to be pointing in the left groin (Figure 2). This initial imaging reported the rectal wall and sigmoid colon appeared irregular, possibly due to an underlying malignancy. These appearances suggested localised perforation into the left iliopsoas from a presumed malignant lesion. A gastrograffin enema study was then performed, however this did not show any extravasation of contrast, or obvious mucosal abnormality. A subsequent magnetic resonance imaging (MRI) scan of the spine revealed hyperintense signals involving L2-L4 intervertebral discs, which raised the suspicion of infective spondylodiscitis. However, reviews of the images by a tertiary spinal unit ruled out infective spondylodiscitis (Figure 2).

CT guided percutaneous drainage was performed on day 2 of admission and aspirate cultures reported heavy growth of *E. coli*, as well as *Klebsiella pneumoniae* which was sensitive to amoxicillin. Despite this intervention, repeat imaging showed no significant improvement in the size of the IPA. The patient's renal function then deteriorated and a CT urogram identified left hydroureteronephrosis, due to

compression by the left IPA (Figure 2). A decision was made to proceed with surgery with involvement of both the general surgical and urology teams.

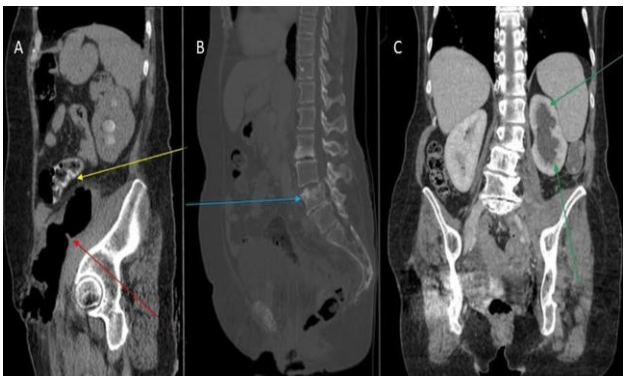

Figure 2: CT imaging demonstrating (A) a large left IPA (red arrow) with contrast loaded colon (yellow arrow), (B) L4 vertebral lesion (blue arrow), and (C) left side hydronephrosis (green arrow).

A diagnostic laparoscopy + JJ stenting of the left ureter was performed. Intra-operatively the sigmoid colon was found to be tethered to the lateral abdominal wall and a decision was made to complete a loop sigmoid colostomy due to a presumed diagnosis of a localised sigmoid diverticular perforation. The left IPA was drained via the left groin. Following this intervention, the patient improved clinically, and she was discharged after a hospital stay of 59 days. 5 months after surgery, the patient had a flexible sigmoidoscopy (antegrade and retrograde) and a narrowed segment 10 cm distal to the stoma was seen, as well as scattered diverticular disease. This confirmed the likely diagnosis of a left IPA secondary to a perforated sigmoid diverticulum.

Case 2: orthopaedic origin

This 55-year-old gentleman with a background of Charcot Marie tooth disease and multiple sclerosis, presented to hospital with a 2-week history of progressive right lower limb weakness and paraesthesia. Admission bloods were unremarkable: C – reactive protein 7.5, white cell count 6.7, admission blood and urine cultures showed no growth. A CT scan was arranged to investigate a possible right hip multiple sclerosis flare-up.

The CT scan demonstrated a bulky right iliacus muscle with suspicion of a small low-attenuation area within and ill-defined fat stranding surrounding the right iliopsoas tendon. A subsequent MRI scan revealed inflammation of the proximal right femur, which extended into a right IPA (Figure 3). The lumbosacral vertebrae appeared grossly unremarkable.

Following the diagnosis of a right IPA, the medical team referred the patient to both the general surgical and orthopaedic team. Care was ultimately transferred to the orthopaedic team, due to the patient's joint pain and the MRI confirming right hip osteomyelitis. The patient underwent ultrasound guided drainage of the right IPA. Cultures of the aspirates did not grow any organisms; however broad-spectrum intravenous antibiotics had been administered from admission. Following interventional radiology (IR) guided drainage of the right IPA, the patient improved clinically, and they were discharged following a total length of stay of 25 days.

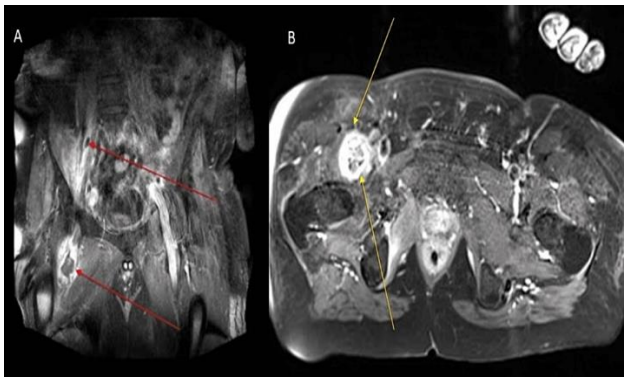

Figure 3: MRI images demonstrating (A) right sided IPA (red arrow) and (B) inflammation of the proximal right femur (yellow arrow).

Case 3: urological origin

This 71-year-old gentleman with a background of hypertension, Type 2 diabetes mellitus and sciatica presented to hospital with a 1-week history of right sided abdominal pain radiating to his back, anorexia and weight loss. Prior to this he reported a 4-week history of pain in his right thigh and difficulty mobilising, which he had ascribed to his sciatica. On examination his abdomen was soft, but there was tenderness to palpation in the right lower abdomen and a palpable mass felt posteriorly. Psoas stretch test was positive. Admission bloods demonstrated: C – reactive protein 238, white cell count 23.8, haemoglobin 108, platelets 508, electrolytes and renal function were normal.

This patient was referred to the general surgical team as a case of suspected perforated appendicitis and a CT scan was arranged. The CT scan revealed a large right sided iliopsoas abscess with a large volume of retroperitoneal fluid and gas, as well as focal nephritis of the lower posterior pole of the right kidney (Figure 4). In the absence of any colonic pathology identified on the CT scan, the original source of the right IPA was attributed to the nephritis and therefore care was subsequently transferred to the urologists.

Broad spectrum antibiotics were administered, and IR guided drainage of the right IPA was performed. Aspirate cultures confirmed the presence of *Streptococcus constellatus*, which was sensitive to Metronidazole and the antibiotics were modified accordingly. The patient was discharged from hospital after 7 days and the drain removed at a follow up appointment.

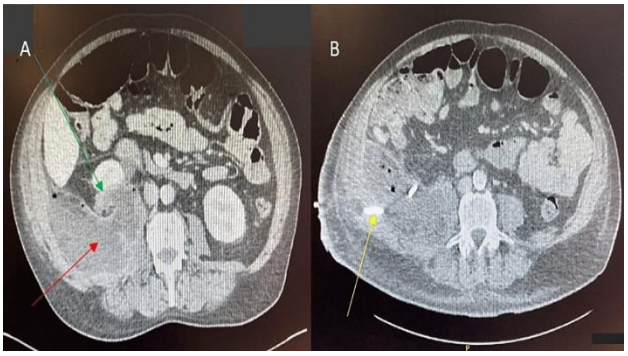

Figure 4: CT scan demonstrating (A) a large right iliopsoas abscess (red arrow) connecting to the lower posterior pole of the right kidney (green arrow), and (B) repeat CT scan imaging showing a retroperitoneal drain in situ (yellow arrow).

DISCUSSION

RPA is an uncommon condition that presents a diagnostic and therapeutic challenge to clinicians. RPA can be classified into five groups based on anatomical location and clinical features perinephric, upper retroperitoneal (i.e., above the pelvic brim), pelvic, combined upper retroperitoneal and pelvic, and localized musculoskeletal (the iliopsoas compartment).[1]

Our case series has focused on IPA. The classical triad of IPA comprising fever (75%), abdominal or back pain (95%) and a limp was reported by Mallick et al in just 30% of their cases and it was reported to be much lower at only 5% in a study by Dietrich et al.[2,3] This finding was mirrored in our case series, with the classical triad not being reported by any of our patients. From our review of the literature, this pathology has a wide array of non-specific presenting signs and symptoms due to the various different aetiologies of IPA. Presenting features can include lower backache, abdominal pain, fever, groin pain/ lump, weight loss and anorexia, malaise, as well as antalgic gait and abnormal hip positioning.[2-4] Back pain is commonly associated in patients with IPA of genitourinary or spinal origin, rather than gastrointestinal aetiology. Radiculopathy is linked to IPA of spinal origin.[4]

Case reports have also reported large iliopsoas abscess to present with deep venous thrombosis due to extrinsic compression of the iliac vein, or with hydronephrosis due to compression of the ureter.[5] This was also seen in one of our cases – case 1. Due to irritation of the iliopsoas muscles, the function of the hip can be affected, and this will manifest in a patient holding the ipsilateral hip flexed and externally rotated or having a detrimental effect on the patient's mobility. These features were seen in all our cases.

Primary IPA arise from haematogenous or lymphatic spread from distant sites. They are common in immunosuppressed individuals, cases of renal failure, HIV, mycobacterium tuberculosis infections and infected psoas hematomas due to haematological disorders, or trauma.[4] Staphylococcal infections, mainly MRSA infections, are typically associated with immunosuppression, or bacteraemia caused by remote infections in IPA (Table 1).[6]

Secondary IPA develop from direct seeding of pathogens from adjacent structures to the iliopsoas compartment. Pyelonephritis secondary to a genitourinary infection is believed to be the most common aetiology of IPA, followed by gastrointestinal infection like diverticulitis, colorectal and urological malignancy/inflammatory disease, viscus perforation, retroperitoneal appendicitis, pancreatitis, biliary, peptic ulcer, puerperal diseases and osteomyelitis.[4] Recent surgical instrumentation has also been identified as a cause of secondary IPA.[7] There are fewer reports of IPA secondary to colonic diverticular perforation compared to cases of colon malignancy. Other case reports have noted the presence of an ipsilateral groin mass in IPA secondary to a colorectal origin and this was also seen in one of our cases (case 1).[8] Our case series has highlighted secondary IPA due to a diverticular perforation (case 1), osteomyelitis (case 2), and nephritis (case 3).

Causative pathogens of IPA, vary depending on the source of the infection. Polymicrobial infections are common, and E. coli is the most common pathogen in IPA.[4] *Staphylococcus aureus* is the most common causative organism (over 88% of cases) in patients with primary IPA. Primary IPA is more common in the younger population and in developing countries. This is due to cases of mycobacterium tuberculosis infection being more prevalent in these regions compared to developed countries where vaccination programmes have been introduced.[9] Mycobacteria has been found to be the most common pathogen in IPA originating from the spine.[4]

Secondary IPA is usually caused by enteric pathogens such as a *Streptococcus* species 4.9% and *E. coli* 2.8%, as seen in our urology and colorectal cases. Secondary IPA predominates in the older population and in the western world.[10]

CT is the gold standard diagnostic modality used to identify IPA with the detection rate exceeding 90%. It can also determine the source of infection in secondary IPA, however, the sensitivity of a CT scan is limited in early stages of the disease.[11] MRI can provide better definition of the soft tissues and surrounding structures. The overall sensitivity of plain CT, enhanced CT, and plain MRI for psoas abscess was 78%, 86%, and 88%, respectively in the study by Takada et al.[12]

Ultrasound has low sensitivity and specificity in IPA and has been reported as diagnostic in only 60% of cases.[13] Overlying bowel gas and pelvic bones can make ultrasound use for IPA technically difficult and this modality is also operator dependant.[14] However, some have demonstrated the usefulness of ultrasound in the

diagnosis of IPA in the paediatric age group as an initial investigation for IPA. A study by Deanehan et al commented on the role of point of care ultrasound for the diagnosis of IPA in the emergency department in a paediatric patient and its use for extraperitoneal drainage of the abscess.[15]

In cases of IPA, empirical treatment should be commenced with broad-spectrum antimicrobial therapy. If the patient is pyrexial blood cultures should be taken and antimicrobial therapy adjusted accordingly, when culture sensitivities are available.

Identifying whether the abscess is of primary or secondary origin is also crucial, in order to treat the original cause of the IPA. This will also enable the patient to be referred to the appropriate specialty to lead care. It is recommended to start anti-staphylococcal antibiotics in suspected primary IPA and in cases of secondary IPA broad-spectrum antibiotics should be initiated, prior to culture results being made available.[8]

The duration of antimicrobial therapy should be adapted based on the patient's medical background and progress; although a minimum of 2 weeks of targeted antimicrobial therapy should follow based on cultures where available.[2] If a case is identified as primary IPA due to tuberculosis, the patient will require a full course of anti-tubercular therapy and management under the infectious disease/ general medicine team.

Before the advent of CT scanning, diagnosis and treatment of IPA was often delayed and generally awaited exploratory laparotomy for identification of the septic focus and open surgical drainage.[16] However, in modern medicine CT scans can easily recognize asymmetrical enlargement of the iliopsoas compartment with focal areas of low attenuation, or gas formation indicating an IPA. Initial management should be conservative using broad-spectrum antibiotics and minimally invasive intervention with percutaneous drainage if this is found to be amenable by interventional radiology. The literature recommends that IPA measuring 3 cm or more in size may require intervention (open or IR-guided drainage), but an abscess <3 cm should be initially treated with antibiotics alone.[17] The indications for operative management are a failure of/ contraindications to percutaneous drainage of the IPA. This may include a multilocular abscess, or presence of another intra-abdominal pathology that warrants surgery – such as Crohn's disease. Where surgical intervention is indicated, the aim should be for damage limitation and definitive management considered after the acute event settles. This pathway in the management of IPA was followed in our cases, with IR guided drainage being used in the first instance for the abscess drainage and surgery reserved for cases where the patient's clinical picture failed to improve.

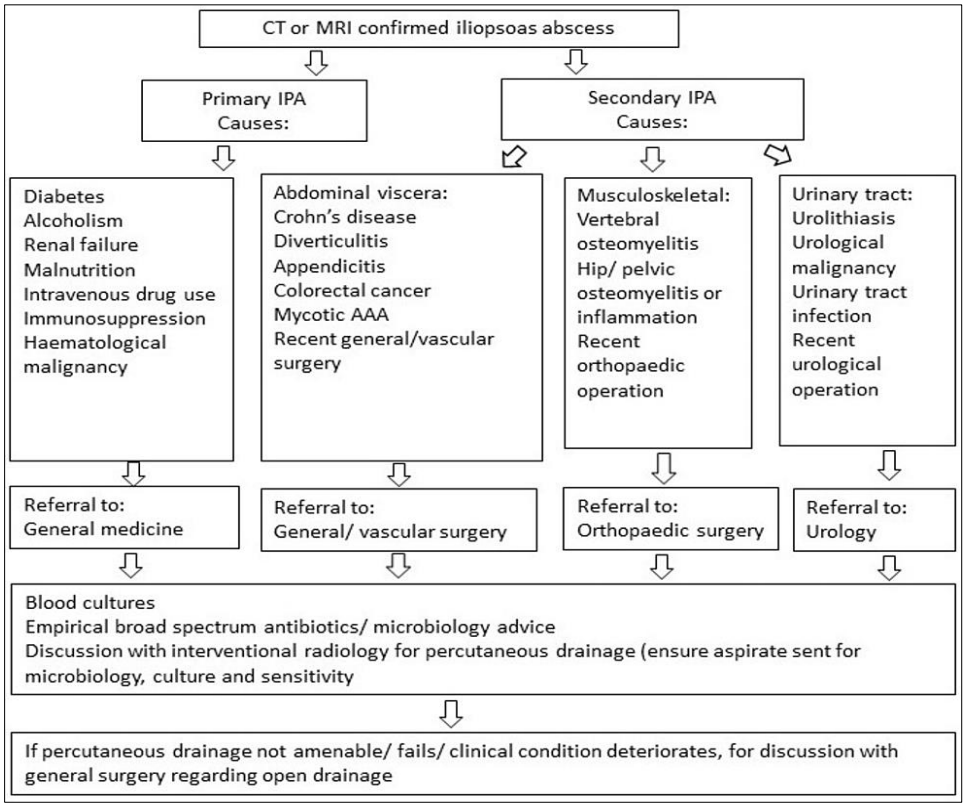

Figure 5: A pathway for the aetiological classification, appropriate speciality referral and management of iliopsoas abscess.

CT: computerised tomography, MRI: magnetic resonance imaging, AAA: abdominal aortic aneurysm

Due to the two different aetiologies of IPA and in turn their vast variety of causes, there is understandably confusion in a practical sense, as to which specialties should lead care for patients diagnosed with IPA. This is complicated further by expected delays in diagnosis due IPA being an uncommon pathology and its presentation with non-specific symptoms. This has been highlighted in our case series – with our patients being referred for consultations to several different specialties including general medicine, general surgery, urology and orthopaedic surgery.

As a means of improving patient care and to help avoid confusion for clinicians', we have introduced an IPA pathway at our hospital (Figure 5). This pathway details the possible causes of primary and secondary IPA, after an imaging modality confirms its presence. With regards to secondary IPA, it also highlights which particular surgical specialty should lead patient care depending on its aetiology.

CONCLUSION

Following a review of the literature, all authors emphasize the importance of maintaining a high index of suspicion for IPA as it can be easily misdiagnosed within a wide range of differentials, due to its insidious onset and greatly variable presenting clinical picture. Our case series highlights that patients do not always present with the classical IPA triad of fever, a limp and abdominal/back pain; this is supported by studies identifying this in just 5–30% of patients with confirmed IPA.

Empirical treatment should always consist of broad-spectrum antibiotics, which cover *Streptococcus* species and *Staphylococcus aureus*, two organisms which are commonly found in IPA microbial cultures. Blood cultures or abscess aspirate cultures should also be sent, and results used to adjust antimicrobial therapy accordingly.

In addition to antibiotics, in the first instance a less invasive IR guided percutaneous drainage of the IPA should be performed. However, the technique of open drainage should be considered if percutaneous drainage is not appropriate, is unsuccessful, or if the patient's clinical condition deteriorates despite this intervention.

From our experience, we appreciate the confusion clinicians can face when determining which teams should best manage IPA. We believe clinical care for IPA should be led by a specialty who have the expertise to treat the original cause of IPA, be it of primary or secondary aetiology. In recognising these difficulties, we have introduced an IPA pathway at our trust, which we hope will be a concise guide for clinicians in the practical management of IPA and ultimately optimise patient care.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Kumar D, Byrne H, Gurung G, Airon N, Rao M. Retroperitoneal abscesses: a diagnostic dilemma – case series, review of the literature and practical guide for the management of iliopsoas abscessess. Int J Res Med Sci 2023;11:4481-7.