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Case Report

Abductor muscle necrosis due to iliopsoas bursal mass after total hip arthroplasty

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ABSTRACT

Background: While symptomatic iliopsoas bursal lesions have been reported after total hip arthroplasty (THA), mass effect of the collection causing abductor muscle damage has not been reported in the literature.

Methods and Results: This report discusses the presentation, clinical findings, and operative management of a patient, status post metal-on-polyethylene THA, with a large psoas bursal collection with resulting abductor muscle injury and deep venous thrombosis from compression of the femoral vein. Despite the improved wear characteristics of modern-generation THA implants, physicians must be aware of the possibility of soft tissue irritation of the iliopsoas as a cause of soft tissue swelling, persistent pain, and potential adverse complications. It is also important to recognize the variety of effects and spectrum of severity for associated lesions, including muscle damage.

Conclusions: This report highlights the rare findings of abductor muscle necrosis, as well as acute thrombosis, related to iliopsoas bursitis. It also highlights a review of the available literature.

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1. Introduction

The formation of cystic inguinal masses due to aseptic iliopsoas bursitis is a rare complication after total hip arthroplasty (THA).^{1–4} Although predominantly associated with implant wear and pressure-driven migration of peri-articular fluid into the iliopsoas bursa,^{4,5} bursal-related complications may also result from direct frictional forces with mal-positioned or prominent hip implants. Large cystic

bursal masses may present as inguinal masses, with or without pain, and in some cases, may cause femoral neurovascular compression and/or lower limb edema. Sudden death from pulmonary embolism has been found in non-surgical arthritis patients presenting with similar masses,⁶ which heightens the potential morbidity and mortality associated with such bursal complications.

Although the majority of reports of iliopsoas bursal lesions after THA have been in the setting of metal-on-polyethylene (PE) implants, recent reports of their formation adjacent to

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metal-on-metal^{7–9} and ceramic articulations¹⁰ demonstrate that they are not limited to patients with certain bearing surfaces or specific trunnion factors. This report presents the case of a patient, status post metal-on-PE THA, with symptomatic bursal mass compressing the common femoral vein as well as causing muscle damage in the abductor mechanism. This is the first report of a cystic iliopsoas bursal lesion causing extrinsic large vein occlusion, deep vein thrombosis (DVT), and abductor muscle damage in the setting of a metal-on-PE bearing couple.

2. Case report

A 61-year-old female presented to our institution 9 years after metal-on-PE THA performed at another institution for femoral neck fracture. She reported anterior groin pain, worse with flexion activities, since the time of the index surgery. She underwent an image-guided iliopsoas tendon injection 4 years after surgery with temporary relief of her symptoms.

On physical examination, the pain was reproducible in the anterior aspect of the hip; this pain was exacerbated with resisted psoas maneuvers. The patient also had pain in the posterior aspect of the hip, as well as tenderness along the abductor musculature; testing of abduction in the lateral decubitus position elicited significant pain. Trendelenburg testing was negative.

Radiographs and advanced imaging revealed a well-fixed prosthesis with a prominent acetabular lip (Fig. 1), despite proper positioning of the components. Infection work-up was

negative: erythrocyte sedimentation rate 9 mm/h, C-reactive protein 0.60 mg/L, and peripheral white blood cell count 5800 cells/ μ L. Serum cobalt and chromium levels were also within normal limits. An ultrasound-guided right iliopsoas bursa and peritendinous injection was administered with some initial pain relief, but no longer-term improvement.

A metal-subtraction magnetic resonance imaging (MRI) study (Figs. 2 and 3) revealed a hematoma and large multilocular iliopsoas bursal collection with intra- and extra-pelvic parts. The bursa extended from the iliac spine to the insertion of the iliopsoas tendon, displacing the intact tendon centrally. There was also extension of the peri-articular collection posteriorly and into the abductor musculature.

The patient elected for surgical decompression of the bursal fluid, with potential release of the iliopsoas tendon and revision arthroplasty as indicated. One week prior to planned surgery, the patient presented acutely with bilateral pulmonary emboli. Repeat imaging demonstrated that the enlarged bursa and hematoma were compressing the adjacent femoral neurovascular structures. A resulting DVT was noted in the femoral vein. An inferior vena cava filter was placed, and treatment was started with rivaroxaban.

At revision surgery, the prior posterolateral approach was utilized. Upon opening the fascia, dark sanguineous fluid was noted throughout the capsule and peri-articular soft tissues. A cystic communicating mass was found in the posterior soft tissues, exiting the capsule at the level of the gluteus maximus sling. Part of the gluteus medius tendon was compromised by necrosis at the insertion on the greater trochanter, due to the pressure phenomenon within the fluid cavity. A thorough

Fig. 1 – Antero-posterior radiographs (A, B) demonstrate a well-fixed total hip arthroplasty performed for femoral neck fracture. Cross-table (C) and frog-leg (D) lateral radiographs highlight a prominent implant rim, with overhang in the supero-anterior aspect of the acetabulum. Axial computed tomography (E) image 8 years after the index surgery confirms prominence of the prosthetic rim despite appropriate cup anteversion, with resulting large iliopsoas bursal collection.

Fig. 2 – Antero-posterior (A) and sagittal (B) STIR sequence magnetic resonance images 8 years after index surgery show the iliopsoas pseudotumor, with both intra-pelvic and peri-acetabular components, and involvement of the abductor musculature and iliopsoas sheath. Sagittal computed tomography (C) performed in the same plane, as panel (B) depicts the prominent acetabular lip and adjacent cystic bursal fluid collection (rim outlined by arrows).

Fig. 3 – Axial STIR (A, B, C) and T1-weighted (D) magnetic resonance images reveal a cystic collection arising from the hip joint. This mass, with septations and intra-cystic debris, communicates between the anterior and posterior aspects of the right hip prosthesis. Mass effect of the pseudotumor is seen anteriorly against the femoral neurovascular bundle, as well as posteriorly upon the gluteal musculature and corresponding insertions on the greater trochanter.

debridement and synovectomy were performed to remove all non-viable and pseudotumor tissue. A debridement of necrotic anterior gluteus medius tendon was done. The iliopsoas tendon was severely frayed with a near-full thickness tear at the level of the joint, with a friction phenomenon seen against the prominent acetabular component rim. The acetabular cup was found to be well-fixed and well-positioned (anteversion and inclination, in accordance with pre-operative cross-sectional imaging). No evidence of corrosion or liner wear

was found. The polyethylene liner and femoral head were replaced, increasing the femoral head size from 28 mm to 32 mm to increase stability. There was no sign of trunnionosis of the retained stem. Multiple cultures taken during the procedure were negative at final analysis.

The patient was maintained in an abduction brace with weight-bearing as tolerating, but no active abduction exercises, for 6 weeks post-operatively. At latest follow-up, the hip was non-tender, and the patient had a smooth range of motion.

Repeat ultrasound showed no evidence of DVT. Radiographs showed satisfactory alignment and intact hardware.

3. Discussion

The etiology of the foreign-body reaction causing iliopsoas cystic lesions after THA has commonly been attributed to PE wear particles in metal-on-PE implants.¹¹ These psoas pseudotumors are characterized by fibrotic and necrotic capsules and may present with loosening of the implant. Other reports exist of masses arising after metal-on-metal THA and metal-on-metal resurfacing and have been attributed to aseptic lymphocytic vasculitis-associated lesions (ALVAL).¹²

Other causes of iliopsoas bursal lesions include a frictional phenomenon and irritation of the psoas tendon and peritendinous bursal tissue. Mal-positioning and/or prominent hardware may be a direct mechanical cause. Tissue reaction from wear particles along with increased forces and pressures leads to a rise in inflammatory fluid production. Fluid pressure inside the hip pseudocapsule concomitantly rises, and the fluid dissects into adjacent tissues.^{1,3–5,7,13} This fluid migration may stem from a communicating iliopsoas bursa, especially in those patients with pre-existing connections between the capsule and bursa. The prevalence of such connections amongst patients with pre-existing hip pathology may be greater than 15%.¹⁴ Rarely, the bursal collection will cause additional simultaneous ipsilateral lower extremity swelling, DVT, and/or nerve palsy, indicating extrinsic compression of the femoral neurovascular structures.

3.1. Diagnostic management

While plain radiographs are obtained in concert with a detailed history and physical examination, they often fail to reveal direct evidence of an iliopsoas bursal lesion. Inflammatory labs and infection work-up are essential in any patient with painful THA, and the diagnoses of infection and psoas bursal collection may co-exist.

Advanced imaging studies, such as computed tomography (CT) and metal-subtraction MRI, may be obtained to evaluate component positioning and any abnormal fluid collections. Advanced imaging modalities are helpful in assessing adjacent structural damage, vein thrombosis, and muscles that may be affected. Dynamic ultrasound imaging may be used in both the diagnosis of psoas lesions and therapeutic interventions. Ultrasound modalities also offer a quick and cost-effective means of assessing vessel patency. Needle aspiration of the cystic collection may be an adjunct to diagnosis (including ruling out concomitant infection), as well as for symptomatic relief. Arthrogram or direct bursal contrast injection may be used to reveal any communication between the joint and the cystic lesion. In some cases, the communication may not be free but rather one-way pathway into the bursal tissue.^{2,3,7,15}

3.2. Therapeutic management

Cyst aspiration and tissue biopsy are favored when underlying etiology or character of the lesion (including discerning

between septic and aseptic causes) is not completely understood. Management of a confirmed cystic lesion and symptomatic psoas tendinitis commonly begins with ultrasound-guided localization, aspiration, and therapeutic injection. Although aspiration of the cyst is expected to provide symptomatic relief, several case reports detail cyst recurrence.^{1,2,4} With recurrence, open cyst excision has typically been performed with persistent resolution of the problem. Both arthroscopic and open techniques may be employed for cyst decompression and potential release of the psoas tendon in the setting of well-fixed and well-positioned components. However, only open techniques offer the ability to change components in the setting of aseptic loosening. While the senior author has significant experience with hip arthroscopy techniques, including release of symptomatic psoas lesions with smaller associated bursal collections, the authors recommend an open approach in the setting of complex cystic pathology or any concern for component mal-positioning and/or THA fixation compromise. It is important to note that, at the time of cyst excision, implant wear may be significant, and loosening may be present despite a lack of symptoms or overt component failure. As such, even if surgical intervention is not performed, patients with such large cystic iliopsoas lesions should be monitored for associated implant failure. For patients undergoing revision surgery and excision of the cystic bursa, good results have been published.^{1,7}

4. Conclusion

Extrinsic occlusion of the common femoral vein, as reported in this case, can lead to thrombosis and pulmonary embolism. Of novel findings, gluteus medius damage was also found in this case report. Although cases of cystic iliopsoas bursal lesions have been documented, this is the first case including simultaneous muscle damage and DVT related to cystic bursal collection. This study emphasizes the importance of proper implant positioning to avoid wear-related sequelae. Managing surgeons must recognize that cystic iliopsoas bursal lesions, although less common, may complicate THA across all bearing surfaces. Prompt diagnosis and management of the pseudotumors may prevent potential adverse sequelae, including DVT and peri-articular muscle damage.

Conflicts of interest

All authors have none to declare.

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