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Extraspinal Vascular Emergency on Lumbar Spine Magnetic Resonance Imaging (MRI): A Case Report

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Abstract

Acute back pain is one of the most frequent chief complaints in the emergency department (ED). Lumbar spine MRI is commonly obtained in this setting, and radiologists typically focus on musculoskeletal or neurologic etiologies. However, a systematic evaluation of extraspinal structures is essential to identify less common but potentially life-threatening causes of back pain. We report the case of a 70-year-old man with hyperlipidemia who presented with one week of progressive lower back, left hip, and left scrotal pain. Lumbar MRI revealed flow voids contiguous with the iliac arteries, an extraspinal feature that prompted immediate CT angiography (CTA). CTA demonstrated a spiral abdominal aortic dissection with the false lumen perfusing the iliac arteries, with associated bilateral iliac aneurysmal dilatation. Notably, recent hemorrhage into the left psoas muscle was also identified. The contained psoas hematoma produced left-sided obturator and psoas signs and explained the patient's constellation of symptoms. This case highlights the lifesaving importance of a structured approach to extraspinal findings on spinal MRI.

Categories: Radiology, Emergency Medicine
Keywords: aneurysm, emergency, hemorrhage, lumbar spine, mri

Introduction

Low back pain is among the most common reasons for emergency department visits, and radiologists are well trained to evaluate the most common musculoskeletal and neurologic etiologies. Yet lumbar spine MRI often reveals extraspinal abnormalities, which demand urgent recognition but can be overlooked when attention is confined to the spinal structures [1-4, 5]. Several cohort studies have demonstrated both the prevalence and the under-reporting of such findings on routine lumbar MRI [1-3, 5].

We present a patient in whom a critical diagnosis was made through careful analysis of extraspinal findings on lumbar MRI. The study revealed a spiral aortic dissection with resultant iliac aneurysmal dilatation, which produced left sided obturator and psoas signs; physical exam findings most frequently encountered on the right in association with acute appendicitis [6]. In this case, these signs resulted from intramuscular hemorrhage, primarily within the left psoas muscle, rather than visceral inflammation [7-9, 10]. This report underscores the need for a systematic search pattern that includes the retroperitoneum and major vessels when interpreting emergent spine imaging [1-5].

Case Presentation

A 70-year-old man with a history of hyperlipidemia presented to the emergency department (ED) with one week of vague, progressive lower back, left hip, and left scrotal pain. An ultrasound of the scrotum was first performed to exclude the possibility of testicular torsion. When the ultrasound revealed no sonographic abnormality, MRIs of the lumbar spine and left hip were ordered to evaluate for nerve impingement and joint abnormalities. The MRI of the hip revealed no associated abnormality of the hip joint to account for the patient's symptoms. The MRI lumbar spine did not demonstrate significant disc herniation, spinal stenosis, or osseous deformity. However, the provided view of the abdomen demonstrated large bilateral T2 hypointense flow voids contiguous with the common and external iliac vessels, occupying the majority of the retroperitoneum (Figure *1*). The left flow void appeared to be inseparable from the left psoas muscle, which was asymmetrically enlarged and edematous. This constellation of imaging findings suggested bilateral iliac artery aneurysms complicated by left psoas intramuscular hemorrhage. A subsequent CT angiogram of the abdomen confirmed a spiral infrarenal abdominal aortic dissection with the false lumen supplying the iliac arteries (Figure *2*). Bilateral iliac artery aneurysms were confirmed, and the left psoas muscle hematoma was further elucidated. No extravascular extravasation of contrast material was noted to indicate an active hemorrhage.

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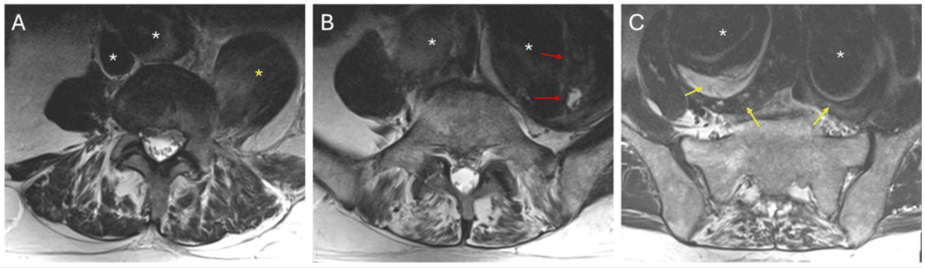


FIGURE 1: Axial T2 weighted MRI images through the lumbar spine

Axial T2-weighted MRI images through the lumbar spine demonstrating bilateral, abnormal flow voids in the retroperitoneum in the expected location of the iliac arteries (white *). (A) The left psoas muscle is asymmetrically enlarged and T2 hyperintense, suggestive of edema (yellow *). (B) Irregular T2 signal within the left psoas muscle raises the possibility of intramuscular hemorrhage (red arrows). (C) Caudally, the suspected iliac artery aneurysms demonstrate regions of T2 iso and hyperintensity, possibly representing mural thrombus (yellow arrows).

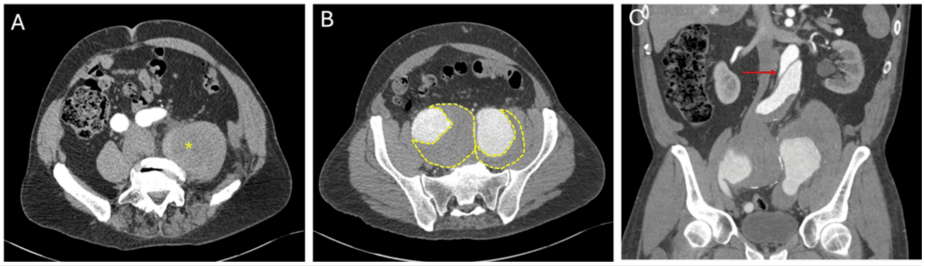


FIGURE 2: Axial and coronal CT angiographic images

Axial and coronal CT angiographic images through the abdomen and pelvis. (A) Axial CTA below the level of the aortic bifurcation confirming edema and abnormal enlargement of the left psoas muscle (yellow *). (B) Axial CTA at the level of the pelvis, demonstrating bilateral large iliac artery aneurysms with crescentic mural hypodensity consistent with thrombus, corresponding to the T2 iso and hyperintensity seen on MRI (yellow dotted lines). (C) Coronal CTA. Spiral dissection of the infrarenal aorta is identified (red arrow).

Following CTA confirmation, the patient underwent emergent endovascular aortic repair (EVAR) with bilateral iliac aneurysm exclusion (Figure *3*). The procedure was uncomplicated. On postoperative day one, he developed bilateral hip-flexion weakness attributable to compression of the psoas muscles by the hematoma. Neurologic causes were ruled out during neurology consultation. With physical therapy and a gradual reduction in swelling, the weakness steadily improved. The patient was discharged on hospital day four with stable vital signs, controlled pain, and detailed return precautions.

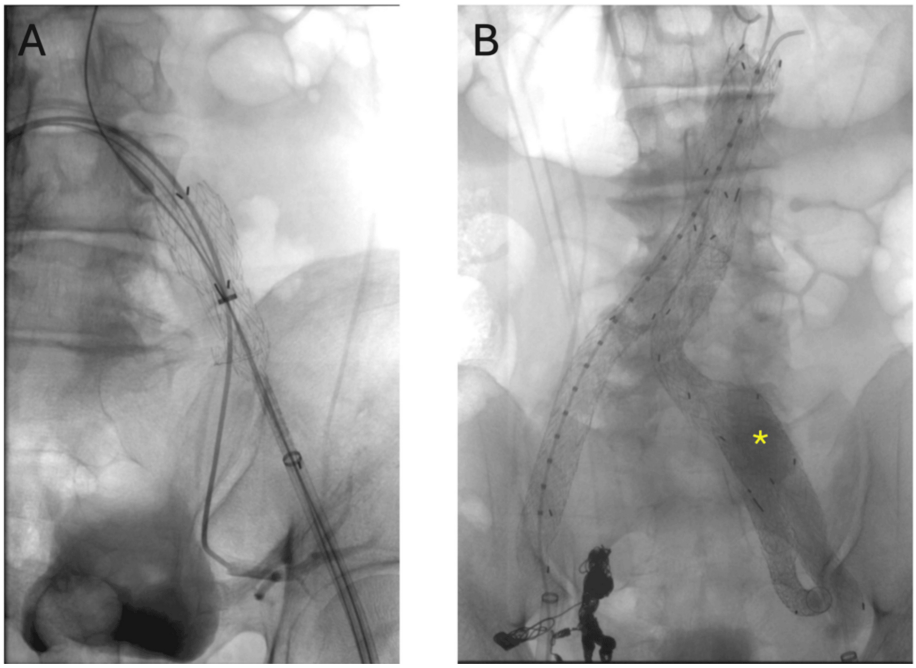


FIGURE 3: Fluoroscopic images from emergent endovascular aneurysm repair

Fluoroscopic images from emergent endovascular aneurysm repair of bilateral iliac artery aneurysms and aortic dissection. (A) Initially, the left common iliac artery was repaired given the associated hemorrhage into the left psoas identified on MRI and CTA. (B) At completion, metal stents are seen within the bilateral iliac arteries and infrarenal aorta. Contrast injection through the left iliac artery confirms exclusion of the aneurysm sac and absence of active extravasation (yellow *).

The patient's array of symptoms was fully explained by the vascular processes described. Numerous vital nerves traverse the retroperitoneum in proximity to the psoas muscle. The presence of psoas and obturator signs suggests that the expanded left psoas muscle resulted in irritation of multiple nerves, including the femoral and obturator nerves, accounting for hip and leg pain. Compression of the genitofemoral nerve likely contributed to the perceived scrotal pain. Containment of the hemorrhage within the psoas muscle appears to have resulted in a protective tamponade, preventing retroperitoneal hemorrhage.

Discussion

Interpretation of lumbar MRI should routinely include a systematic evaluation of extraspinal structures, particularly the retroperitoneum and major vessels. Extraspinal findings are not rare and may represent emergent, actionable findings [1-5]. Within these studies, extraspinal findings were reported in 17.6 - 25% of studies, of which 1.8 - 7.5% of studies demonstrated critical / actionable findings [2-5]. However, the authors note inconsistent detection of extraspinal abnormalities relative to spinal pathology [1-3, 5].

In this case, the key extraspinal MR finding was bilateral flow voids following the course of the iliac arteries. Such flow artifacts should immediately raise concern for vascular abnormalities such as aneurysm and/or dissection, rather than more common causes of T2 hypointensity such as gas, stool, or bowel structures [4-7, 9]. When flow voids occur together with psoas enlargement or edema, hemorrhage (either primary muscular hematoma or retroperitoneal bleeding) should be highly suspected given the associated morbidity and mortality risks [4-7, 9].

The patient's pathology reflected a complex vascular cascade. A spiral abdominal aortic dissection created a false lumen that perfused the iliac system, generating high intraluminal pressures and promoting aneurysmal dilatation. Transmural leakage of the dilated iliac arteries into the adjacent psoas muscle produced a contained intramuscular hematoma. Since the hematoma was confined within the psoas muscle, a natural tamponade effect took place, preventing a catastrophic free retroperitoneal hemorrhage [7, 9-10].

Physical examination provided subtle but important clues. The patient demonstrated left sided psoas and obturator signs, which are classically associated with acute appendicitis when detected on the right side. Psoas sign is a physical exam finding indicating irritation to the iliopsoas muscle [6]. To evaluate for the presence of psoas sign, the examiner passively flexes the hip while the patient is on their side. Pain is elicited during hyperextension and/or flexion of the hip, due to stretching of the iliopsoas muscle. Obturator

sign results from a similar mechanism and involves irritation to the obturator internus muscle [6]. The examiner internally rotates the hip while the patient is supine. Pain is elicited during internal rotation due to stretching of the obturator internus. In acute appendicitis, right-sided psoas and obturator signs are observed when the inflamed appendix contacts these muscles, causing secondary irritation. In this case, the mechanism of irritation to the left psoas and obturator internus muscles was likely from a combination of mechanical irritation from the hematoma stretching these muscles as well as the proinflammatory responses to blood products. Irritation of the nearby genitofemoral nerve, then contributed to the additional symptom of vague left scrotal pain, in addition to the left hip and back pain which was exacerbated by leg movement.

Prior literature emphasizes the importance of systematically reporting emergent extraspinal findings on lumbar spine MRI [1-3, 5]. Incorporating a checklist-based approach can reduce missed diagnoses. In addition, when MRI demonstrates vascular flow voids, prompt CTA is critical for confirming vascular pathology and guiding lifesaving therapy [4-7, 9-10]. Together, these observations highlight the value of a structured extraspinal search pattern in improving detection of emergent vascular disease.

Conclusions

This case demonstrates the value of a patterned, methodical extraspinal search algorithm during spine MRI interpretation. Careful recognition of vascular flow voids led to immediate CTA confirmation of a spiral aortic dissection with bilateral iliac aneurysmal dilatation and psoas hematoma, an uncommon but critical cause of back, hip, and scrotal pain. By routinely incorporating extraspinal evaluation into spinal MRI interpretation, emergency radiologists can improve detection of emergent vascular disease and other life-threatening conditions.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Avetis Azizyan, Milos M. Cekic

Drafting of the manuscript: Avetis Azizyan, Arthur Ter-Pogosyan

Critical review of the manuscript for important intellectual content: Avetis Azizyan, Milos M. Cekic

Supervision: Avetis Azizyan

Acquisition, analysis, or interpretation of data: Arthur Ter-Pogosyan

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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