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Positive Psoas Sign in a Disabled Child-Not Always Appendicitis, Seldomly due to Duodenal Perforation by Sharp Foreign Body

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Abstract

We present a rare cause for "positive psoas sign" secondary to duodenal perforation by an ingested wooden skewer in a disabled 13 years old male. The unreliable clinical evaluation made the appreciation of a "positive psoas sign" obscured. We highlight the possible occurrence of this pathology in young or disabled children, and the importance of CT leading to this diagnosis, with the utilization of multiplane MIP reconstructions. This case also points that the psoas muscle is a long structure in the retroperitoneum, and irritation of its upper most part may also present as positive psoas sign.

Keywords: Psoas sign; Psoasabscess; Skewer; Perforation; Missed diagnosis

Case Report

A 13 years old male is seen in the pediatric emergency room (ER) due to new onset of limp on the right lower limb, nausea and agitation. His past medical history consists of prematurity with severe psychomotor delay including mental retardation as a sequelae. Past surgical history consists of fundoplication procedure due to diaphragmatic hernia and feeding jejunostomy which was thereafter closed.

Medical history was negative for any recent illness with fever, nothing to support food poisoning or any trauma. Physical examination revealed a positive psoas sign, with no tenderness upon deep palpation of the abdomen, and additional point tenderness upon palpation of the distal femur. Lab evaluation shows no leukocytosis but elevated CRP and ESR.

With the suspicion of acute appendicitis, the patient was sent to the sonography suite. Appendix was demonstrated without pathological findings, and the right psoas muscle, shown from the level of the right kidney down to the pelvis, seemed without pathology. There was no free fluid in the upper or lower abdomen. The only positive finding was mild hydronephrosis of the right kidney without hydroureter, and without evidence of nephrolithiasis (Figure 1).

The patient was admitted and scheduled for a bone scan to rule out osteomyelitis of the right hip as a possible etiology for positive psoas sign. Bone scan revealed a focal 'blood pool' in the right knee, interpreted as point of inflammation by the nuclear medicine team, and the patient was therefore scheduled for a right knee MRI for further evaluation. MRI study was reported negative without imaging findings supporting osteomyelitis.

At that point the patient was re-evaluated by a pediatric infectious disease specialist who emphasized that the only clinical finding present is a "positive psoas sign" therefore required an abdominal computed tomography (CT) to rule out inflammatory or malignant process in the right psoas. An abdominal CT was performed with oral and intravenous (IV) contrast media (CTDI of 6.217 mGy*cm). This study revealed enlargement and inflammation of the right upper psoas, affecting the proximal part of the right ureter (Figure 2a and 2b). While observing the duodenum an unusual structure caught the attention of the interpreting radiologist- a straight thin sharp pointy hyperdense structure located within the second part of the duodenum, suspected to be a foreign body. To better define this structure the radiologist used a MIP of 8mm coronal reconstruction which clearly demonstrated a 3.8cm long foreign body with its distal tip lodged in the posterior duodenal wall, causing micro-perforation into the psoas muscle thus initiating this inflammatory

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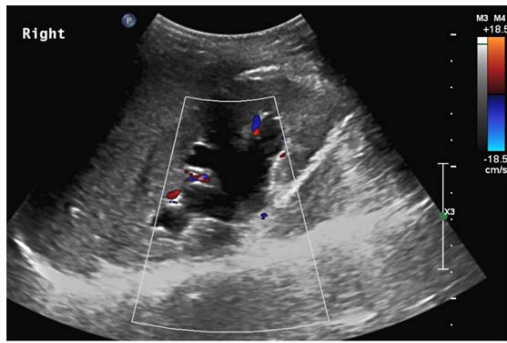


Figure 1: Abdominal Ultrasound demonstrating right renal hydronephrosis without evidence of nephrolithiasis.

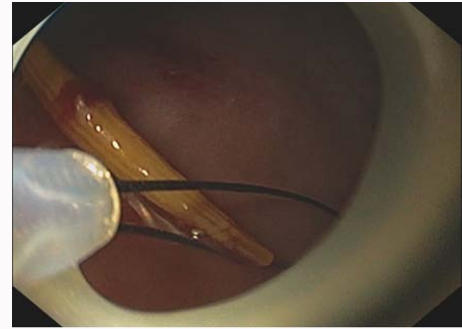


Figure 4: Endoscopy of the duodenum. Proof of the wooden skewer lodged within posterior duodenal wall. The Skewer was removed successfully by endoscopic Lasso without complications.

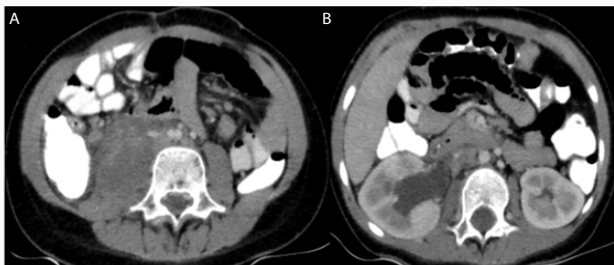


Figure 2: A) CECT Axial view demonstrating swollen and inflamed Right Psoas muscle. B) CECT Axial view demonstrating right sided renal hydronephrosis.



Figure 3: CECT, Coronal MIP 8mm reconstruction demonstrating a Foreign Body (white arrow) within the 2nd part of the Duodenum with its distal tip lodged in the duodenal posterior wall.

cascade (Figure 3). Endoscopy confirmed the radiological suspicion and revealed a wooden skewer lodged in the posterior wall of the duodenal wall (Figure 4). The foreign body was removed successfully by endoscopy, and the patient was treated with antibiotics and bowel rest for several days with full recovery.

Discussion

The psoas is a retroperitoneal muscle which originates from the lateral borders of the twelfth thoracic to fifth lumbar vertebrae. Psoas muscle has two fibrous and one fascial attachment on the spine. Fascicles attach posteriorly to the L1–L5 transverse processes and anteriorly from the T12–L1 disc to the L4–L5 disc. In 70% of people, it is a single structure (psoas major), however, 30% may have

an additional smaller psoas minor muscle, which lies anterior to the psoas major along the same course. It is innervated by ventral rami of the lumbar spinal nerves T12–L4 [1].

The psoas sign, first introduced by an English surgeon, Dr Zachary Cope, is a clinical sign that indicates irritation to the iliopsoas group of hip flexors in the abdomen.

The psoas maneuver stretches or retracts the muscle. An inflammatory process adjacent to the muscle will produce pain and a positive sign. Positive psoas sign is mainly used to suggest an appendicitis or a psoas abscess [2]. Uncommon etiologies include retroperitoneal malignancies such as sarcoma [3], and in rare cases, such as our reported case, due to duodenal perforation by a foreign body. Psoas abscess may mimic osteomyelitis of the hip as was in this case [4].

In our case, the right psoas muscle was only partially demonstrated on its distal part in the abdominal ultrasound obtained and acute appendicitis was ruled out. At that time, the right sided hydronephrosis was not referred to a possible retroperitoneal pathology or to the positive psoas sign presented upon admission.

It is important to keep in mind small clues presented in the initial imaging, which in our case, was hydronephrosis without hydroureter or nephrolithiasis. These findings were neglected by the clinicians, postponing by nearly two weeks the final diagnosis obtained by the later performed CT scan.

Knee MRI was performed to further evaluate a misleading positive bone scan, without clinical correlation or relevance to the clinical presentation. Once a thorough clinical evaluation including elaborated physical examination was performed, the correct imaging study was ordered. This case highlights our tendency to believe and pursue any positive finding on imaging, regardless of their relevance to the case in hand, thus performing unnecessary studies and procedures, shifting us off tract from correct diagnosis. Bone scan, as any other study, has a false positive and false negative results and must never be interpreted in isolation [5].

Pointed sharp foreign bodies such as toothpicks and fish bones have been documented as etiologies of viscus organ perforation and complications such as sepsis are common [6]. Duodenal perforation secondary to foreign bodies ingestion is uncommon, with only a few cases identified in the literature. They occur either in young pediatric patients, or intentionally in the adult population. In disabled patients, there is a higher incidence of foreign body ingestion [7]. The presenting symptoms are usually vague, without fever or elevated

CRP, which makes diagnosis and treatment delayed [7]. None of the reported cases presented a "positive psoas sign" as in our case. Diagnosis is made with abdominal CT scan and in some cases, to be able to detect foreign bodies in CT, reconstructive manipulations such as using MIP should be done. Retrieval of the foreign body is done either by endoscopy or surgically. In our case, the foreign body was proven by endoscopy to be a wooden meat skewer.

In our patient, anamnesis was lacking, presumably due to his mental retardation, and clinical evaluation was difficult resulting with a wider differential diagnosis. Since our patient is fed by his primary caregivers, we suspect that the incident occurred during a barbecue where wooden skewers were served.

To conclude, "positive psoas sign" in a child with lab findings suggestive of inflammation or infection, should raise suspicion of acute appendicitis with or without psoas abscess, and abdominal ultrasound should be performed [8], demonstrating the appendix from its origin to its blind distal end. Once pathologies of the appendix are ruled out by sonography, one must take into consideration other, less common etiologies presenting with a "positive psoas sign", that perhaps may not be demonstrated by sonography. In such cases, abdominal CT scan with iv and oral contrast should be performed without delay, and multiplane reconstructions should be made.

As always regarding pediatric patients, adjusted low radiation protocol should be used.

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