Urachus Remnant: Importance of Early Diagnosis in Preventing Complications

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Abstract: The urachus remnant is a vestigial structure that results from incomplete involution of the cloaca and allantois, forming a duct between the bladder and the umbilical scar. Normally, it obliterates to form the middle umbilical ligament. Despite its rarity and often nonspecific symptoms, it can be incidentally discovered during imaging tests or due to complications, such as infections or neoplasms. The first diagnostic test usually ordered is an ultrasound, followed by computed tomography or magnetic resonance imaging for a more detailed evaluation. Early diagnosis and appropriate management, which may include surgical resolution, are important to prevent complications. This report discusses the case of a 4-year-old female presenting with abdominal pain, fever, and constipation, who was diagnosed with a urachus remnant through ultrasound. The patient responded well to antibiotic therapy for a urinary tract infection and was advised to follow-up with ultrasound for the urachus remnant. The article reviews the potential complications, diagnostic methods, and treatment options for urachus remnants, highlighting the importance of early detection in preventing more severe outcomes, including malignancies.

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Introduction

The remnant of the urachus is a vestigial structure originating from the involution of the cloaca and allantois, forming a duct between the bladder and the umbilical scar, which normally obliterates to form the middle umbilical ligament (Parada Villavicencio et al., 2016). Despite its rarity and nonspecific or absent symptomatology, it may be incidentally diagnosed during imaging tests or due to developed complications, with the most common complications being infections and neoplasms of the urachus (Buddha et al., 2019).

The first test usually ordered when a remnant of the urachus is suspected for diagnosis is an ultrasound of the urinary tract, but computed tomography (CT) or magnetic resonance imaging (MRI) of the pelvis are excellent tests to better characterize this structure (Buddha et al., 2019). The importance of early diagnosis of the urachus remnant lies in avoiding the occurrence of complications and indicating, if necessary, surgical resolution of this remnant (Parada Villavicencio et al., 2016).

Herein, we report the case of a 4-year-old female patient with abdominal pain and fever (38.8 °C) for one day. Informed consent was obtained from the patient's parents.

Case report

A 4-year-old female patient presented with abdominal pain and fever (38.8 °C) for one day, accompanied by constipation for three days. The patient's mother denied any allergies, use of medications, or previous surgeries, but reported a urinary tract infection six months prior, which was treated with oral antibiotic therapy.

Upon physical examination, the patient exhibited a flaccid abdomen and was painless upon palpation. Ultrasound revealed an oval image in the anterior wall of the bladder, consistent with a remnant of the urachus (Figure 1). A urine test confirmed the diagnosis of urinary tract infection.

The patient was treated with trimethoprim-sulfamethoxazole, resulting in resolution of the symptoms within three days. She was instructed to undergo ultrasound follow-up for the urachus remnant.

Discussion

The urachus remnant is a structure that arises from incomplete involution and persistence of embryonic structures. During pregnancy, the urachus connects the fetal urinary bladder to the allantois, and at birth, it undergoes obliteration to become the middle umbilical ligament (Buddha et al., 2019). More specifically, in the third week of embryonic life, the allantois is formed from the yolk sac as a diverticulum, which enlarges until it joins the cloaca. Subsequently, as segments of the cloaca form the fetal bladder while still connected to the allantois, these structures continue to develop into the navel. By the fourth month of gestation, involution of the allantois occurs, resulting in the formation of the urachus, which ultimately obliterates to form the middle umbilical ligament (Buddha et al., 2019).

Anomalies of the urachus are less prevalent in women than in men, with an incidence of about 1 in 5,000 adults (Parada Villavicencio et al., 2016).

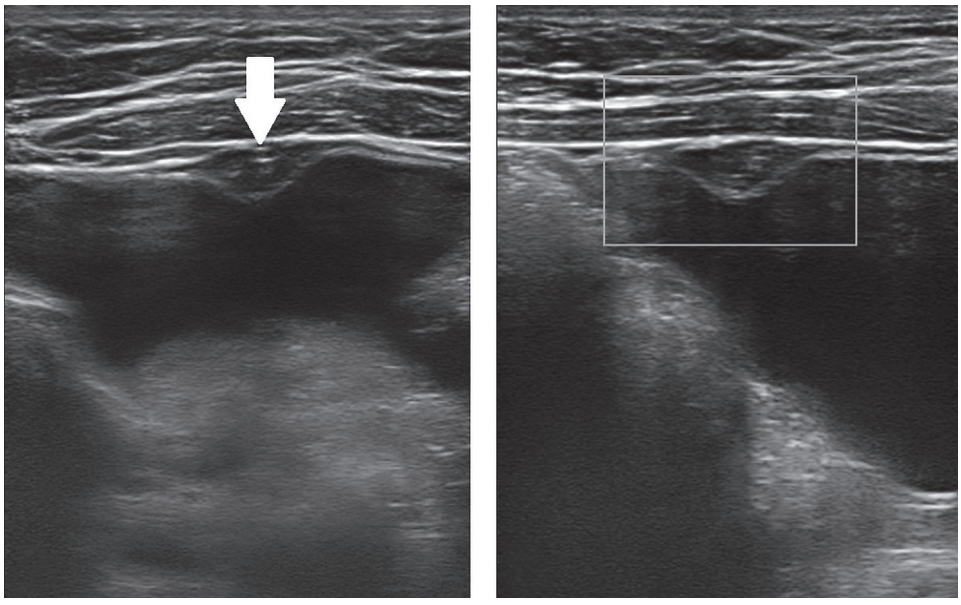

Figure 1: Bladder ultrasound detecting an oval image in the anterior wall of the bladder compatible with a remnant of the urachus (white arrow in A) without vascularization on Doppler study (B).

In autopsies, this condition is observed in only 3% of the general population. Due to either the absence of symptoms or the presence of nonspecific symptoms such as abdominal pain, urinary retention, and fluid drainage through the umbilical scar (Galati et al., 2008), and because it is a rare condition in the general population, the urachus remnant is most often detected incidentally during imaging studies or surgical procedures (Upadhyay and Kukkady, 2003).

There are five ways the urachus remnant can manifest itself (Upadhyay and Kukkady, 2003):

- Complete patent urachus
- Umbilical urachus sinus
- Alternating sinus
- Vesico-urachal diverticulum
- Urachal cyst

The completely patent urachus, also known as urachal fistula, is a tubular structure that connects the navel to the urinary bladder. The "umbilical sinus of the urachus" results in fusiform dilation of the urachus proximal to the navel, and when this dilation periodically empties (either into the urinary bladder or navel), it is referred to as an "Alternating Sinus". A vesico-urachal diverticulum occurs in the suprabladder portion of the urachus, causing the formation of a pouch from the anterosuperior portion of the urinary bladder. Lastly, the urachal cyst forms due to obliteration of the bladder and the umbilical end of the urachus (Buddha et al., 2019).

The increased availability and demand for medical imaging tests in everyday medical practice have made it more common to identify the urachus remnant as an incidental finding. However, several imaging techniques are useful for diagnosing this condition. These include ultrasonography (US), CT, MRI, voiding cystourethrogram, and cystogram. Generally, ultrasonography is initially used to identify and locate the structure, as it is easily accessible and cost-effective (Parada Villavicencio et al., 2016). CT and MRI are capable of assessing the extent of the disease and detecting any complications related to the urachus remnant (Parada Villavicencio et al., 2016; Buddha et al., 2019). Additionally, MRI plays an important role in staging urachal neoplasms. Finally, voiding cystourethrogram and cystogram are contrast-enhanced imaging tests that assist in the detection of vesico-urachal diverticulum and urachal cysts (Buddha et al., 2019).

The complications of the urachus remnant vary according to the age of the patient. In infants, the most common complications include infection of this structure, as reported in the case, and when associated with other changes of the genitourinary tract, such as vesicoureteral reflux, hypospadias, and stenosis of the meatus, among others. In adults, complications may include infection and the development of malignancy of the urachus remnant (Parada Villavicencio et al., 2016).

The choice of treatment for the urachus remnant primarily depends on the age and symptomatology of the patient. For patients under one-year-old, it is recommended to monitor the case and wait for spontaneous resolution, as many remnants of the urachus involute with age. Surgical excision of the structure may be considered for children or those with significant symptoms. In asymptomatic adults, prophylactic excision of the urachus remnant is typically recommended to prevent complications (Parada Villavicencio et al., 2016).

Conclusion

Although urachal anomalies are uncommon, it is important to recognize them. This recognition enables diagnosis in patients presenting with typical changes on imaging exams or symptoms associated with the condition. Early diagnosis is crucial to prevent complications, such as the development of malignancies involving this structure.

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