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Case Report

Incidental vesicourachal diverticulum in a young female ☆

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ABSTRACT

A vesicourachal remnant is the rarest presentation of the congenital urachal remnant anomalies, occurring approximately in 3% of those who have them. We discuss a case where a vesicourachal anomaly is discovered incidentally in a pediatric patient by ultrasound and subsequently confirmed by MRI. The urachus connects the dome of the bladder to the umbilical cord in fetal life. After birth, this structure is obliterated and becomes the median umbilical ligament. When complete obliteration does not occur, a urachal remnant is created.

Introduction

The urachus is a hollow fibromuscular cordlike structure that extends from the anterosuperior surface of the bladder to the umbilicus. It is present in almost 100% of infants at birth but regresses secondary to fibrosis with age, becoming the median umbilical ligament. When the urachus fails to obliterate completely, the structure that remains is known as a urachal remnant.

Case report

An 8-year-old female presented to the Emergency Department for evaluation of nonradiating abdominal pain. The patient's caretaker reported that the pain began on the day of presentation and was associated with episodes of nonbloody emesis. Of note the caretaker denied recent fever or diarrhea but did endorse that the patient had not had a bowel movement in the past 2 days. All personal identifiers for the patient were removed in addition to the age changed. This was within the requirements of our department and institution to send for publication without requiring consent from the patient as there is no manner in which to identify the patient.

Physical examination revealed a relatively firm "mound" inferior to the umbilicus with tenderness in the surrounding periumbilical area. There was no left or right lower quadrant tenderness.

Laboratory results were significant for an elevated white count 21.2 and bandemia. Urinalysis was positive for leukocyte esterase, WBCs, and hyaline casts, and the patient was started on empiric antibiotics for a urinary tract infection.

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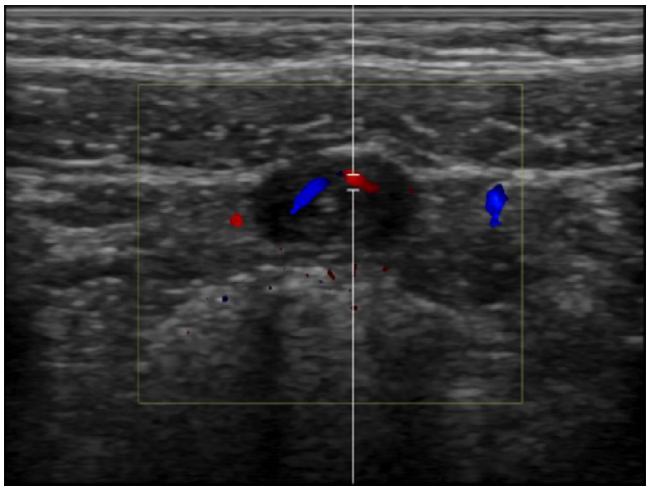

Fig. 1 – Transverse ultrasound along the midline just superior to the bladder. A hypoechoic mass with punctate hyperechoic center with internal symmetric doppler flow is identified. This mass is contiguous and demonstrates the same echogenicity as the bladder.

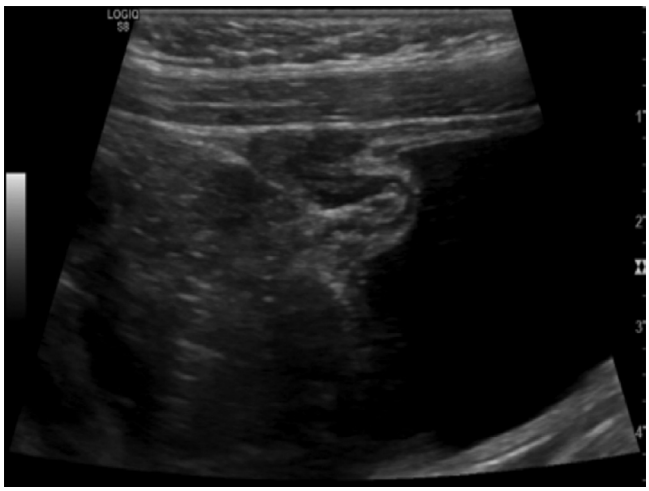

Fig. 2 – Sagittal ultrasound image of the hypoechoic mass as it enters into the bladder. Note the close association with the vesicourachal diverticulum with the bladder lumen.

Abdominal obstructive series demonstrated a large stool burden without findings to suggest bowel obstruction or free air.

A focused ultrasound of the abdomen was performed for further evaluation of the periumbilical mass which demonstrated a well circumscribed hypoechoic lesion immediately superior to the bladder. Internal Doppler flow was detected, and the lesion appeared to be opening into the urinary bladder (Figs 1 and 2).

A magnetic resonance imaging (MRI) of the abdomen was subsequently performed for further characterization of the ultrasound findings. The MRI demonstrated a midline structure arising from the dome of the urinary bladder measuring

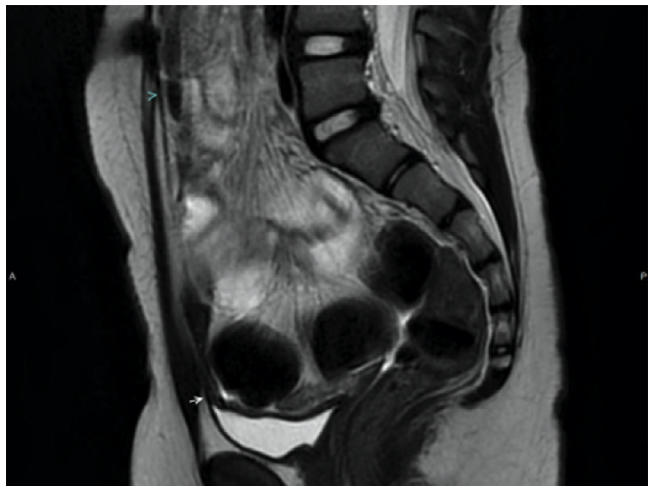

Fig. 3 – Multiple sagittal T2-weighted MRI imaging through the midline abdomen and pelvis demonstrates an anterosuperior outpouching within the bladder as demonstrated by the white arrows and arrowhead. The median umbilical ligament is identified with the blue arrowhead; distended large bowel prevents complete visualization of the umbilical ligament into the vesico-urachal diverticulum along a single sagittal image.

11 × 8.9 × 29 mm, consistent with a urachal remnant (Figs. 3-5).

With the above findings, the urology team was consulted and the decision was made to not surgically remove the urachal remnant. Although a remnant with a narrow os can trap urine leading to stasis and infection, the urology team felt likely inciting source of the patient's current infection was the significant constipation. Therefore, given the low risk of malignant transformation and presumed asymptomatic urachal anomaly, conservative management was preferred.

The patient was subsequently discharged to complete her course of antibiotics at home and with close follow-up as an outpatient.

Discussion

The urinary bladder begins to develop during the 4th week of embryogenesis. At which point in time, the urogenital septum separates the cloaca into the rectum posteriorly and the urogenital sinus anteriorly. The urogenital sinus continues to develop into the urethra and urinary bladder [1]. The proximal aspect of the urogenital sinus is continuous with the allantois which terminates at the umbilicus. As fetal development continues the lumen of the allantois involutes leaving behind the urachus, a fibrous chord of tissue. The urachus subsequently becomes the median umbilical ligament [2]. Involution of the urachus is often not complete until after birth [3]. Failure of the allantois to involute leads to a hollow urachal remnant.

Urachal remnants have a prevalence of approximately 1/5000 and are often an incidental finding on cross-sectional imaging [3]. A study by Schubert et al suggested that urachal

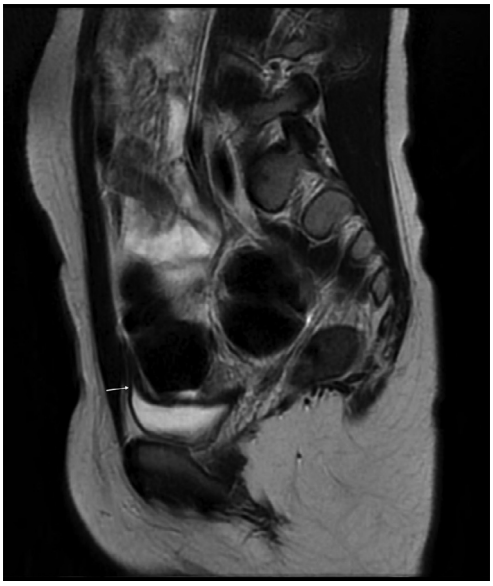

Fig. 4 – Multiple sagittal T2-weighted MRI imaging through the midline abdomen and pelvis demonstrates an anterosuperior outpouching within the bladder as demonstrated by the white arrows and arrowhead. The median umbilical ligament is identified with the blue arrowhead; distended large bowel prevents complete visualization of the umbilical ligament into the vesico-urachal diverticulum along a single sagittal image.

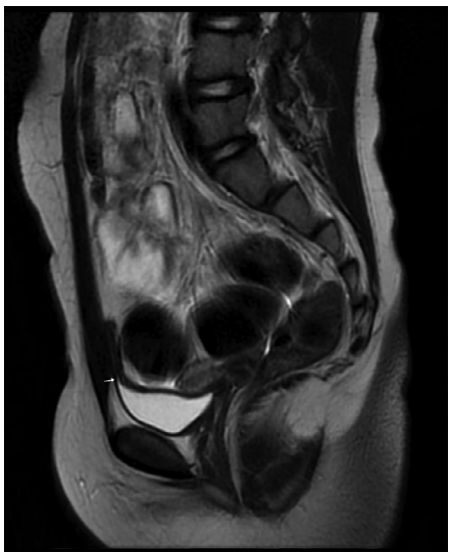

Fig. 5 – Multiple sagittal T2-weighted MRI imaging through the midline abdomen and pelvis demonstrates an anterosuperior outpouching within the bladder as demonstrated by the white arrows and arrowhead. The median umbilical ligament is identified with the blue arrowhead; distended large bowel prevents complete visualization of the umbilical ligament into the vesico-urachal diverticulum along a single sagittal image.

remnants are present in one third of all adults [4]. It was further suggested in a study by Galati et al that urachal remnants in infants under 6 months of age should be viewed as physiologic as more than 80% resolve with nonoperative management [5].

Urachal remnants can be classified into 4 categories: patent urachus, umbilical-urachal sinus, urachal cyst, and vesicourachal diverticulum [6]. A patent urachus is when there is a persistent connection between the umbilicus and urinary bladder. This leads to leakage of urine from the umbilicus and is often associated with posterior urethra valves [7]. The umbilical-urachal sinus describes an blind outpouching extending from the umbilicus but without connection to the urinary bladder [8]. Urachal cyst occurs when the proximal and distal ends of the urachus involute but the middle persists [7]. The vesicourachal diverticulum is similar in concept to the umbilical urachal sinus; however there is a blind ending urachus with an opening to the urinary bladder as opposed to the umbilicus. This is the rarest form of a urachal remnant anomaly [3, 7].

As mentioned above, the urachal anomalies are often diagnosed incidentally. This has only increased with the prevalence of cross-sectional imaging techniques. Imaging modalities including ultrasound (US), computed tomography and MRI can easily identify the presence of a urachal remnant. Of note, US has been shown to have a diagnostic accuracy of 90% [5]. US findings include identification of a midline tubular structure with hypoechoic walls and anechoic content [3]. Further imaging modalities help confirm the US findings and can better demonstrate the extent of the anomaly.

Management of urachal remnants remains controversial. In children under the age of one, conservative treatment is favored unless the patient remains symptomatic. At which point surgical intervention is recommended [3, 5]. Surgical excision in asymptomatic individuals is controversial as spontaneous regression occurs throughout all age groups. Furthermore the risk of malignant transformation is exceedingly rare [9]. Continued monitoring with various imaging modalities is recommended until resolution of the remnant.

REFERENCE

[1] Rehman S, Ahmed D. Embryology, Kidney, Bladder, and Ureter. FL: StatPearls.Treasure Island; 2020.

[2] Martin AJ, McDonald L, Gopal M. Urachal remnant causing umbilical in-drawing during micturition. Ann R Coll Surg Engl 2018;100(2):e31–ee3 Epub 2017/11/29.PubMed PMID: 29181994; PubMed Central PMCID: PMCPMC5838699. doi:10.1308/rcsann.2017.0197.

[3] Parada Villavicencio C, Adam SZ, Nikolaidis P, Yaghmai V, Miller FH. Imaging of the urachus: anomalies, complications, and mimics. Radiographics 2016;36(7):2049–63 Epub 2016/11/11.PubMed PMID: 27831842. doi:10.1148/rg.2016160062.

[4] Schubert GE, Pavkovic MB, Bethke-Bedurftig BA. Tubular urachal remnants in adult bladders. J Urol 1982;127(1):40–2 Epub 1982/01/01PubMed PMID: 7057501. doi:10.1016/s0022-5347(17)53595-8.

[5] Galati V, Donovan B, Ramji F, Campbell J, Kropp BP, Frimberger D. Management of urachal remnants in early

childhood. J Urol 2008;180(4 Suppl):1824–6 discussion 7. Epub 2008/08/30PubMed PMID: 18721938. doi:10.1016/j.juro.2008.03.105.
[6] Buddha S, Menias CO, Katabathina VS. Imaging of urachal anomalies. Abdom Radiol (NY) 2019;44(12):3978–89 Epub 2019/09/04PubMed PMID: 31478084. doi:10.1007/s00261-019-02205-x.
[7] Yu JS, Kim KW, Lee HJ, Lee YJ, Yoon CS, Kim MJ. Urachal remnant diseases: spectrum of CT and US findings. Radiographics 2001;21(2):451–61 Epub 2001/03/22PubMed PMID: 11259707. doi:10.1148/radiographics.21.2.g01mr02451.
[8] Berman SM, Tolia BM, Laor E, Reid RE, Schweizerhof SP, Freed SZ. Urachal remnants in adults. Urology 1988;31(1):17–21 Epub 1988/01/01PubMed PMID: 3122397. doi:10.1016/0090-4295(88)90564-x.
[9] Gleason JM, Bowlin PR, Bagli DJ, Lorenzo AJ, Hassouna T, Koyle MA, et al. A comprehensive review of pediatric urachal anomalies and predictive analysis for adult urachal adenocarcinoma. J Urol 2015;193(2):632–6 Epub 2014/09/16PubMed PMID: 25219697. doi:10.1016/j.juro.2014.09.004.