

CASE REPORT

Urachal Remnant Infection Caused by *Actinomyces Turicensis*

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SUMMARY

Background: Urachal remnants (URs) represent uncommon and underdiagnosed entities that are usually detected incidentally at imaging or present clinically different manifestations.

Methods: Here we presented a boy with UR infection. Ultrasonography and bacterial culture and identification were performed. He received antibiotic treatment and underwent surgical excision of the cyst.

Results: The patient presented with both a urachal cyst and umbilical-urachal sinus. UR infection was caused by *Actinomyces turicensis*. He recovered well from the operation without complications.

Conclusions: The present case reminds clinicians to be familiar with imaging features of different types of URs and their potential complications and indicates the necessity of pathogenic microorganism analysis to tailor antibiotic treatment and post-operative follow-up to prevent complications.

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KEYWORDS

urachal remnants, urachal remnant infection, *actinomyces turicensis*

INTRODUCTION

Urachal remnants (URs) arise from incomplete involution of the urachus, an embryologic tract that extends from the bladder to the umbilicus during development of the fetus [1]. URs can be present in various forms, such as patent urachus, urachal cyst, umbilical-urachal sinus and vesicourachal diverticulum [2]. Urachal abnormalities are mostly asymptomatic and often discovered incidentally or after complications occur. Infection is one of the common complications of URs and may be misdiagnosed initially, resulting in therapeutic failure and recurrent infections. *Staphylococcus aureus* is the most frequently isolated organism in UR infection, followed by *Escherichia coli*, *Enterococcus*, *Citrobacter*, *Klebsiella*, and *Proteus*, etc. [3].

Here we presented a case of urachal remnant infection in a boy caused by *Actinomyces turicensis*, indicating the necessity of pathogenic microorganism analysis to

tailor antibiotic treatment and post-operative follow-up to prevent complications.

CASE PRESENTATION

An 11-year-old boy was admitted to our hospital with the chief complaint of abdominal pain after urination and appearance of yellow umbilical discharge. Before admission, the patient took oral amoxicillin for a while and his symptoms were ameliorated to some extent. Physical examination revealed subumbilical tenderness, yellow sticky umbilical discharge and a sinus tract of about 3 cm depth at the base of the umbilicus. Abdominal ultrasonography showed a well-defined hypoechoic cystic structure located between the subumbilical fat layer and abdominal muscles, indicating the possible existence of infected UR (Panel A). Laboratory results of routine examinations revealed no signs of urinary tract infection, anemia, white blood cell elevation, or thrombocyte abnormality. The umbilical discharge was collected for microorganism analysis. A type of gram-positive bacillus was isolated (Panel B) and identified as *Actinomyces turicensis* by 16S rRNA gene sequencing. The patient was given intravenous penicillin against the infection and his symptoms improved gradually. After a course of antibiotics, he underwent surgical excision of the cyst (about 2 x 2 cm), which had no connections with the bladder. On day 7 after the operation, he had recovered well and was discharged home. Subsequent outpatient follow-up for one and a half years confirmed an uncomplicated recovery.

DISCUSSION

URs represent uncommon and underdiagnosed entities that are usually detected incidentally at imaging or present clinically different manifestations with the development of unspecific abdominal or urinary complications [1]. Clinical presentations of URs include abdominal discomfort, urinary tract infection, UR infection, and umbilical mass/discharge, while the most fearful long-term outcome is the development of urachal adenocarcinoma resulting from malignant transformation of the columnar metaplastic epithelium [4,5]. According to Sato et al. [6], umbilical granulation and abdominal pain are the most common symptoms in infants under one year old and in children over one year old, respectively. Here we reported an 11-year-old boy with URs who presented with abdominal pain after urination, appearance of yellow umbilical discharge, and infection of the remnant. Infection is the most common complication of URs and may lead to some marked unspecific symptoms, such as fever, abdominal pain, erythema and purulent urinary discharge. In addition, severe infection can result in the formation of abscesses and complex fistulas, with the risk of rupture-induced peritonitis and sepsis [7]. So, if infection occurs, it must be managed

timely and properly. *Staphylococcus aureus* is the most commonly isolated organism in UR infection, followed by *Escherichia coli*, *Enterococcus*, *Citrobacter*, *Klebsiella*, and *Proteus*, etc. [3]. As for our patient, the umbilical discharge was collected for bacterial culture and *Actinomyces turicensis* was identified as the pathogen by 16S rRNA gene sequencing, indicating the necessity of pathogenic microorganism analysis to tailor antibiotic treatment.

With the advancements and wide use of imaging technologies, URs are increasingly diagnosed incidentally. When URs are suspected, ultrasonography is the first-choice imaging modality that should be preferred for diagnosis and differential diagnosis. Compared with other imaging methods, ultrasonography has several advantages. It is fast with a shorter turnover time, noninvasive, easily accessible, and does not entail exposure to radiation, which is especially important in children [8]. It was reported that ultrasonography had a sensitivity of 79%, a positive predictive value of 83%, a specificity of 30%, and a negative predictive value of 25% in the diagnosis of URs, suggesting that this imaging method is apt to identify URs if they are present rather than rule out a nonexisting urachal anomaly [9]. Computed tomography, voiding cystourethrogram, and magnetic resonance imaging are usually recommended when ultrasonography fails. Physical examination of our patient revealed a sinus tract of about 3 cm depth at the base of the umbilicus and subsequent ultrasonography showed a well-defined hypoechoic cystic structure located between the subumbilical fat layer and abdominal muscles, confirming the diagnosis of UR presenting both urachal cyst and umbilical-urachal sinus.

Up to now, the treatment modalities for URs remain controversial. Surgical excision is the mainstay to prevent infections and rarely-occurring malignancies. However, post-operative complications should be taken into consideration. Naiditch et al. [8] reported that in their series post-operative complications including persistent urachus, umbilical hernia, wound infection, bladder leak, bladder diverticulum, and bladder rupture occurred and the post-operative complication rate reached 14.7%. So, they advocated for conservative treatments of asymptomatic URs. In addition, increasing studies demonstrated spontaneous resolution of URs with age [10,11]. Ueno et al. [12] found a 33% spontaneous regression rate in children under one year of age, while the rate decreased to 12% at older ages. Stopak et al. [13] reported that 87% of the patients undergoing observation without surgery showed spontaneous resolution within 1 year. So, more and more studies favor conservative management over surgical interventions for URs, especially when they are asymptomatic or in infants [13,14]. Some researchers follow a treatment algorithm dependent on the patient's age, symptoms, and the type of remnant. Small cysts can be observed conservatively, while clinically symptomatic large cysts should be excised and patients should be followed up to prevent possible post-operative complications. Our patient received

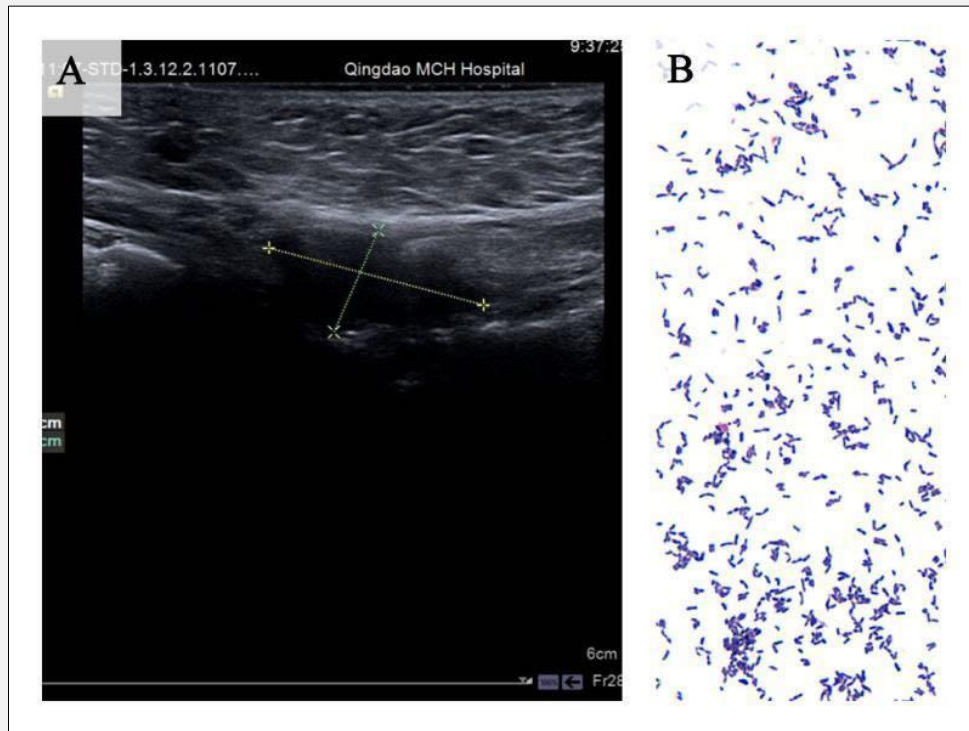


Figure 1. Abdominal ultrasonography of the infected urachal remnant and gram staining of the isolated bacteria from the umbilical discharge.

(A) Abdominal ultrasonography showed a well-defined hypoechoic cystic structure. (B) Gram staining revealed a type of non-spore-forming, gram-positive bacillus.

surgical excision of the cyst, and he recovered well without any complications after a follow-up for one and a half years.

CONCLUSION

The present case reminds clinicians to be familiar with imaging features of different types of URs and their potential complications and indicates the necessity of pathogenic microorganism analysis to tailor antibiotic treatment and post-operative follow-up to prevent complications.

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Declaration of Interest:

All authors declare no conflict of interests.

References:

- Orbatu D, Alaygut D. Evaluation and management of urachal remnants in children. *Pediatr Int* 2020;62:1158-61. (PMID: 32347613)
- Potisek N, Weihe J. Infected Urachal Cyst. *N Engl J Med* 2016; 375:2582. (PMID: 28029928)
- Buddha S, Menias CO, Katabathina VS. Imaging of urachal anomalies. *Abdom Radiol (NY)* 2019;44:3978-89. (PMID: 31478084)
- Keceli AM, Donmez MI. Are urachal remnants really rare in children? An observational study. *Eur J Pediatr* 2021;180:1987-90. (PMID: 33492442)
- Upadhyay V, Kukkady A. Urachal remnants: an enigma. *Eur J Pediatr Surg* 2003;13:372-6. (PMID: 14743323)
- Sato H, Furuta S, Tsuji S, Kawase H, Kitagawa H. The current strategy for urachal remnants. *Pediatr Surg Int* 2015;31:581-7. (PMID: 25896294)
- Yoo KH, Lee SJ, Chang SG. Treatment of infected urachal cysts. *Yonsei Med J* 2006;47:423-7. (PMID: 16807994)

8. Naiditch JA, Radhakrishnan J, Chin AC. Current diagnosis and management of urachal remnants. *J Pediatr Surg* 2013;48:2148-52. (PMID: 24094971)
9. Widni EE, Hollwarth ME, Haxhija EQ. The impact of preoperative ultrasound on correct diagnosis of urachal remnants in children. *J Pediatr Surg* 2010;45:1433-7. (PMID: 20638520)
10. Nogueras-Ocana M, Rodriguez-Belmonte R, Uberos-Fernandez J, Jimenez-Pacheco A, Merino-Salas S, Zuluaga-Gomez A. Urachal anomalies in children: surgical or conservative treatment? *J Pediatr Urol* 2014;10:522-6. (PMID: 24321777)
11. Galati V, Donovan B, Ramji F, Campbell J, Kropp BP, Frimberger D. Management of urachal remnants in early childhood. *J Urol* 2008;180:1824-6; discussion 1827. (PMID: 18721938)
12. Ueno T, Hashimoto H, Yokoyama H, Ito M, Kouda K, Kanamaru H. Urachal anomalies: ultrasonography and management. *J Pediatr Surg* 2003;38:1203-7. (PMID: 12891493)
13. Stopak JK, Azarow KS, Abdessalam SF, Raynor SC, Perry DA, Cusick RA. Trends in surgical management of urachal anomalies. *J Pediatr Surg* 2015;50:1334-7. (PMID: 26227313)
14. Dethlefs CR, Abdessalam SF, Raynor SC, et al. Conservative management of urachal anomalies. *J Pediatr Surg* 2019;54:1054-1058. (PMID: 30867097)