



# A Rare Case of Urachal Remnant with Calculus Just Above the Bladder

Amin Mirsani <sup>1</sup>, Mohammad Amin Dana <sup>2</sup>, Seyed Hadi Sajjadi <sup>3</sup> and Raheleh Baradaran <sup>4,\*</sup>

<sup>1</sup>Department of Urology, Allameh Bohlool Gonabadi Hospital, Gonabad University of Medical Sciences, Gonabad, Iran

<sup>2</sup>Department of Radiology, Allameh Bohlool Gonabadi Hospital, Gonabad University of Medical Sciences, Gonabad, Iran

<sup>3</sup>Department of Anesthesiology, Allameh Bohlool Gonabadi Hospital, Gonabad University of Medical Sciences, Gonabad, Iran

<sup>4</sup>Department of Operating Room, Allameh Bohlool Gonabadi Hospital, Gonabad University of Medical Sciences, Gonabad, Iran

\*Corresponding author: Department of Operating Room, Allameh Bohlool Gonabadi Hospital, Gonabad University of Medical Sciences, Gonabad, Iran. Email: baradaranr941@mums.ac.ir

Received 2023 May 02; Revised 2023 August 23; Accepted 2023 September 16.

## Abstract

The urachus closes naturally after birth. Its opening leads to anomalies in which secondary complications, including urachus calculi, may be formed. This disease is often discovered incidentally in radiographic examinations and is rare in adults. The purpose of this study is to present a rare case of urachus calculus in an adult located precisely in the anterior wall of the bladder, at the junction of the bladder and urachus. Our case was a 38-year-old man with complaints of abdominal pain. The computerized tomography (CT) scan images showed a calculus attached to the anterior and inner wall of the bladder in inserting the urachus into the bladder. Cystoscopy showed the calculus is connected to the urachus duct without any mass/tumor. The collection of evidence suggests a calcified urachus. The patient was discharged with conservative treatment and a mild analgesic.

**Keywords:** Urachal Remnant, Calculus, Bladder, Stone Bladder

## 1. Introduction

The urachus is a natural embryonic remnant. In adults, it is a fibrous cord potentially located in the midline region between the peritoneum and the transversalis fascia, developing from the bladder dome to the navel (1). In the first trimester of gestation, the urachus is responsible for removing the neonate's nitrogenous waste via the placenta and the umbilical cord (2), but its function in adults is unclear. The urachus opening after birth causes anomalies. Four types of congenital urachal anomalies include patent urachus (~50% of all anomalies), umbilical-urachal sinus (~15%), vesicourachal diverticulum (~3% to 5%), and urachal cyst (~30%), which may be seen in children or adults. These anomalies may mostly close after birth but open again following some pathological conditions (3). Urachal anomalies occur at an incidence of 1 in 5,000 births; of this number, about 2% can be found in adults. It is two-fold more common in males than in females (4). The clinical symptoms are nonspecific and vary between children and adults. The most common symptoms in adults are hematuria, dysuria, and pain. Of course, it is possible to be asymptomatic or associated with dermatitis or abscess of the periumbilical. Most patients with urachal anomalies are asymptomatic

unless associated with infection (5). Ultrasonography (US) and a computerized tomography (CT) scan are effective tools for diagnosis. Timely and correct diagnosis of urachal anomalies is vital because they are prone to infection and malignancy (6). The two complications after these anomalies are calculi and cancer (7). According to our best search of the English literature, urachus calculi are a rare anomaly, with only eleven cases reported in adults to date.

## 2. Case Presentation

The patient was a 38-year-old man referred to a urologist complaining of abdominal ambiguous pain. He had tenderness in the abdomen wall on a physical exam. Vital signs and laboratory results were normal. He had no weight loss, urinary obstruction, irritation symptoms, hematuria, or medical history. A CT scan of the abdomen and pelvis was requested for the patient. The results of the CT scan in both sagittal and axial axes showed a calculus with a size of 10 mm attached to the anterior and inner wall of the bladder, which was located at the insertion of the bladder to the urachus (Figure 1). Cystoscopy was performed to definitively diagnose and differentiate urachus calculus from bladder calculus.

Cystoscopy images (Figure 2) showed that the calculus is connected to the urachus duct, and no trace of tumor or mass was observed in this area. The collection of evidence suggests a calcified urachus. The patient was discharged with only conservative treatment and a mild analgesic.

### 3. Discussion

We report an unusual presentation of a symptomatic urachal remnant with calculus just above the bladder in an adult. According to previous studies, we concluded that urachus calculi are a secondary complication of urachus anomalies, including vesicourachal diverticulum, cyst, sinus, and cancer. Infections, bladder outlet obstruction, and urine stasis can also be due to infections. To date, only eleven similar patients have been reported as case reports. The present patient is the 12th case (presented in Table 1).

In the vesicourachal diverticulum, the urachus communicates only with the bladder dome. This condition results when the vesical end of the urachus fails to close. Vesicourachal diverticulum is asymptomatic in most cases and is usually discovered incidentally on axial CT performed for unrelated reasons, appearing as a midline cystic lesion just above the anterosuperior aspect of the bladder (17). The US readily demonstrates an extraluminally protruding, fluid-filled sac that does not communicate with the umbilicus. This lesion is found in patients with chronic bladder outlet obstruction, and it may be complicated by urinary tract infection, intratracheal calculus formation, and an increased prevalence of carcinoma after puberty (18).

In accordance with our case, Rodrigues and Gandhi indicated a rare calcified urachal remnant similar to a bladder calculus near its insertion into the urinary bladder. They were associated with left-sided renal colic (13). Rawal and Maldjian demonstrated a rare case of urachal remnant calcification with a 7 mm size located at the anterior bladder wall at the embryological urachus insertion on a CT scan. They stated that two important factors that cause urachal calcification are urachal carcinoma and bladder infections, including schistosomiasis and tuberculosis (8).

Sometimes, the presence of urachus cysts leads to calcification of the cyst wall and the formation of calculus (19). For example, Ozbulbul et al. reported a midline cyst exactly above the bladder anterosuperior portion that included two calculi on CT images. They stated that intratracheal calculus formation might be due to chronic bladder outlet obstruction that subsequently leads to complications such as urinary tract infection and the occurrence of adenocarcinoma. The existence of urachal calculus indicates that there was already a connection

between the bladder and urachal remnant that permitted urine to flow into the urachal lesion and induced the formation of the calculi (3).

Tanomogi et al. reported a cyst approximately 3 cm by cystoscopy that communicated the umbilicus to the bladder. The patient complained of persistent discharge from the umbilicus for 18 years. Computerized tomography scan and magnetic resonance imaging (MRI) revealed a  $5 \times 3$  cm calculus within the cyst removed by surgery. The authors claimed that > 210 cases of urachal cysts had been presented in Japan, while about 10% were accompanied by calculus (20).

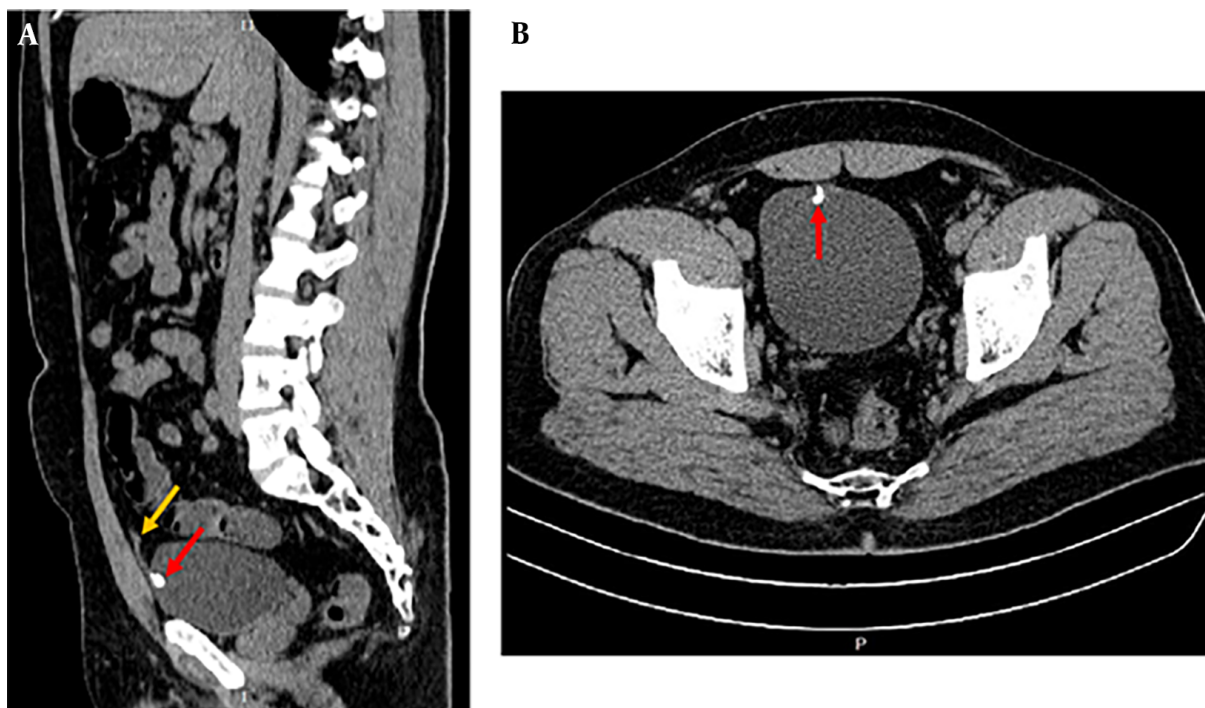
Calculus formation is special for adults, probably due to the long-term stoppage of urine in the urachal remnant, carried out by a crystallization factor including mucus or shed epithelium. Timely diagnosis and treatment of the urachal remnant can prevent complications such as calculus formation or abscess. If this disorder is completely ignored, it may become a silent and chronic source of inflammation, infection, and cancer (7).

Diehl reported a urachal cyst that was communicated with the bladder and contained calculus from the infection's origin. Histological examination showed no evidence of malignancy. The calculus is composed of calcium phosphate (15). Seo et al. showed calcifications within a cyst in front of the bladder in the US. In addition, cystography revealed the existence of calculi of  $1.8 \times 1.3$  cm and  $0.6 \times 0.3$  cm in the pelvic cavity and outer of the bladder. They removed the cyst and its calculi by a laparoscopic incision (10).

It is proven that calcification occurs in 50% - 70% of urachal cancers (21). Urachal carcinomas can produce typical psammomatous calcifications that are detectable on CT. Calcifications in a midline supravescical mass are diagnosed as urachal carcinoma (22, 23).

Hladun et al. reported a rare and aggressive cancer originating from the urachus in a 73-year-old female. The patient was followed up for 12 years, showing the slow growth of cancer without any symptoms, and finally, it became calcified and entered the bladder lumen. After the patient developed haematuria and mucous discharge in urine, an urgent CT scan and MRI showed a 4.2 cm calcified cystic lesion connected to the lumen of the bladder. An open diagnostic laparotomy discovered a calcified tumor originating from the urachal remnant. The tumor, which was  $5 \times 4$  cm, infiltrated the bladder dome (11).

In line with our study, many surgeons believe in a conservative approach, such as antibiotic and analgesia treatment and patient follow-up. They suggest that conservative treatment will spontaneously obviate many lesions and may be especially effective in incidental detection of the urachal remnant (5, 24). On the other



**Figure 1.** The images of the computerized tomography (CT) scan in both sagittal (A); and axial (B); axes show a calculus (red arrow) with the size of 10 mm attached to the anterior and inner wall of the bladder, which was exactly located in the insertion of the bladder to the urachus. The yellow arrow shows the portion of the urachus.

**Table 1.** Reported Cases of Urachal Remnant Calcification in Adults

Authors	Year	Age	Gender	Symptoms	Diagnostic	Stone Size	Therapy	Test that Leads to Diagnose	Ref.
Rawal and Maldjian	2022	44	M	Abdominal pain following an accident	Urachal calculus	7 mm	Conservative treatment	CT	(8)
Kato et al.	2022	28	M	Umbilical drainage	Urachal calculus + inflammation	-	Laparoscopic resection	CT	(9)
Seo et al.	2008	58	M	Abdominal pain + urinary frequency	Urachal cyst + calculi	1.8 × 1.3 cm + 0.6 × 0.3 cm	Laparoscopic resection	CT + US + cystoscopy	(10)
Hladun et al.	2021	73	F	Hematuria+ mucous discharge in urine	Urachal cyst + calculus + tumour	4.2 cm	Laparotomy	CT + MRI	(11)
Nakano et al.	2014	96	F	Pyuria+ bacteriuria + fever + loss of appetite	Urachal sinus + calculus	-	Removed through the navel by soaking in sterilized olive oil	CT + physical examination	(12)
Rodrigues and Gandhi	2013	45	M	Abdominal pain	Urachal calculus	-	-	CT	(13)
Milotic et al.	2001	73	F	Nocturia	Urachal cyst + calculi	5-10 mm	Laparotomy	CT + sonography	(14)
Diehl	1991	74	M	Intractable urinary tract infections	Urachal cyst + calculus	-	Surgery	X-ray	(15)
Leyson	1984	32	M	Suprapubic pain after a drinking + nausea	Urachal cyst + calculus	-	Surgery	X-ray	(16)
Ozbulbul et al.	2010	60	M	Asymptomatic	Vesicourachal diverticulum + calculi	-	-	CT + US + MDCT urography	(3)
Good et al.	2022	26	M	Red umbilical nodule + clear malodorous discharge	Urachal sinus + calculus	1 cm	Surgery	CT + US	(6)
Current study	2023	38	M	Abdominal pain	Urachal calculus	10 mm	Conservative treatment	CT + US + cystoscopy	-

Abbreviations: CT, computerized tomography; US, ultrasonography; MDCT, multi-detector CT; MRI, magnetic resonance imaging.



**Figure 2.** Cystoscopy image shows a calculus connected to the urachus duct without any tumor or mass.

hand, some surgeons stated that surgery should be done at diagnosis time since these abnormalities are unlikely to be repaired spontaneously (5, 19).

### 3.1. Conclusions

Physicians and specialists should notice that the urachus stone is not mistaken for a bladder stone, though rare. Urachus stones require conservative treatments, and the patient must be periodically followed up to ensure symptoms or complications do not occur.

### Footnotes

**Authors' Contribution:** A. M. and R. B. conceived and designed the evaluation and drafted the manuscript. A. M., M. A. D., and S. H. S. evaluated the clinical results and revised the manuscript. All authors read and approved the final manuscript.

**Conflict of Interests:** The authors declare that there are no conflicts of interest, both financial and non-financial.

**Funding/Support:** There was no funding for the present study.

**Informed Consent:** Written and signed informed consent was obtained from the patient for publishing this case report.

### References

1. Gearhart JP, Walsh PC, Retik AB, Vaughan ED. *Campbell's Urology*. Philadelphia: Saunders;1998.
2. Larsen WJ. Development of the urogenital system. *Human Embryology*. London: Churchill Livingstone; 2001.
3. Ozbulbul NI, Dagli M, Akdogan G, Olcer T. CT urography of a vesicourachal diverticulum containing calculi. *Diagn Interv Radiol*. 2010;**16**(1):56-8. [PubMed ID: 19838994]. <https://doi.org/10.4261/1305-3825.DIR.1798-08.1>.
4. Sitting KM. Abdominal wall, umbilicus, peritoneum, mesenteries, omentum, and retroperitoneum. *Textbook of surgery*. Philadelphia: Saunders;1991. p. 722-35.
5. Wilson AL, Gandhi J, Seyam O, Rahmani B, Patel S, Joshi G, et al. Urachal anomalies: A review of pathological conditions, diagnosis, and management. *Transl Res Anat*. 2019;**16**:100041. <https://doi.org/10.1016/j.tria.2019.100041>.
6. Good AJ, Tucker DC, Rudnick EW, De Benedetto A. Calcified Urachal Remnant in a Young Adult: An Unusual Case. *Cutis*. 2022;**109**(5):E30-1. [PubMed ID: 35856768]. <https://doi.org/10.12788/cutis.0534>.
7. Ashley RA, Inman BA, Routh JC, Rohlinger AL, Husmann DA, Kramer SA. Urachal anomalies: a longitudinal study of urachal remnants in children and adults. *J Urol*. 2007;**178**(4 Pt 2):1615-8. [PubMed ID: 17707039]. <https://doi.org/10.1016/j.juro.2007.03.194>.

8. Rawal N, Maldjian P. Urachal Remnant Calcification: A Rare Cause of Calcification Within the Urinary Bladder. *Cureus*. 2022;**14**(9). e29443. <https://doi.org/10.7759/cureus.29443>.
9. Kato H, Deguchi M, Sakata Y. A Rare Case of Urachal Remnant with Calculus Just Below Umbilicus. *J Surg Case Rep*. 2022;**4**(2):1-3. <https://doi.org/10.31487/j.jSCR.2022.02.03>.
10. Seo IY, Han DY, Oh SJ, Rim JS. Laparoscopic excision of a urachal cyst containing large stones in an adult. *Yonsei Med J*. 2008;**49**(5):869-71. [PubMed ID: 18972612]. [PubMed Central ID: PMC2615372]. <https://doi.org/10.3349/ymj.2008.49.5.869>.
11. Hladun T, Ratajczak J, Salagierski M. Calcified Urachal Cancer Managed by Partial Cystectomy: A Case Report. *Res Rep Urol*. 2021;**13**:745-8. [PubMed ID: 34676177]. [PubMed Central ID: PMC8504699]. <https://doi.org/10.2147/RRU.S330765>.
12. Nakano H, Watari T, Suganami Y, Tokuda Y. A navel stone mimicking a urachal sinus. *BMJ Case Rep*. 2014;**2014**:bcr2013202271. [PubMed ID: 24419812]. [PubMed Central ID: PMC3902660]. <https://doi.org/10.1136/bcr-2013-202271>.
13. Rodrigues JC, Gandhi S. Don't get caught out! A rare case of a calcified urachal remnant mimicking a bladder calculus. *J Radiol Case Rep*. 2013;**7**(3):34-8. [PubMed ID: 23705044]. [PubMed Central ID: PMC3661425]. <https://doi.org/10.3941/jrcr.v7i3.i230>.
14. Milotic F, Fuckar Z, Gazdik M, Cicvaric T, Milotic I, Zauhar G. Inflamed urachal cyst containing calculi in an adult. *J Clin Ultrasound*. 2002;**30**(4):253-5. [PubMed ID: 11981938]. <https://doi.org/10.1002/jcu.10056>.
15. Diehl K. A rare case of urachal calculus. *Br J Urol*. 1991;**67**(3):327-8. [PubMed ID: 2021827]. <https://doi.org/10.1111/j.1464-410x.1991.tb15147.x>.
16. Leyson JF. Calcified urachal cyst. *Br J Urol*. 1984;**56**(4):438. [PubMed ID: 6534435]. <https://doi.org/10.1111/j.1464-410x.1984.tb05843.x>.
17. Schnyder P, Candardjis G. Vesicourachal diverticulum: CT diagnosis in two adults. *AJR Am J Roentgenol*. 1981;**137**(5):1063-5. [PubMed ID: 6794339]. <https://doi.org/10.2214/ajr.137.5.1063>.
18. Blichert-Toft M, Nielsen OV. Diseases of the urachus simulating intra-abdominal disorders. *Am J Surg*. 1971;**122**(1):123-8. [PubMed ID: 5559805]. [https://doi.org/10.1016/0002-9610\(71\)90365-5](https://doi.org/10.1016/0002-9610(71)90365-5).
19. Cilentio Jr BG, Bauer SB, Retik AB, Peters CA, Atala A. Urachal anomalies: defining the best diagnostic modality. *Urology*. 1998;**52**(1):120-2. [PubMed ID: 9671882]. [https://doi.org/10.1016/s0090-4295\(98\)00161-7](https://doi.org/10.1016/s0090-4295(98)00161-7).
20. Tanomogi H, Masuda T, Yamamoto Y, Yokoyama I, Nougata K. [Urachal cyst with stone: a case report]. *Hinyokika Kyo*. 1994;**40**(7):613-5. Japanese. [PubMed ID: 8085524].
21. 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. [PubMed ID: 11259707]. <https://doi.org/10.1148/radiographics.21.2.g01mr02451>.
22. Khati NJ, Enquist EG, Javitt MC. Imaging of the umbilicus and periumbilical region. *Radiographics*. 1998;**18**(2):413-31. [PubMed ID: 9536487]. <https://doi.org/10.1148/radiographics.18.2.9536487>.
23. Friedland GW. Congenital anomalies of the urinary tract. *Clinical Urography*. Philadelphia, PA: WB Saunders; 1990. p. 559-787.
24. Sato H, Furuta S, Tsuji S, Kawase H, Kitagawa H. The current strategy for urachal remnants. *Pediatr Surg Int*. 2015;**31**(6):581-7. [PubMed ID: 25896294]. <https://doi.org/10.1007/s00383-015-3712-1>.