

# Urachal abscess mimicking malignant tumor: can imaging tell them apart?

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## Abstract

The urachus is an embryonic remnant that usually involutes before birth. Abnormal persistence of this structure can lead to infectious or neoplastic complications later in life. We report a case of an 84-year-old man that presented with a urachal complex mass which, after proper investigation, revealed to be a urachal abscess. Urachal abscesses are rare and usually occur in severe infections. Urachal abscesses can be indistinguishable from urachus carcinoma on imaging studies. This article reviews the clinical and imaging aspects of urachal abscess and carcinoma and possible differentiating elements in imaging. However, definitive diagnosis usually depends on a biopsy or fluid aspiration.

## Keywords

Abdomen/GI, abscess, biopsy, urachus, embryonic remnants

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## Introduction

The urachus is an embryonic remnant that involutes before birth (1). Partial or complete failure of urachus obliteration can give rise to several complications, such as infection and malignancy later in life (1,2).

In the adult population, the incidence of urachal anomalies is approximately 1 in 5000 with a higher prevalence in men (2).

The clinical presentation of urachal anomalies is non-specific; the imaging features of benign urachal conditions (e.g. abscess) and malignant urachal neoplasms frequently overlap (3,4).

We report a case of an 84-year-old man that presented with a urachal complex mass which, after proper investigation, was revealed to be a urachal abscess.

This article reviews the clinical and imaging features of the urachal abscess and carcinoma and possible differentiating features in imaging.

## Case report

An 84-year-old man presented at the emergency department with a three-week history of hypogastric pain with nausea, vomiting, and a decrease of urine output. The patient denied fever, dysuria, diarrhea,

weight loss, weakness, or decreased appetite. Past medical history included benign prostate hyperplasia and heart failure.

A pelvic mass was found at physical exam. Laboratory tests revealed a normal hemoglobin level (12.1 g/dL; normal range = 12–15.3 g/dL), an elevated C-reactive protein level of 17.3 mg/L (normal < 1 mg/L), a white blood cell count of  $13.2 \times 10^3/\mu\text{L}$  (normal range =  $3.5\text{--}10.5 \times 10^3/\mu\text{L}$ ) with neutrophil count of  $10.7 \times 10^3/\mu\text{L}$  (normal range =  $2\text{--}7.5 \times 10^3/\mu\text{L}$ ) and a slightly elevated creatinine level of 1.2 mg/dL (normal range = 0.5–0.9 mg/dL). Urine test was negative for leucocytes or nitrites.

A pelvic ultrasound (US) was then requested and showed an ill-defined heterogeneous mass, with cystic

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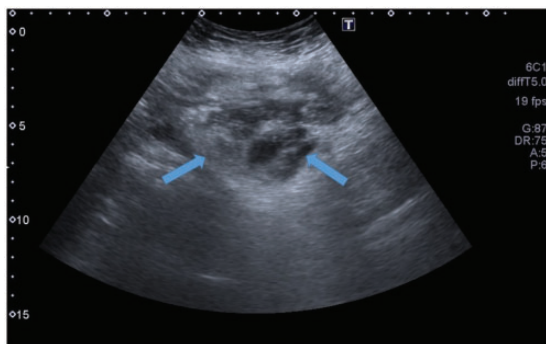
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and solid components, located anteriorly in the midline of the hypogastric region (Fig. 1). For further characterization, computed tomography (CT) of the pelvis was performed and showed a heterogeneous oval shaped pelvic mass, located anteriorly in the midline, between the umbilicus and the bladder, with continuation with the urinary bladder caudally. The lesion has a thick irregular enhancing peripheral wall and a hypodense non-enhancing central area, probably reflecting cystic/necrotic content (Fig. 2).

At that point, a lesion of the urachus was suspected. However, it was not clear whether it was a urachal abscess or a carcinoma. The patient started intravenous antibiotic therapy and a biopsy was done eight days later.

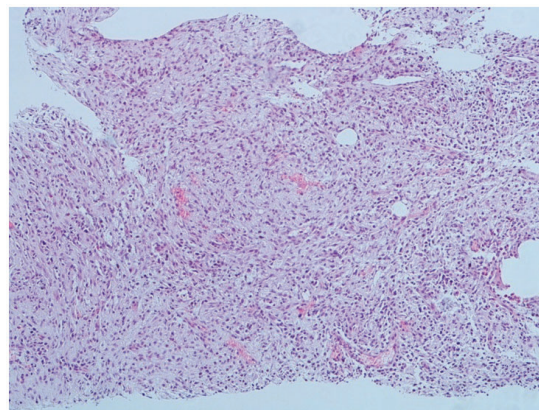


**Fig. 1.** Axial pelvic US image, with the probe at the midline, showing an anterior ill-defined, complex heterogeneous mass (blue arrows) with a hypoechoic center, suggesting cystic/fluid nature, and a mixed hypo and hyperechoic appearance at the periphery, suggesting a solid component.

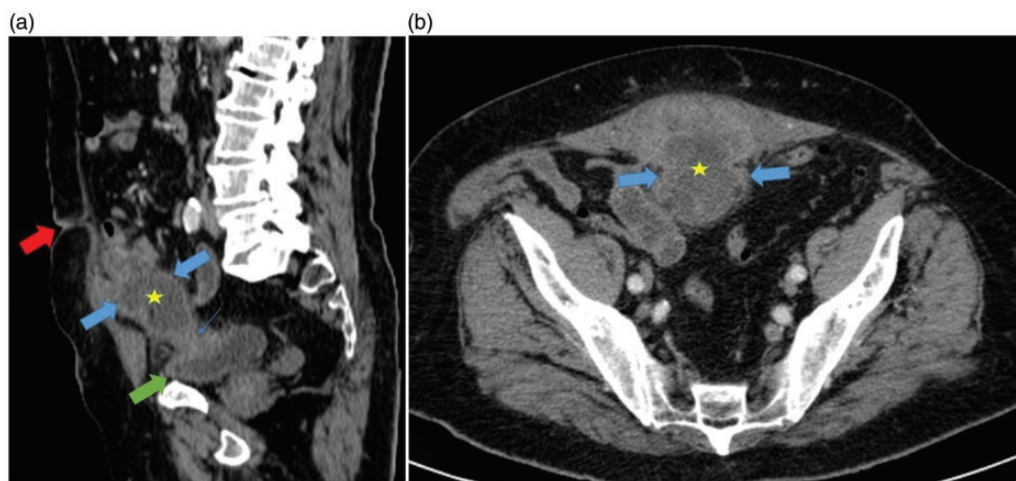
Biopsy revealed an inflammatory infiltrate and dense fibrosis (Figs. 3 and 4). A follow-up CT performed ten days later showed resolution of the mass, persisting only an enhancing cord-like structure in the same location, which might represent an umbilical-urachal sinus (Fig. 5). A diagnosis of urachal abscess was made based on the biopsy results and follow-up.

## Discussion

The urachus, also called median umbilical ligament, is a vestigial remnant of two embryonic structures: the cloaca and the allantois that involutes before birth, remaining as a fibrous band (1). It is located anteriorly



**Fig. 3.** Biopsy area (stained with hematoxylin and eosin) showing inflammatory tissue with lymphocytes, plasmacytes, macrophages, new capillary vessels, and fibroblasts.



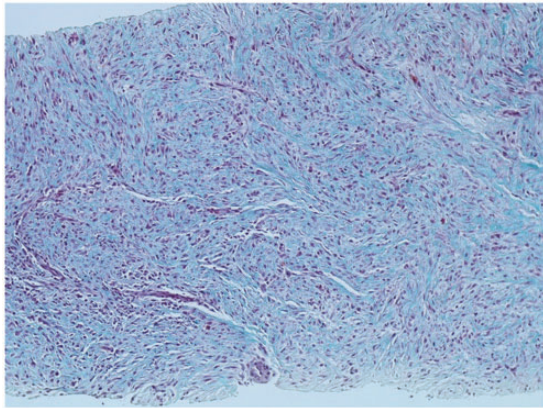
**Fig. 2.** Sagittal (a) and axial (b) enhanced CT images showing a  $9 \times 4.5$  cm oval mass (blue arrows) with thick irregular enhancing peripheral wall and central non-enhancing low attenuation area (star) located in the lower abdomen, between the umbilicus (red arrow) and the bladder (green arrow). The sagittal image (a) shows that the lesion is in continuation with the urinary bladder caudally (thin arrow).

in the midline extending from the anterior dome of the bladder to the umbilicus (1).

Incomplete involution of the urachus may occur, originating congenital anomalies that include: (i) patent urachus (tubular connection between the bladder and the umbilicus); (ii) umbilical-urachal sinus (blind dilatation of the urachus at the umbilical end); (iii) vesico-urachal diverticulum (outpouching from the anterior bladder dome at the location of the urachal attachment); and (iv) urachal cyst (fluid-filled structure that results from the obliteration of the umbilical and bladder ends of the urachus) (1,2).

The most frequent complications in adults are infection and neoplasms (1,2).

Infection is the most common complication of urachal remnants and occurs more frequently in children and young adults (2,3). The route of spread of the infection may be lymphatic, hematogenous, or by



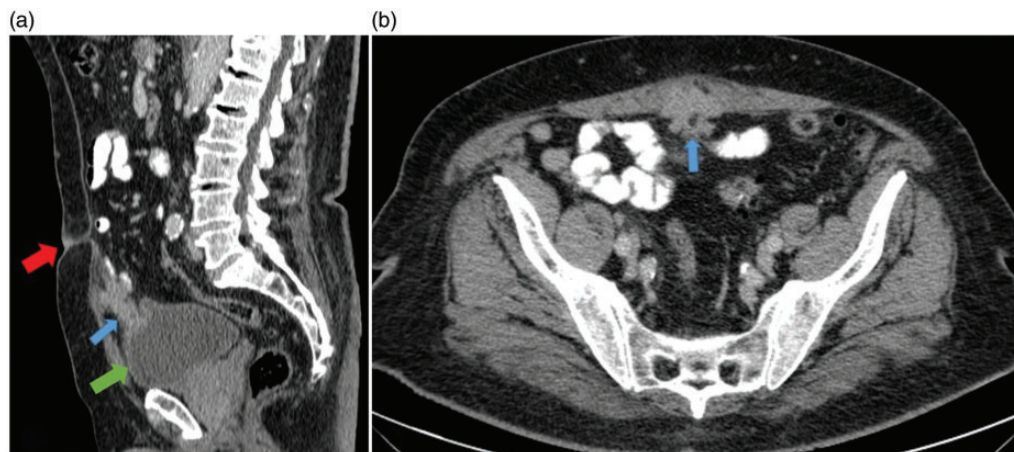
**Fig. 4.** Biopsy area (stained with Masson trichrome) showing dense fibrosis with fascicles of collagen and spindle fibroblasts, and a few small blood vessels.

direct extension from the bladder (2,3). The presenting symptoms include fever, abdominal pain, palpable mass, dysuria, and purulent urinary discharge (3). A formation of an abscess is rare and may originate from uncomplicated urachus cysts, generally in severe infections (2,4). In rare cases, an abscess can rupture and cause peritonitis (1).

The preferred imaging techniques to characterize a urachal abscess are US and CT (3). The US may show an elliptical, complex heterogeneous echogenic mass in the midline lower abdomen, often in continuity with the dome of the bladder (3,4). CT depicts a conical or oval shape ill-defined heterogeneous enhancing mass in the anterior midline between the bladder and the umbilicus (4,5). Surrounding inflammation may be seen and appears as adjacent fat stranding (4). Gas within the lesion might be seen in US and CT studies (4).

Malignant urachal tumors represent <5% of the bladder cancers, with adenocarcinoma being the most common type (90%) (1,2,4). The most common appearance of a urachal carcinoma is a supravvesical mixed solid and cystic mass (4). Calcifications occur in 50–70% of cases and may be punctate, stippled, or curvilinear (1). The presence of hematuria, mural nodularity, calcification, and lack of adjacent inflammatory change favor the urachal carcinoma (5).

However, a urachal abscess may be indistinguishable from a urachal carcinoma on imaging studies (1,3–5); no radiologic study has a high negative predictive value (4). Both urachal abscess and carcinoma may appear as a heterogeneous solid or mixed cystic and solid mass with fat stranding (4). A urachal carcinoma may also simulate an abscess presented as a midline fluid-filled cavity (4). Calcifications can also be seen in abscesses in rare cases (4); perilesional fat stranding may occur in carcinoma and represent tumor infiltration (4).



**Fig. 5.** Sagittal (a) and axial (b) enhanced follow-up CT images showing almost complete resolution of the mass, persisting an enhancing cord-like structure (blue arrow) between the umbilicus (red arrow) and the bladder (green arrow).

For a definitive diagnosis, a percutaneous needle biopsy or fluid aspiration is usually necessary (1,6).

Differential diagnosis also includes hematoma, sarcoma of the abdominal wall, peritoneal tumor, metastatic carcinoma, ventral or umbilical hernia, and inflammatory lesions (7,8).

The treatment of choice of a urachal abscess in the adult patient includes broad-spectrum antibiotics and drainage, if necessary, as initial therapy (3,9,10). Surgical excision is recommended after the resolution of the infection because there is a 30% reinfection rate and a risk of malignant degeneration of an unresected or incompletely resected urachal remnant (1,2,10).

In conclusion, the urachal abscess is rare in the adult population and their presenting symptoms are non-specific. A urachal abscess may be indistinguishable from a urachal carcinoma on imaging and a percutaneous needle biopsy or fluid aspiration is usually necessary to make a diagnosis.

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