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Urachal adenocarcinoma: a rare bladder tumor management

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Urachal adenocarcinoma is a rare and aggressive form of non-urothelial carcinoma. It commonly encountered the bladder at the dome or along its midline. Adenocarcinoma histology with frequent mucinous or signet ring cell features distinguishes it from traditional urothelial tumours. It usually manifests in adults aged 47 to 56, with an even distribution between genders. It constitutes about 0.5 to 2 % of all bladder malignancies. Surgery remains the primary treatment modality in prolonging patients' overall survival time. We wish to discuss a case of a patient diagnosed with urachal adenocarcinoma.

Keywords: urachal adenocarcinoma, bladder tumor, non-urothelial carcinoma, bladder malignancy

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Аденокарцинома урахуса: тактика ведения редкой опухоли

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Аденокарцинома урахуса – редкая и агрессивная форма неуротелиального рака, обычно развивающаяся на верхушке мочевого пузыря и вдоль его средней линии. В отличие от уротелиальных опухолей, данное заболевание имеет гистологическое строение аденокарциномы с муцинозными или перстневидно-клеточными характеристиками. Аденокарцинома урахуса обычно развивается у взрослых в возрасте от 47 до 56 лет с одинаковой встречаемостью среди мужчин и женщин. Аденокарцинома урахуса составляет примерно 0,5–2 % всех злокачественных новообразований мочевого пузыря. Хирургическое вмешательство остается основным методом лечения для увеличения общей выживаемости пациентов. В статье обсуждается клинический случай аденокарциномы урахуса.

Ключевые слова: аденокарцинома урахуса, опухоль мочевого пузыря, неуротелиальная карцинома, злокачественное новообразование мочевого пузыря

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Case Report

A 55-year-old gentleman presented to our surgical outpatient clinic with dysuria, nocturia and passage of mucous per urethra for two months. He denied having other association symptoms such as hematuria, abdominal pain, and no significant constitutional symptoms. His medical history includes diabetes mellitus, hypertension, gouty arthritis, and stage III chronic kidney disease with ECOG status 2. Clinical and digital rectal

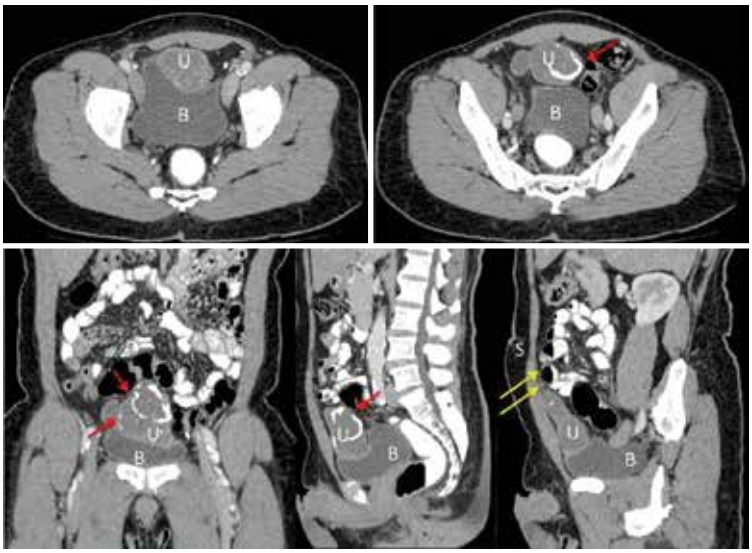

Fig. 1. *Axial, sagittal and coronal CT images show a heterogeneously enhancing mass (labelled as U) arising from the dome of the urinary bladder (marked as B) over the midline. This mass grows exophytic with no significant intravesical component. A thin band (yellow arrow) connects the superior aspect of this mass to the umbilicus (labelled as S). This mass has few curvilinear and stippled calcifications that suggest psammomatous calcification (red arrow)*
Рис. 1. *На аксиальном, сагиттальном и фронтальном изображениях компьютерной томограммы визуализируется неоднородно накапливающее контрастный препарат образование (отмечено U), исходящее из верхушки мочевого пузыря (отмечено B) и вдоль средней линии. Данное образование имеет экзофитный рост без выраженного внутрипузырного компонента. Тонкая полоска (отмечено желтой стрелкой) соединяет верхнюю часть образования с пупком (отмечено S). Образование содержит несколько криволинейных и полосатых кальцификаций, указывающих на псаммоматозную кальцификацию (красная стрелка)*

examinations were unremarkable. His carcinoembryonic antigen (CEA) was found to be raised. Initial ultrasound of the kidney, ureter, and bladder revealed irregular heterogeneously hypoechoic mass anterosuperior to the urinary bladder with areas of rim and specks of calcifications within (measures approximately 5.0 × 5.1 × 8.9 cm), is seen indenting onto the dome of the bladder. There is no communication with the umbilical region and no definite increase in internal vascularity. Staging contrast-enhanced computed tomography (CECT) of the abdomen/pelvis revealed a well-defined enhancing mass at the midline bladder dome measuring 4.3 × 5.9 × 7.1 cm, with coarse calcification within, likely representing psammomatous bodies (Fig. 1). Prompt referral to urology was made, and the patient was scheduled for curative surgery.

Rigid cystoscopy showed tumours fungating at the bladder dome with bilateral ureteric orifices seen. Partial cystectomy and tumour excision with pelvic lymph node dissection were done. The patient made an unremarkable recovery and was discharged on postoperative day 3. The formal histopathological result showed malignant cells display enlarged, pleomorphic vesicular nuclei with nuclear pseudo stratification and prominent nucleoli with a modest amount of pale eosinophilic cytoplasm (Fig. 2). The malignant glands showed diffuse and strong positivity for CK7 and CK20. Dissected bilateral pelvic lymph nodes revealed no evidence of tumour infiltration. Surgical margins were free from tumour involvement. A prompt oncology referral was made, and he was scheduled for six cycles of the FOLFOX regimen. Surveillance cystoscopy at three months post-operation showed no local recurrence. However, repeated computed tomography during the midway of chemotherapy showed distant metastasis with features suggestive of pseudomyxoma-peritonei. During treatment, the patient and his family opted for palliative care, not further chemotherapy. He succumbed to death about 12 months post-surgery due to disease progression.

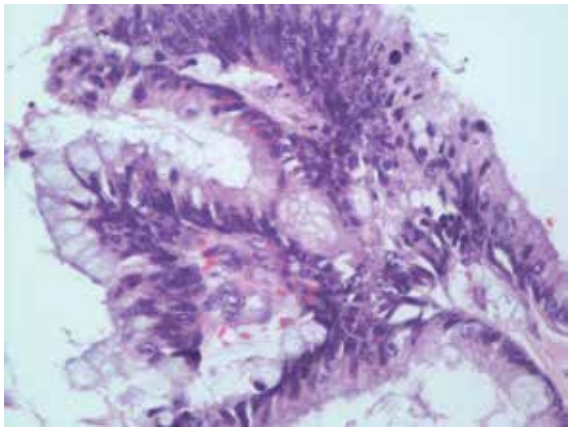

Fig. 2. *Malignant cells with enlarged pseudostratified pleomorphic, vesicular nuclei, with prominent nucleoli and a moderate amount of pale eosinophilic nucleoli (hematoxylin and eosin, ×40)*
Рис. 2. *Клетки злокачественной опухоли с увеличенным псевдомногослойным плеоморфным везикулярным ядром, с выраженными ядрышками и умеренным числом бледных эозинофильных ядрышек (окраска гематоксилином и эозином, ×40)*

Discussion

The urachal ligament is a vestigial tubular structure connecting the allantoid and the dome of the urinary bladder during early embryonic development [1]. It is in the space of Retzius, anteriorly bounded by transversalis fascia and posteriorly by peritoneum [2]. It Is usually obliterated after the third trimester of gestation and converted into medial umbilical ligament. Literature shows that urachal remnant may persist as a tubular or cystic structure communicating with the bladder along its midline in up to one-third of adults [3].

Urachal adenocarcinoma is a relatively rare malignancy of the bladder. It constitutes about 0.5–2.0 % of all bladder tumours and 20–40 % of primary bladder adenocarcinomas [4–6]. The mean survival for a patient with urachal adenocarcinoma is found to be around 12 and 24 months [7–9]. The prognosis is poor, with a 5-year survival rate of only about 43 %, mainly contributed to delayed presentation, the tendency for early local invasion and distant metastasis [7–9].

The anatomical position of the urachal ligament, which is extravesical and extraperitoneal, patients are usually asymptomatic in the early stages. Unfortunately, the patient typically presents later with irritative voiding, mucous-like discharge and hematuria, manifest only after the bladder's invasion [10]. Sometimes, patients also can present with umbilical pain and discharges [7].

Given the nature of the disease and delayed presentation, a high index of clinical suspicion and imaging correlation is needed to diagnose urachal adenocarcinoma. Strict diagnostic criteria were imposed by many. However, those criteria were too restrictive and implementing them would exclude most known cases of urachal cancers. Hence, investigators from MD Anderson Cancer Centre (MDACC) proposed two main criteria and four supportive criteria to facilitate the diagnosis [7]. The two main criteria are the midline location of the tumour and a sharp boundary between the tumour and normal surface epithelium. The four supportive criteria include enteric histology, the absence of urothelial dysplasia, the absence of cystitis cystica and the absence of a primary adenocarcinoma of another origin.

Typical diagnostic workup includes ultrasound, CECT, and magnetic resonance imaging (MRI) of the abdomen and pelvis. Ultrasound is often the usual initial imaging modality. The tumour is usually depicted as a heterogeneous soft tissue mass with calcification, as demonstrated in our case. At times, internal vascularity may be observed with doppler imaging. On the other hand, CECT and MRI are commonly used for staging and evaluation of distant metastasis. On a CT scan, 84 % of the tumours appear to be mixed solid and cystic; in the remaining cases, they seem solid [11]. The cystic component seen in this tumour is mucin. Bladder wall invasion is seen in about 92 % of adenocarcinomas, distinguishing it from urothelial tumours. The tumour's location is well appreciated in the sagittal view, particularly in MRI images.

Adding on, the T2 sequence aids in localizing the high-intensity area, usually produced by mucinous components and highly suggestive of adenocarcinoma. Cystoscopy is a crucial tool to visualize the invasion of the tumour into the bladder wall directly, and a biopsy of the mass confirms the diagnosis of urachal adenocarcinoma [9]. A dilemma happens when other mimicking pathologies, such as colorectal or gynaecology pathology, invade the bladder. Even though relatively rare, it is being reported in literature. Immunohistochemistry may aid in differentiating between primary and secondary adenocarcinomas. Like our case, primary adenocarcinoma will exhibit positive for both CK7 and CK20, whereas colonic adenocarcinomas express only CK20 [12].

We are surprised to know that CEAs were found to be elevated in 55.7 % of patients diagnosed with urachal adenocarcinoma [7]. Unfortunately, elevated CEA at the time of diagnosis is associated with worse overall and progression-free survival; however, data is limited [7]. The decreasing trend of CEA is also observed in patients, postoperatively and post-chemotherapy. Biomarkers such as CA 19.9 are also elevated in patients with urachal adenocarcinoma [7]. Hence, retrospectively, serum markers such as CEA and CA 19.9 can be said to be helpful in monitoring and following up on urachal adenocarcinoma patients.

Urachal adenocarcinoma was staged with two different staging systems: the system described by C.A. Sheldon et al. [4] (Table 1) and a modification of the staging system initially proposed by D.R. Henly et al. [13]. In the modified D.R. Henly staging system, hereafter referred to as the Mayo staging

Table 1. *Staging system of urachal cancer adopted from C.A. Sheldon et al. 1984*

Table 1. *Система стадирования карциномы урахуса, предложенная C.A. Sheldon et al. 1984*

Stage Стадия	Description Описание
I	Confined to urachal mucosa Опухоль ограничена слизистой оболочкой
II	Invasion confined to urachal itself Опухоль с инвазией, ограниченной урахусом
III	Local invasion of urinary bladder Local extension to the abdominal wall Local extension to the peritoneum Local extension to viscera other than urinary bladder Местное распространение на мочевой пузырь Местное распространение на брюшную стенку Местное распространение на брюшину Местное распространение карциномы урахуса на внутренние органы, кроме мочевого пузыря
IV	Metastasis to lymph nodes Metastasis to distant sites Метастазы в регионарых лимфатических узлах Отдаленные метастазы

system, four stages were defined: Stage I, tumours confined to the urachus and bladder; Stage II, tumours extending beyond the muscular layer of the urachus and the bladder; Stage III, tumours infiltrating the regional lymph nodes; and Stage IV, tumours infiltrating nonregional lymph nodes or other distant sites.

The major predicting factor of the disease prognosis is surgical margin status [14]. In the absence of metastatic disease, the gold standard surgical approach for the management of the localized urachal adenocarcinoma is with either complete or partial cystectomy with an en bloc excision of the urachal ligament and umbilicus combined with bilateral pelvic lymph node dissection [15]. Resection of the umbilical ligament and umbilicus is highly recommended as it affects the surgical margin, and it has been reported tumour recurrence occurs at the umbilicus in 7 % of cases [16]. Spillage of the tumour containing fluid during transection of the urachus into the peritoneum can increase the risk of relapse [4]. The open surgical approach is commonly practised; however, a few patients undergo laparoscopic or robotic surgeries.

Unfortunately, unlike other malignancies, no standard adjuvant or metastatic chemotherapy regimens are available to treat urachal adenocarcinoma. The choice of regimen is primarily based on case reports and single-institution experience. Given the enteric-type histology of urachal adenocarcinomas, chemotherapy regimens used to treat gastrointestinal malignancies may be more effective. In our case, the patient was subjected to Oxaliplatin and 5-fluorouracil. He responded poorly to chemotherapy and showed disease progression based on radiological imaging. To our knowledge, this is the first case of urachal adenocarcinoma operated and managed at our centre. We recognized urachal adenocarcinoma as a rare neoplasm of bladder malignancies associated with a dismal prognosis. Prompt diagnosis and surgical intervention can improve overall outcome and survival.

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M.A.M. Daud: article concept development, article checking and approval;
M.F. Othman: article concept development, article writing and editing, article checking and approval;
A.F.N.M. Ghazi: article concept development, article checking and approval;
S.S. Tan: article writing and editing, article checking and approval;
G.C. Teh: obtaining the data, analysis of the data, article checking and approval.
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