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2nd Department of Radiology, Medical University of Lublin

MAREK PASŁAWSKI, KONRAD KRZYŻANOWSKI,
JANUSZ ZŁOMANIEC

Metachronous tumors of the urinary bladder and left ureter in patient with abdominal aortic aneurysm. A case report

Bladder cancer is the most common malignant urothelial neoplasm. Because of its natural history of multifocal development approximately 30% of patients with bladder cancer have multifocal lesions at the time of evaluation. Transitional cell carcinoma is the most common bladder tumor, it accounts for 90% of cases (8, 5). Primary small cell carcioma of the urinary bladder is very rare, but highly aggressive, and involves early and widespread metastasis (4). Squamous cell carcinoma accounts for only 3%–7% of bladder cancer in US. On average, patients are 10–20 years younger at presentation than are patients with transitional cell carcinoma. Staging classification of bladder cancer is based on TNM system (8). Solitary fibrous tumor involving urinary bladder is very rare (2, 6).

Carcinosarcomas of the urotheral system consisting of both malignant epithelial and malignant stromal components are extremely rare tumors, that usually arise from urinary bladder (10). The tumors of the ureter constitute 1% of the upper urinary tract neoplasias. Approximately 70% of the lesions affect the distal ureter and an overwhelming majority has transition cell histology. The disease most commonly affects patients in their fifth to seventh decade and shows male predominance (1).

The aim of the study is to present the case of the patient with metachronous tumors of urinary bladder and ureter, and abdomen aortic aneurysm, and to discuss the imaging diagnosis of the urinary system tumors.

MATERIAL AND METHODS

An 83-year-old man with acute abdominal pain, with suspected ruptured aortic aneurysm was sent to our department for CT examination. The examination begins with conventional unenhanced CT. Discontinuous images are obtained every 20 mm with 10-mm collimation in single mode: coverage begins 2 cm above the diaphragm and continues to the iliac arteries bifurcation. We injected then 130 ml of nonionic contrast agent (Ultavist) at a rate of 3.5 ml/sec through a catheter positioned in the right arm. Helical CT is performed when desired enhancement in the aorta is obtained with the following parameters: 140 mA, 130 kV, pitch of 1.5, 3 mm collimation, and 3-mm reconstruction interval. Multiplanar reformation (MPR) images in sagittal, coronal, oblique sagittal and curved projections are generated.

RESULTS

The large abdominal aortic aneurysm (the diameter 6.6 cm) with parietal thrombus was seen, with narrowing of the patent aortic lumen to 2.6 cm. The aneurysm extends to the right common iliac artery. No evidence of aortic rupture on CT examination was found. The left ureter was dilated to 19 mm, and was S-curved, which was seen clearly on MPR image (Fig. 1AB). The upper part of the dilated ureter was filled with urine of liquid density (13 HU) (Fig. 2A), while the

lower part was filled with an obscuring solid mass revealing strong contrast enhancement from 35 up to 87HU (Fig. 1B, 2B).

In the urine bladder CT axial sections reveal the solid, inhomogeneous pathological mass, measuring 5x4.3 cm. The pathological mass reveal strong contrast enhancement from 31 up to 88 HU (Fig. 3AB). The block of the left ureter resulted in compromising left renal function.

The right kidney did not reveal any evident pathology, with normal renal excretion.

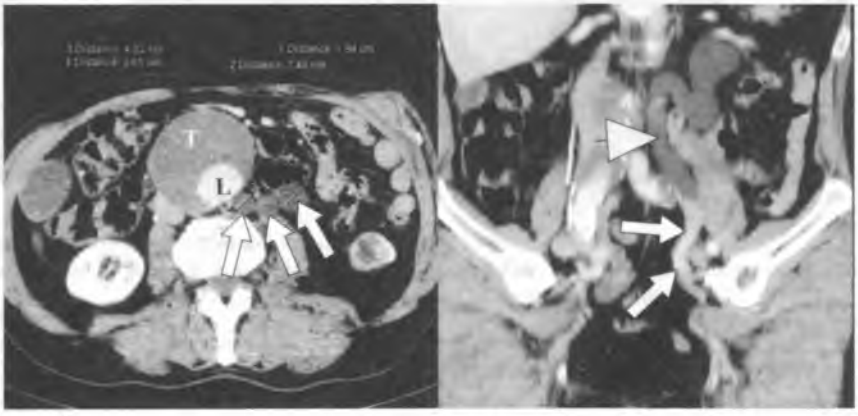


Fig. 1. The large abdominal aortic aneurysm with parietal thrombus on axial CT image (T – thrombus; L – patent aortic lumen), with dilated left ureter, visible three times on one section due to S-shaped course (arrows) – A. MPR reconstruction presents the S-shaped dilated ureter on the left, with urine in the upper part (arrowhead) obstructed with solid mass in the lower part (arrows) – B

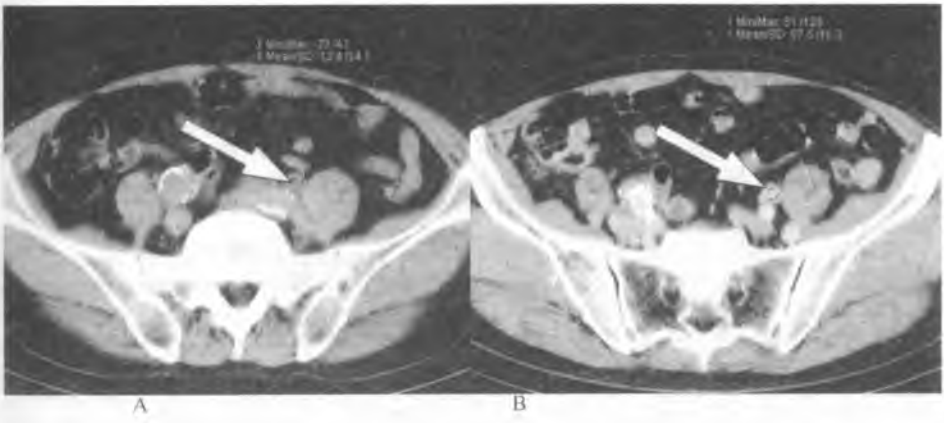
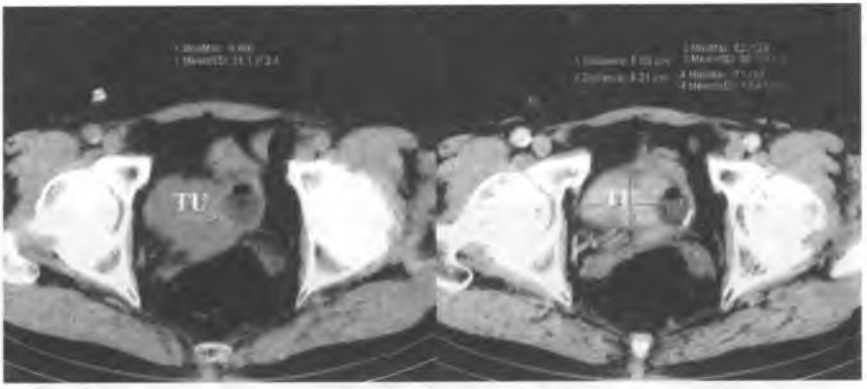


Fig. 2. Axial CT section of the abdomen. The dilated ureter filled with urine of liquid density (13 HU) marked with an arrow. Widening right common iliac artery – A. Lower part of the dilated ureter filled with obscuring solid mass, revealing strong contrast enhancement from 35 up to 87 HU (arrow) – B



A B

Fig. 3. Axial CT section of the urine bladder reveals the solid, inhomogeneous pathological mass representing a bladder tumor. The enhanced CT section reveals a strong tumor contrast enhancement from 31 up to 88 HU – B (TU – tumor)

DISCUSSION

Numerous entities may mimic a bladder tumor. Bladder filling defects or wall irregularity and thickening may result from air, blood clot, calculi, infection, bezoar (fungus ball) or an extrinsic or intrinsic bladder mass. Cystitis, either infectious or noninfectious one may mimic a bladder tumor. Infectious causes include bacteria, granulomatous disease, viruses, fungi or parasites. Noninfectious causes include bladder extrophy, systemic lupus erythematousus vasculitis, eosinophilic cystitis, and interstitial cystitis. Inflammatory changes in cystitis may produce irregularity and thickening of the bladder wall, and focal thickening can mimic a discrete mass. Differentiation from tumor may be difficult at radiology and may be better achieved with cystoscopy (8). Staging of the urinary bladder tumors is based on TNM system (Table 1).

About 85% of patients with bladder cancer present with painless microscopic hematuria. Initial laboratory studies include urinalysis and urine cytologic analysis. Urologists order intravenous urography, which although not sensitive for small tumors, helps evaluate the upper collecting systems and may reveal metachronous lesions (8). All patients with suspected bladder cancer should undergo cystoscopy and bimanual examinations. Cystoscopy remains the standard of references, providing direct visualization of the bladder and an oppurtunity for cytologic washing, biopsy or local excision. Cystoscopic biopsies provide invaluable staging information regarding depth of bladder wall invasion (8).

Imaging modalities for bladder cancer include IVU, cystography, US, CT, MR imaging and scintigraphy. Previously, IVU and cystography were used extensively for detecting and staging suspected bladder tumors, but they have largely been supplanted by US, CT and MR imaging. The inability to evaluate the full thickness of the bladder wall limits IVU, but this modality may provide useful information about the upper urinary tract and obstructive disease. Because urothelial tumors are often multifocal, IVU may help identify synchonous lesions. Renal function and detailed morphologic information regarding the renal pelvis and ureters may be ascertained. Bladder tumors usually appear at IVU as nonspecific filling defects surrounded by contrast material. Oblique views may help distinguish confounding bowel gas from true bladder disease and localize tumors within the bladder. However IVU is not reliable for detecting or staging bladder tumors (8).

IVU is one of the most commonly used tests in patients suspected to have a urinary tract tumor. In a substantial proportion of patients with ureteral tumors, long-standing urinary obstruction and consequent deterioration in renal function preclude visualization of the tumor in IVU. In those patients antegrade pyelography may be used to reveal the site and cause of obstruction (1).

Table 1. Staging of the urinary bladder tumors

Classification system (8)		
Jewett-Strong	TNM	Characteristics
0	Tis	carcinoma *in situ*
	Ta	noninvasive papillary carcinoma
A	T1	subepithelial connective tissue invasion
B1	T2	muscle layer invasion
	T2a	superficial muscle (inner half) invasion
B2	T2b	deep muscle (outer half) invasion
	T3	perivesical tissue invasion
C	T3a	microscopic perivesical invasion
	T3b	macroscopic perivesical invasion (extravesical mass)
	T4	adjacent organ invasion
D1	T4a	prostatic, uterine or vaginal invasion
	T4b	pelvic or abdominal wall invasion
	N0	no regional lymph node metastases
	N1	single lymph node (<=2 cm in greatest dimension)
	N2	single lymph node (>2 cm but <= 5 cm) or multiple lymph nodes (<=5 cm)
	N3	lymph node greater than 5 cm
D2	N4	lymph node above the bifurcation
	M0	no distant metastasis
	M1	distant metastasis

Cystography may occasionally be used to supplement IVU in patients with tumors seen at cystoscopy or urography, especially in the evaluation of bladder diverticula. Neoplasm within a diverticulum may occur in 2%–10% of cases, and cystoscopic access to the divericulum may be limited (8).

US has a high sensitivity in the diagnosis of urethral tumors, which appear on sonography as hypoechoic intraluminal soft tissue masses (1). US methods of bladder evaluation include transabdominal, transrectal, transvaginal and intravesical US. Bladder visualization may be limited by patient body habitus, overlying bowel gas, or poor bladder distention. The lesion may appear as a hypoechoic plaquelike or polypoid mass, that may project in the bladder (8).

Computed tomography and magnetic resonance imaging are the main radiologic examinations used in the evaluation of patients with bladder cancer. There is still controversy about which imaging modality is better. The advantages of CT include shorter acquisition time, wide coverage in a single breath hold, and lower susceptibility to various patients' factors. On the other hand CT is limited in the detection of small bladder cancers (5). Currently CT is the primary imaging modality in the evaluation of bladder tumors. Local CT staging accuracy ranges from 55% to 92%. Rapid scanning in the early vascular phase (40–90 seconds after contrast material injection) may reveal an enhancing lesion against a background of low-attenuation urine in the bladder. Delayed scans may reveal a filling defect against the high-attenuation contrast material as the bladder fills. Bladder tumor may appear plaquelike, polypoid or papillary. Tumoral calcifications may be noted on unenhanced images. Circumferential bladder wall thickening may be seen as the tumor enlarges. Other causes of wall thickening (biopsy, inflammation, hypertrophy from chronic outlet obstruction, radiation fibrosis, chemotherapy) may complicate the CT diagnosis. It may be impossible to differentiate among Ta-T3a tumors, leading some to group them together as "stage Ta-T3a". T3b or T4 tumor invasion through the serosa exhibits soft-tissue-attenuation stranding in the low-attenuation perivesical fat (1, 3, 8). The lymph node staging accuracy of CT ranges from

50% do 97%. CT allow visualization of hole size or enhancement abnormality only (8). CT virtual cystoscopy is a newer technique that shows promise for detecting bladder tumors greater than 5 mm in diameter in patients who are unable to tolerate conventional cystoscopy. Because this technique is limited to evaluating the epithelial surface of the bladder, it is inappropriate for staging bladder tumors (7, 8, 9).

MR is superior to CT in terms of its multiplanar capability and higher soft-tissue contrast but has been shown to have a similar staging accuracy. On T2-weighted images the tumor has intermediate signal intensity, slightly higher than that of the bladder wall. Fat usually has low T2 signal intensity but may have high signal intensity with fast spin-echo sequences. Urine has high T2 signal intensity. On T1-weighted images, the tumor has intermediate signal intensity compared with the high-signal intensity fat, a fact that aids in detecting perivescal fat extension. Urine usually has lower T1 signal intensity than the tumor. Fat-saturated T1-weighted imaging allows differentiation of the enhancing tumor from the adjacent high-signal-intensity fat (8).

The role of scintigraphy in the evaluation of bladder cancer has been limited to staging for bone metastases (8).

CONCLUSIONS

Transitional cell carcinoma is the most common bladder tumor. Imaging modalities for bladder cancer include IVU, cystography, US, CT, MR imaging and scintigraphy. Previously, IVU and cystography were used extensively for detecting and staging suspected bladder tumors, but they have largely been supplanted by US, CT and MR imaging. The inability to evaluate the full thickness of the bladder wall limits IVU, but this modality may provide useful information about the upper urinary tract and obstructive disease. Currently CT is the primary imaging modality in the evaluation of bladder tumors. Rapid scanning in the early vascular phase may reveal an enhancing lesion against a background of low-attenuation urine in the bladder. Urothelial tumors are often multifocal. CT enables identifying synchonous lesions and provides detailed information on renal function and morphology.

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SUMMARY

Bladder cancer is the most common malignant urothelial neoplasm. Because of its natural history of multifocal development approximately 30% of patients with bladder cancer have multifocal lesions at the time of evaluation. Transitional cell caricnoma is the most common bladder tumor. The tumors of the ureter constitute 1% of the upper urinary tract neoplasias. Approximately 70% of the lesions affect the distal ureter and an overwhelming majority has transition cell histology. The disease most commonly affects patients in their fifth to seventh decade and shows male predominance. The aim of the study is to present the case of the patient with metachronous tumors of urinary bladder and ureter, and abdomen aortic aneurysm, and to discuss the imaging diagnosis of the urinary system tumors. An 83-year-old man with acute abdominal pain, with suspected ruptured aortic aneurysm was sent to our department for CT examination. CT examination was performed before and after administering of contrast agent with automatic syringe from the level of the diaphragm to the iliac arteries bifurcation. Multiplanar reformation (MPR) images in sagittal, coronal, oblique sagittal and curved projections are generated. The large abdominal aortic aneurysm with parietal thrombus was seen. The aneurysm extends to the right common iliac artery. No evidence of aortic rupture on CT examination was found. The left ureter was dilated and S-curved. The upper part of the dilated ureter was filled with urine of liquid density (13 HU), while the lower part was filled with an obscuring solid mass revealing strong contrast enhancement. In the urine bladder CT axial sections reveal the solid, inhomogeneous pathological mass revealing strong contrast enhancement. The block of the left ureter resulted in compromising left renal function. The right kidney did not reveal any evident pathology, with normal renal excretion. Transitional cell carcinoma is the most common bladder tumor. Currently CT is the primary imaging modality in the evaluation of bladder tumors. Rapid scanning in the early vascular phase may reveal an enhancing lesion against a background of low-attenuation urine in the bladder. Urothelial tumors are often multifocal, CT enable identifying synchonous lesions and provide detailed information on renal function and morphology.

Dwuogniskowy rak pęcherza oraz lewego moczowodu u pacjenta z tętniakiem aorty brzusznej, opis przypadku

Rak pęcherza moczowego jest najczęstszym nowotworem złośliwych w obrębie dróg moczowych. U około 30% pacjentów z rakiem pęcherza występuje on w postaci wieloogniskowej. Rak z nabłonka przejściowego jest najczęstszym guzem złośliwym pęcherza. Wśród złośliwych nowotworów moczowodów również najczęstszy jest rak wywodzący się z nabłonka przejściowego, w 70% przypadków miejscem wyjścia jest dystalny odcinek moczowodu. Choroba najczęściej dotyka ludzi pomiędzy piątą a siódmą dekadą życia, częściej mężczyzn. Celem pracy jest zaprezentowanie przypadku pacjenta z dwuogniskowym rakiem pęcherza oraz moczowodu oraz przedstawienie możliwości obrazowania TK guzów dróg moczowych. 83-letni mężczyzna z ostrym bólem brzucha i podejrzeniem pękniętego tętniaka aorty został skierowany do naszego Zakładu w celu wykonania badania TK. Badanie tomograficzne zostało wykonane przed i po dożylnym podaniu (za pomocą strzykawki automatycznej) kontrastu, od poziomu przepony do poziomu podziału tętnic biodrowych. Multiplanarne rekonstrukcje zostały wykonane. Duży tętniak aorty brzusznej z przyścienną skrzepliną został uwidoczniony. Tętniak przechodził na prawą tętnicę biodrową wspólną. Nie znaleziono żadnych śladów wskazujących na możliwość pęknięcia tętniaka. Uwidoczniono poszerzony i esowato wygięty lewy moczowód. Proksymalny odcinek moczowodu był wypełniony treścią o gęstości płynowej, natomiast odcinek dystalny był wypełniony masą tkankową ulegającą znacznemu wzmocnieniu kontrastowemu po dożylnym podaniu kontrastu. Zablokowanie moczowodu spowodowało upośledzenie funkcji lewej nerki. Uwidoczniono również niejednorodną masę tkankową ulegającą znacznemu wzmocnieniu kontrastowemu po dożylnym podaniu kontrastu, wypełniającą pęcherz moczowy. Prawa nerka oraz prawy moczowód nie wykazały żadnych cech patologii. Rak wywodzący się z komórek nabłonka przejściowego jest najczęstszym nowotworem złośliwym dróg moczowych. Obecnie badanie

tomografii komputerowej jest podstawową metodą obrazowania guzów dróg moczowych. Szybko wykonane skanowanie we wczesnej fazie tętniczej pozwala na łatwe zidentyfikowanie wzmocnionej kontrastowo zmiany na tle nisko densyjnego moczu. Nowotwory dróg moczowych często są wieloogniskowe. Tomografia komputerowa umożliwia wykrycie równoczesnych, wieloogniskowych zmian i dostarcza szczegółowych informacji o morfologii układu moczowego i o funkcji nerek.