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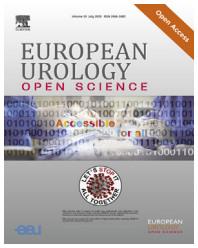

European Association of Urology

Case Report

Percutaneous Biopsy Tract Seeding in a Patient with Muscle-invasive Bladder Cancer

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Article info

Article history:
Accepted July 24, 2020

Associate Editor: Guillaume Ploussard

Keywords:
Bladder cancer
Upper tract urothelial carcinoma
Percutaneous biopsy
Tumor seeding

Abstract

Percutaneous biopsy can be used for tissue diagnosis of bladder tumors when cystoscopy with transurethral resection is not possible. The largest known case series includes 15 patients with no reported complications and good concordance with surgical pathology. However, concern remains regarding exposure of non-urothelial surfaces to tumor cells, as there are rare documented cases of tumor seeding along nephrostomy and biopsy tracts in upper tract urothelial carcinoma (UC). We present the first documented human case of bladder cancer involvement of the omentum and peritoneum along a biopsy tract and review the use of percutaneous access for upper and lower tract UC.

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1. Case report

A 65-yr-old male with a history of hypertension, diabetes mellitus type 2, and Gleason grade group 2 prostate cancer treated with brachytherapy and external beam radiotherapy presented with gross hematuria. Further workup revealed acute renal failure (serum creatinine 4.4 mg/dl), severe bilateral hydronephrosis, and a posterior-wall bladder mass without evidence of metastatic disease or lymphadenopathy on computed tomography (CT) imaging. Transurethral resection of bladder tumor (TURBT) was attempted by an external urologist, but was unsuccessful because of urethral narrowing and severe fixation of the bladder neck, presumably due to prior radiotherapy. The patient underwent a percutaneous core needle biopsy of the bladder mass under CT guidance by the interventional radiology service (Fig. 1). A 17-gauge coaxial cannula sheath was positioned near the lesion, through which four core biopsy samples were obtained using an 18-gauge Temno needle. The pathology revealed high-grade, muscle-invasive urothelial carcinoma with glandular differentiation (10%; Fig. 2). Bilateral nephrostomy tubes were

http://dx.doi.org/10.1016/j.euros.2020.07.005

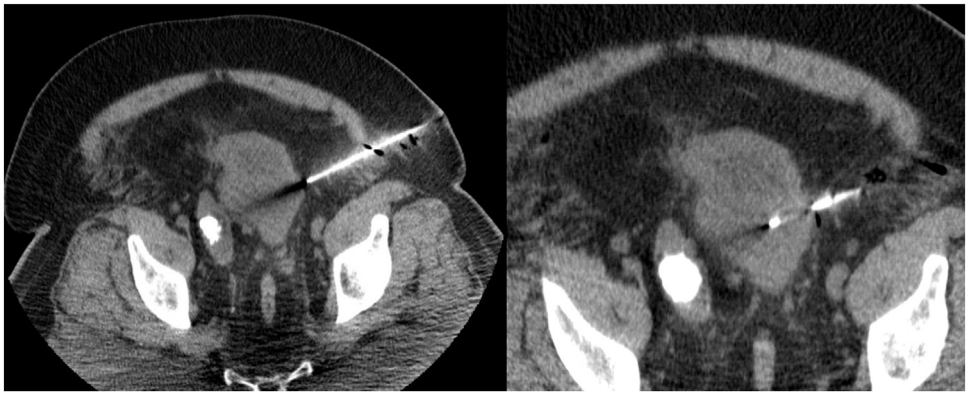

Fig. 1 – Initial computed tomography–guided percutaneous bladder biopsy.

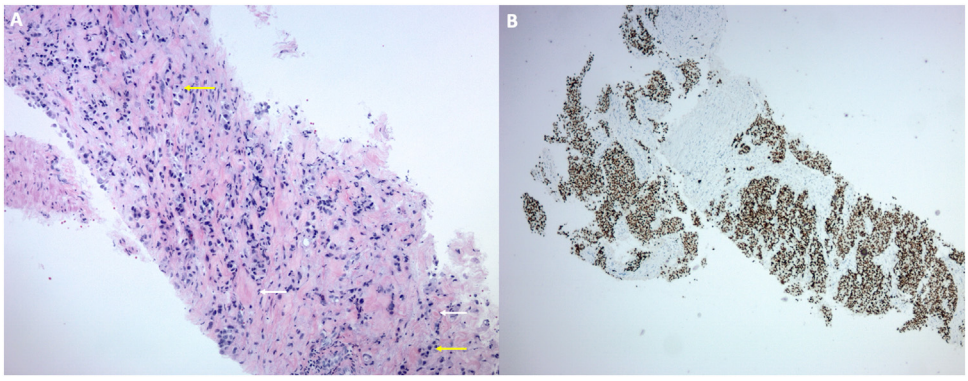

Fig. 2 – Pathology specimen from the bladder biopsy: (A) 10× view showing tumor cells (yellow arrow) infiltrating the muscularis propria (white arrow) and (B) GATA3 staining highlighting the tumor cells.

placed and led to prompt improvement in his renal function.

The patient underwent four cycles of neoadjuvant chemotherapy with gemcitabine and cisplatin. Postchemotherapy CT imaging 2 d before surgery did not reveal evidence of metastatic disease; however, it showed inflammation of the left lower quadrant omentum around the area of the biopsy tract, without an obvious mass. At the time of planned robotic cystectomy, laparoscopy demonstrated significant omental and small bowel adhesions in the left lower quadrant, with omental caking and nodularity extending onto the peritoneal surface, concerning for malignancy. A small amount of peritoneal ascites was noted. Intraoperative frozen and permanent section pathology of a resected segment of omentum revealed metastatic carcinoma of urothelial origin (Fig. 3). With this pathologic finding in the setting of unresectable disease and malignant ascites, cystectomy was aborted. The patient underwent a postoperative CT scan to radiologically assess omental disease (Fig. 4) and was referred to medical oncology.

He underwent second-line treatment for platinum-refractory metastatic bladder cancer with pembrolizumab. After two rounds of therapy, the patient experienced worsening abdominal pain, nausea, and vomiting. Interval CT imaging demonstrated progression, with extension of omental involvement to the right side of the abdomen and increased intra-abdominal ascites (Fig. 5). He began enfortumab vedotin therapy and subsequently experienced interval radiologic improvement.

2. Discussion

The standard of care in the diagnosis of bladder cancer is cystoscopic visualization and resection of the bladder tumor. In rare cases, diagnosis of urothelial carcinoma (UC) via cystoscopy and TURBT may be technically challenging or even impossible. This can be related to urethral or bladder neck anatomic factors preventing the passage of a scope due to a stricture, prior prostate or bladder surgery, or pelvic radiation. In other cases, significant bleeding or a difficult-to-access tumor location, such as a diverticulum, can prevent proper visualization or tissue sampling. For these patients, image-guided percutaneous biopsy has been used as an alternative means for tissue diagnosis. Data on the safety and efficacy of this technique for sampling of bladder tumors are limited. A retrospective review by Butros et al [1] described 15 patients who underwent percutaneous biopsy of the bladder at Massachusetts General Hospital over 14 yr. Indications for biopsy were negative cystoscopy with persistent concern for malignancy, technically unsatisfactory cystoscopy, and serosal tumor found on cross-sectional

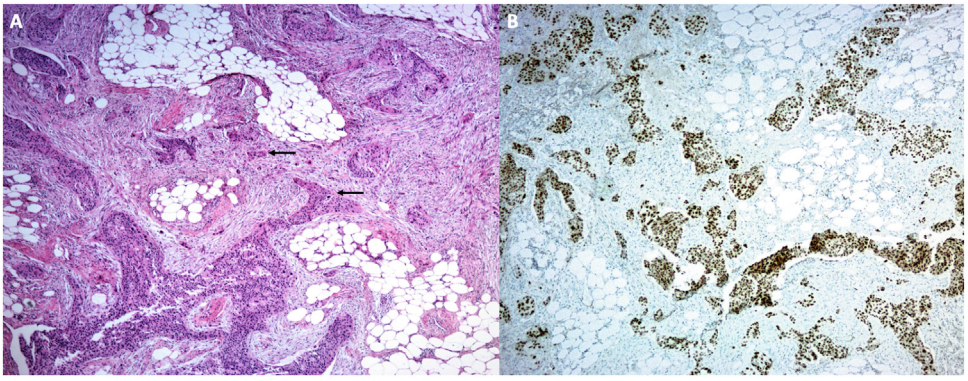

Fig. 3 – Pathology specimen of omental tissue: (A) 4× view with infiltrating islands of tumor cells (arrow) eliciting a desmoplastic response and (B) GATA3 staining highlighting sheets of tumor cells with a similar immune profile to that seen in bladder biopsy tissue.

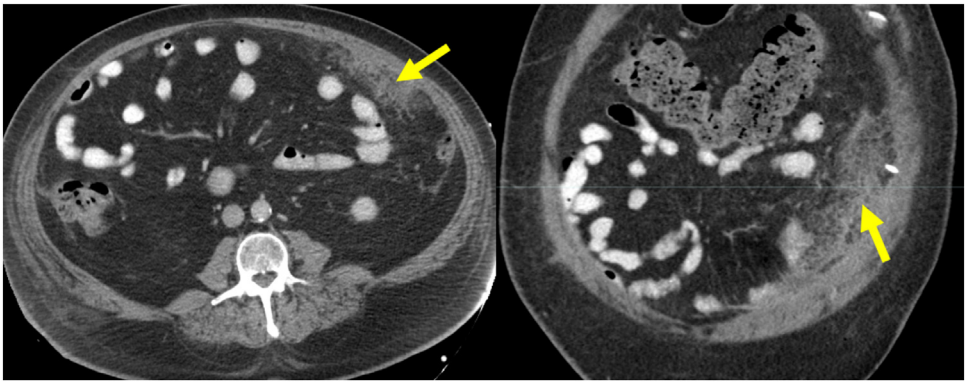

Fig. 4 – Computed tomography 9 d after aborted robotic cystectomy for radiologic assessment of omental disease. Axial and coronal images demonstrate fat stranding and nodularity in the right mid and lower quadrants (yellow arrows).

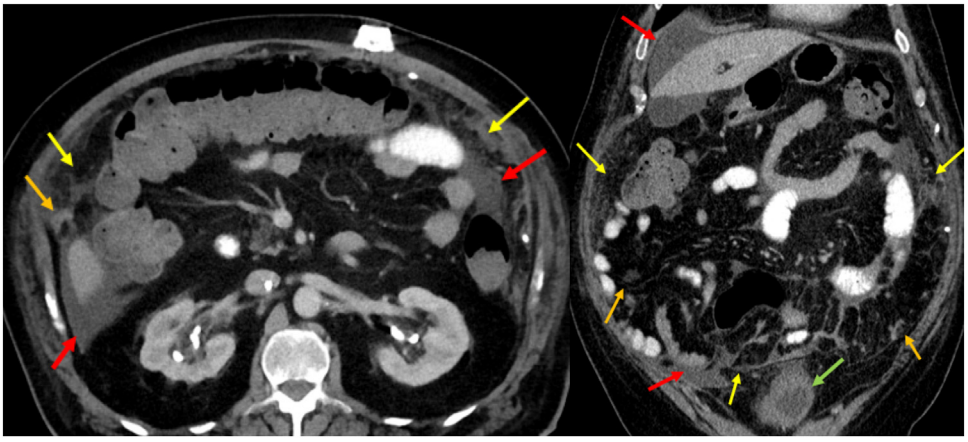

Fig. 5 – Follow-up computed tomography demonstrating omental disease progression. Axial and coronal images reveal bilateral peritoneal thickening and nodularity (yellow arrows), omental nodules (orange arrows), and ascites (red arrows). The bladder wall is circumferentially thickened (green arrow).

imaging. The procedures were carried out under CT or ultrasound (US) guidance. All biopsies were successful in obtaining adequate tissue specimen for diagnosis, yet only six confirmed UC. Of the remaining nine biopsies, seven were benign, one demonstrated prostate cancer, and one cervical cancer. In patients who had surgery, concordance between biopsy and surgical pathology was 87%. After mean follow-up of 25 mo (range 2–144), there were no biopsy-related complications in the cohort. Follow-up imaging, available for all patients, did not demonstrate any signs of tumor seeding. The authors concluded that percutaneous bladder biopsy is a safe and technically feasible alternative for select patients in whom traditional retrograde examination of the bladder is not possible.

While uncommon in bladder cancer, the use of percutaneous access for renal mass biopsy (RMB) is well documented. The modern era has proven that RMB is a safe technique with few complications and high diagnostic yield (specificity and positive predictive value >95%) [2]. There have been no reported cases of renal cell carcinoma tumor seeding in the contemporary literature [3]. Core biopsies are preferred over fine-needle aspiration and have dependable concordance with surgical pathology for histologic subtype (>90%), but less so for Fuhrman grade (60–80%) [4]. Guideline indications for RMB include concern for lymphoma, abscess, or metastasis, or if the patient is considering active surveillance or ablation. It may also be used in the setting of a clinical trial when pathologic diagnosis is required for enrollment.

The diagnosis of suspected upper tract UC (UTUC) involves radiologic evaluation with CT or magnetic resonance urography followed by direct visualization via ureteroscopy. Ureteroscopic biopsy is the standard method for obtaining tissue for diagnosis but has several limitations. Owing to the small size of ureteroscopic instruments, obtaining sufficient tissue can be challenging. In addition, ureteroscopic biopsy may be difficult or impossible in cases of significant hematuria, prior cystectomy with a urinary conduit, or complex anatomy of the renal pelvis and calyces. For these reasons, percutaneous biopsy has been used under select circumstances despite the concern of potential seeding of nonurothelial surfaces with tumor cells.

Similar to lower tract UC, there is a paucity of data and literature related to the use of percutaneous biopsy for the diagnosis of UTUC. One of the few studies to date is a retrospective review of 42 patients over 8 yr by Joseph et al [5] at the Mayo Clinic. In this cohort, indications for percutaneous biopsy were provider preference, prior unsuccessful or nondiagnostic ureteroscopic biopsy, and prior cystectomy with a urinary conduit. The procedures were all performed under CT or US guidance. All patients underwent nephroureterectomy and the concordance rate between biopsy and surgical pathology was 95%. The rates of major and minor biopsy-related complications were 2% and 14%, respectively. The only major complication was an arteriovenous fistula requiring embolization. On follow-up imaging at a median time of 28 mo after biopsy (interquartile range 11–49), no cases of biopsy tract seeding were identified even though 62% of UTUC tumors were of high grade on surgical pathology. The authors concluded that percutaneous biopsy for UTUC may be a safe option when ureteroscopic biopsy is not feasible. With that said, it is important to acknowledge that there have been rare case reports of percutaneous tract seeding in UTUC. Of 14 reported cases from 1986 to 2017, 12 occurred following percutaneous resection or placement of a nephrostomy tube, while two were after percutaneous biopsy [5,6]. A systematic review of 736 patients undergoing percutaneous or ureteroscopic treatment of UTUC found that the overall rate of tumor seeding with percutaneous treatment was 0.3% [7]. Thus, the risk of tumor seeding along a percutaneous tract for biopsy or treatment of UTUC, although very small, should be noted and discussed with the patient during the consent process.

While we have focused on percutaneous approaches, the oncologic risk of endoscopic evaluation of UC should also be considered. Several retrospective studies have demonstrated a higher risk of local recurrence with various endoscopic interventions. Yoo et al [8] found that ureteroscopic biopsy before radical nephroureterectomy for UTUC of the renal pelvis was a predictor of increased intravesical recurrence. Kiss et al [9] found that placement of a double-J stent before radical cystectomy for bladder cancer increased the risk of upper tract recurrence when compared to drainage via percutaneous nephrostomy. While these studies are limited in size and are retrospective in nature, they highlight that endoscopic approaches for UC may also carry a potential risk of tumor implantation in separate tissue fields, albeit via a distinct mechanism from that of percutaneous biopsies.

Tumor seeding of a percutaneous tract is a rare event in the diagnosis and management of UC. Two cases of lower-tract percutaneous biopsy seeding have been documented in canines [10]. We present the first human case of lower tract UC seeding from percutaneous biopsy in the literature. The rarity of this event may relate to the relative ease in accessing the lower urinary tract for biopsy. Percutaneous biopsy enters the diagnostic paradigm for unusual cases for which endoscopic access is not possible. This case demonstrates that while percutaneous bladder biopsy may be technically feasible, there is a possibility of tract seeding, so all other options for tissue diagnosis should be exhausted before pursuing such an approach.

Conflicts of interest: The authors have nothing to disclose.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.euros.2020.07.005.

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