

Lung cancer is a major epidemiological threat worldwide, which commonly metastasizes to distant sites. Often, the presence of metastasis is the first manifestation of lung cancer. Some of the most common sites for lung cancer metastasis are bones, adrenal glands, liver, brain, and lungs. However, metastases to unusual locations pose a diagnostic and therapeutic challenge. We present a case of a 74-year-old woman in whom the first manifestation of lung cancer was metastasis to the right ureter. We also analyse the available literature on lung cancer metastases to the ureter, taking into account the possible mechanisms of their spread in the ureter.

**Key words:** lung cancer, metastasis, ureter.

Contemp Oncol (Pozn) 2023; 27 (1): 57–59  
DOI: <https://doi.org/10.5114/wo.2023.127077>

# Metastasis to the ureter as the first manifestation of occult pulmonary adenocarcinoma. Case report and review of the literature

Aleksandra Ciarka<sup>1</sup>, Filip Skowronek<sup>2</sup>, Michał Kunc<sup>1</sup>, Michał Bieńkowski<sup>1</sup>, Rafał Pęksa<sup>1</sup>

<sup>1</sup>Department of Pathology, Medical University of Gdansk, Gdansk, Poland

<sup>2</sup>Student Scientific Circle, Department of Cardiac Surgery, Medical University of Silesia, Katowice, Poland

## Introduction

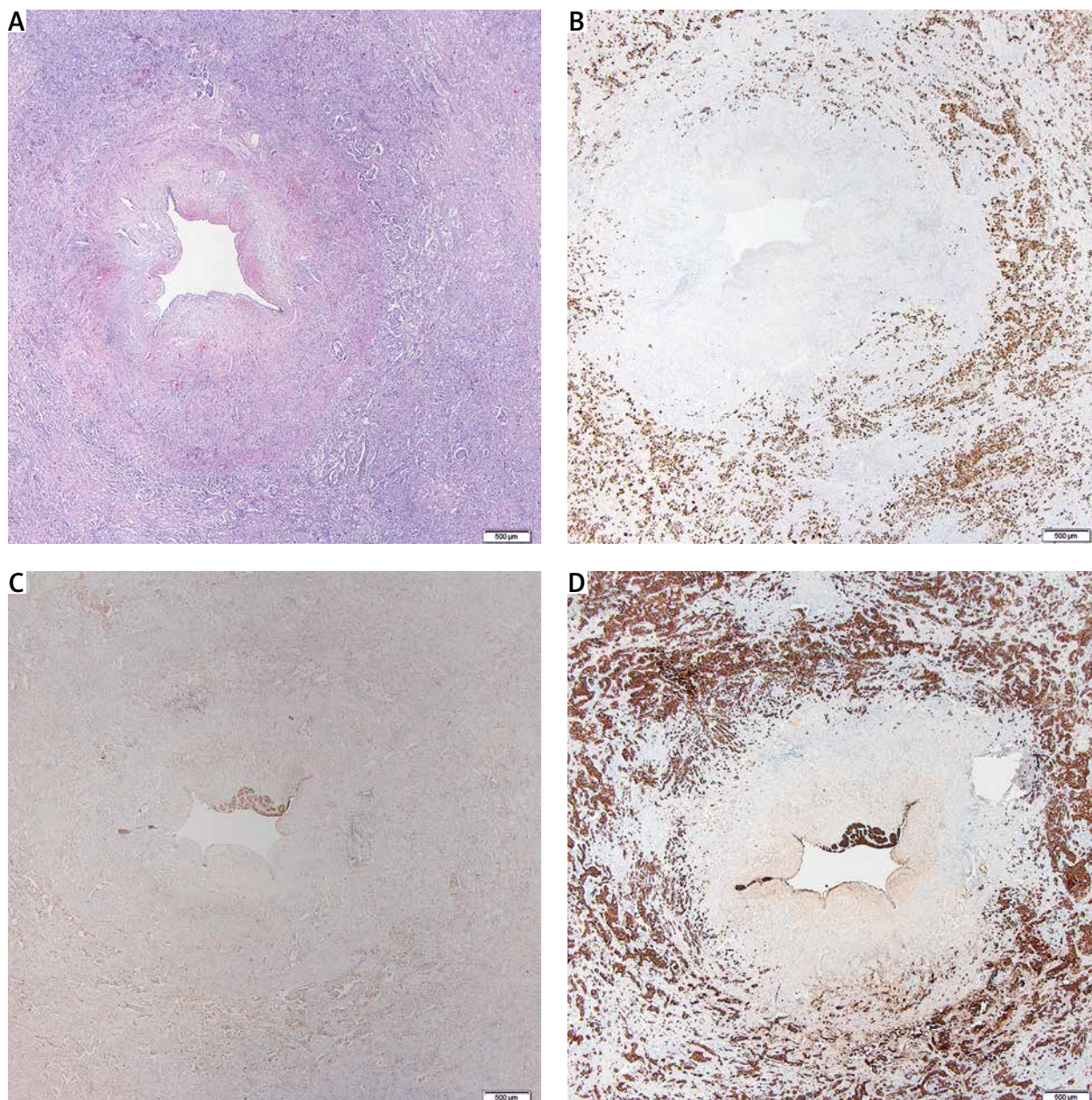
Lung adenocarcinoma is the most common type of lung cancer, accounting for 40% of cases [1]. It typically metastasizes to the other lung, brain, bones, liver, and lymph nodes, but metastases to unusual locations, including ureters, are also possible. Here, we present a case of pulmonary adenocarcinoma the first clinical manifestation of which was spread to the ureter, along with a review of the literature on lung cancer ureteral metastases.

## Case report

A 74-year-old woman was admitted to the emergency department because of stomach ache and constipation for 3 days. She had a history of resection of the sigmoid colon due to colorectal cancer, followed by adjuvant chemotherapy. Computed tomography scan revealed right-sided hydronephrosis, dilatation of the proximal part of the right ureter to a diameter of 26 mm, thickening of the wall of the renal pelvis and ureter, confluent infiltrative masses in the lower lobes of both lungs, and a tumour in the anterior acetabulum of the left hip, leading to the suspicion of metastatic urothelial carcinoma. The ureterorenoscopic biopsy of the right ureter was complicated by its rupture, so the kidney and the proximal ureter were excised. Gross examination revealed a grey, solid mass infiltrating the intramural proximal and central part of the ureter, penetrating the surrounding adipose tissue. Histologically, the wall of the ureter showed solid infiltration by epithelioid cells with marked atypia, with massive lymphovascular invasion. Urothelial epithelium remained intact. Tumour cells expressed CK7, TTF1, SMAD4, and PD-L1 (70% of cells) but not CK20, PAX8, GATA3, WT1, p63, p40, prostein, mucicarmine, synaptophysin, ROS1, or ALK-Bond (Fig. 1). Metastatic lung adenocarcinoma was diagnosed, and the patient was referred for palliative treatment but died 3 weeks after diagnosis.

## Discussion

The knowledge of lung cancer metastatic sites is of great clinical importance, particularly due to its high prevalence and frequent diagnosis at the disseminated stage. A study on 10,464 non-small cell lung carcinoma (NSCLC) cases reported that single distant metastases were localized in bone (22.3%), lung (19.9%), brain (15.8%), and liver (5.8%), while multiple distant metastases predominantly affect bones and liver [2]. Among 729 metastatic lung cancer cases, the most common metastatic sites were bone (34.3%), lung (32.1%), brain (28.4%), adrenal gland (16.7%), liver (13.4%), and extrathoracic lymph node (9.5%) [3]. Nevertheless, NSCLC may spread



**Fig. 1.** Haematoxylin-eosin staining and immunohistochemical staining of ureteral metastatic lung carcinoma (A–D), low-power histopathological examination slide of transverse section of the ureter with intramural involvement of lung cancer metastasis ( $\times 2$ , HE) (A), TTF1 positive nuclear staining in cancer cells ( $\times 2$ ) (B), GATA3-positive nuclear staining in urothelial epithelium, negative in cancer cells ( $\times 2$ ) (C), CK7-positive staining in urothelial epithelium and in cancer cells ( $\times 2$ ) (D)

to virtually any site. For metastases to the urinary system, the most common location is kidney (1–4% of all lung cancer metastases) [4], while bladder, ureter, and urethra involvement occur sparsely. Importantly, the sites of lung cancer metastases carry prognostic information. Isolated metastases to the lungs have unequivocally the best prognosis. However, involvement of liver, adrenal glands, or uncommon locations is associated with poor outcomes [2–4]. This most likely includes ureter, an extraordinary metastatic site. In a systematic review of 295 ureteral metastases, the most frequent primary sites were prostate, bladder, breast, and intestines (19%, 17%, 14%, and 13%, respectively). Lung cancer metastases were identified in 5 cases (2%) [5]. Searching PubMed with the following keywords:

ureter, ureteral, lung cancer, and metastasis, identified 9 publications after exclusion of unavailable or non-English full texts as well as those reporting direct ureteral involvement (Table 1) [6–13]. Two of these were autopsy studies: one reported 2 cases of lung cancer ureteral metastases (and 35 of other origin) among 11,698 patients [14], and the other identified 3 such cases among 3200 patients [15]. Three possible mechanisms of metastatic involvement of the ureter were postulated [13, 16, 17]. Firstly, metastases to the ureter are most often located in a well-vascularized longitudinal area of the periureteral adventitial layer. Alternatively, only some layers of the ureteral wall may be involved (e.g. the muscular layer), which may result from the involvement of vessels perpendicular to the long

**Table 1.** Details of cases of lung cancer metastases to the ureter reported in the literature

Publication	Number of cases	Age	Ureter site	Gender	Part of the ureter involved	Histopathological diagnosis	Treatment
Fitch <i>et al.</i> [6]	1	49	Right	Male	1/3 lower	Squamous cell carcinoma	Nephroureterectomy
DiPietro <i>et al.</i> [7]	1	67	Left	Male	1/3 middle	SCLC	Unknown
Ren <i>et al.</i> [8]	1	61	Left	Male	1/3 lower	Adenocarcinoma	Nephroureterectomy with partial cystectomy
Wang <i>et al.</i> [9]	1	48	Right	Male	Unknown	SCLC	Chemotherapy
Kodama <i>et al.</i> [10]	1	76	Right	Male	1/3 middle	Adenocarcinoma	Chemotherapy
Dooldeniya <i>et al.</i> [11]	1	77	Right	Male	1/3 middle	NSCLC	Palliative care
Shen <i>et al.</i> [12]	1	37	Left	Male	1/3 upper	Adenocarcinoma	Nephroureterectomy
Babaian <i>et al.</i> [14]	2	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Cohen <i>et al.</i> [15]	3	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

NSCLC – non-small cell lung carcinoma

axis of the ureter. Finally, neoplastic cells may infrequently be implanted in the sub-epithelial region, forming a nodule, which is most likely caused by the penetration of cancer cells into the lamina propria by perforating arterioles. Nephroureterectomy is the treatment of choice for ureteral metastases, while palliative chemotherapy is offered to ineligible patients [7, 9–12, 15].

## Conclusions

The ureter is a rare site of lung cancer metastasis. We describe a new case of lung cancer ureteral metastasis and present a review of the available literature on the topic, which extends and systematizes the clinical knowledge on this rare site of lung cancer metastasis.

*The authors declare no conflict of interest.*

## References

- Roviello G. The distinctive nature of adenocarcinoma of the lung. *Onco Targets Ther* 2015; 8: 2399.
- Li J, Zhu H, Sun L, et al. Prognostic value of site-specific metastases in lung cancer: a population based study. *J Cancer* 2019; 10: 3079.
- Tamura T, Kurishima K, Nakazawa K, et al. Specific organ metastases and survival in metastatic non-small-cell lung cancer. *Mol Clin Oncol* 2015; 3: 217-221.
- Akduman B, Altun R, Yesilli C, et al. Symptomatic renal metastasis 5 years after the management of a squamous cell carcinoma of the lung. *Int J Urol* 2004; 11: 421-423.
- Hu J, Deng J, Guo J, et al. Ureteral involvement by metastatic malignant disease. *Clin Exp Metastasis* 2019; 36: 499-509.
- Fitch WP, Robinson JR, Radwin HM. Metastatic carcinoma of the ureter. *Arch Surg* 1976; 111: 874-876.
- DiPietro M, Zeman RK, Keohane M, et al. Oat cell carcinoma metastatic to ureter. *Urology* 1983; 22: 419-420.
- Ren F, Liu M, Xu X, et al. Ureteral metastasis of non-small-cell lung cancer: a case report. *Onco Targets Ther* 2019; 12: 619.
- Wang Y, Li J, Luo L, et al. Ureteral metastasis of small cell lung cancer transformed from lung adenocarcinoma: a case report. *Thorac Cancer* 2022; 13: 1731.
- Kodama K, Imao T, Komatsu K. Metastatic ureteral involvement of non-small cell lung cancer. *Case Rep Med* 2011. Epub ahead of print 2011. DOI: 10.1155/2011/394326.
- Dooldeniya MD, Biyani CS, Weston PMT. An unusual presentation of non-small cell lung carcinoma. *BMJ Case Rep* 2009. Epub ahead of print 9 December 2009. DOI: 10.1136/BCR.07.2009.2095.
- Shen W, Chen J, Gao L, et al. Ureteral metastasis from pulmonary adenocarcinoma: a case report and literature review. *Thorac Cancer* 2021; 12: 3277.
- Stearns DB, Gordon SK. Ureteral metastasis secondary to carcinoma of the large bowel. *Am J Surg* 1960; 99: 244-246.
- Babaian RJ, Johnson DE, Ayala AG, et al. Secondary tumors of ureter. *Urology* 1979; 14: 341-343.
- Cohen WM, Freed SZ, Hasson J. Metastatic cancer to the ureter: a review of the literature and case presentations. *J Urol* 1974; 112: 188-189.
- Arvind NK, Singh O, Gupta S, et al. Ureteral metastasis as the presenting manifestation of pancreatic carcinoma. *Rev Urol* 2013; 15: 124.
- Marincek B, Scheidegger JR, Studer UE, et al. Metastatic disease of the ureter: patterns of tumoral spread and radiologic findings. *Abdom Imaging* 1993; 18: 88-94.

## Address for correspondence

**Aleksandra Ciarka, MD**  
 Department of Pathology  
 Medical University of Gdansk  
 Gdansk, Poland  
 e-mail: aleksandra.ciarka@gumed.edu.pl

**Submitted:** 12.04.2023

**Accepted:** 12.04.2023