Case Report

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Prostate Metastasis from Gastric Malignancy: A Rare Case Report and Literature Review

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Abstract

Metastasis of gastric cancer to the prostate gland is extremely rare. Here, we report a unique case of prostate metastasis from gastric malignancy, diagnosed through a transrectal ultrasound-guided prostate biopsy four years after subtotal gastrectomy. We believe this case highlights the importance of vigilant follow-up for detecting uncommon metastatic events.
Keywords: Gastric cancer, metastases, prostate, seconder prostate neoplasm

Introduction

Signet ring cell adenocarcinomas (SRCCs) are a rare histological subtype of adenocarcinomas with a poor prognosis, typically because of advanced disease at diagnosis. The SRCCs are characterized by an abundance of intracytoplasmic mucin that displaces the nucleus to the cell's periphery.

This cell type is observed in >50% of these tumors. While SRCCs are more common in the gastrointestinal tract, especially the stomach, they may also arise in other locations, such as the colon, esophagus, rectum, lung, bladder, pancreas, and prostate. In particular, primary SRCC of the prostate is remarkably rare (0.4% of all SRCC cases) (1), and only a few reported cases of gastric SRCC metastasis to the prostate are available in the literature (2-10). This case report presents this rare entity from a histopathological perspective.

Case Report

A 61-year-old man was previously diagnosed with gastric SRCC and underwent subtotal gastrectomy, eight chemotherapy cycles, and six rounds of radiotherapy four years ago. He is currently experiencing frequent urination, interrupted urination, and dripping. In a contrast-enhanced chest computed tomography (CT) examination, newly developed parenchymal and subpleural nodules, which were not present in the previous examination, were observed in both lungs. In a contrast-enhanced abdominal CT examination, an indeterminate density area with vague borders was spotted in the mesentery of the small intestine on the right side, at the level of the bladder trigone. Additionally, an asymmetrical wall thickening in a plaque-like shape, reaching approximately 1.2 cm in size, was observed at the level of the prostate base, which also involved the intramural segments of both ureters. A contrast-enhanced magnetic resonance imaging of the prostate showed a prostate gland size of 4.9 x 5.7 x 5.7 cm and a prostate volume of 83.32 cubic cm. Multiple hyperplastic nodules and numerous multifocal non-encapsulated T2A hyperintense foci were observed in the transitional zone, with diffusion restriction at these locations. In addition, several spherical lymphadenopathies with diffusion restriction, the largest of which was 5 mm in diameter, were observed in sections passing through the left periprostatic bladder base. A transrectal ultrasound-guided prostate biopsy was performed.

Our pathological findings revealed a malignant tumor negative for several immunohistochemical (IHC) markers, including NKX3.1, androgen receptor (AR), prostate-specific membrane antigen (PSMA), and prostatic acid phosphatase (PSAP) (Figure 1A-D). Additionally, the tumor had positive staining for mucin with PAS-AB and, the tumor was positive for Villin, CK-7, (Figures 1E, F, 2B, D, F). On the previous biopsy, five months

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ago, the patient had been diagnosed with small focus prostate carcinoma Gleason score of 3+3 and a high-grade prostatic intraepithelial neoplasia (HGPIN) on his three cores was given. No signet ring cell-like morphology was found in the stroma outside this area. In the new biopsy, no significant HGPIN or prostate carcinoma was observed. In addition, serum prostate-specific antigen (PSA) levels were 8.3 and 6 in the previous and current biopsy, respectively. Based on these findings, we have diagnosed our patient with prostate metastasis of gastric SRRC. Informed consent was obtained from the patient.

Discussion

In this case, we initially identified the prostatic adenocarcinoma as Gleason pattern 5. However, based on the patient's medical history, the immune panel we did (NKX3.1, AR, PSMA, PSAP) did not show any prostate-specific markers (Figure 1 A-D). The presence of extracellular mucin in the PAS-AB stain (Figure 1E) made us think it might be SRCC from somewhere else, since SRCC in the prostate usually doesn't have a lot of mucin droplets in the tumor cells (11). We looked at the immunostaining panel of the previous tumor and that of the current one to see if the carcinoma was a primary tumor of the prostate or came from the gastrointestinal system. The villin and CK7 staining patterns were similar (Figure 1F, Figure 2B,D,F). Compared to the literature cases in Table 1, which include patients primarily in their 50s and 60s with a history of gastric adenocarcinoma and presenting with urinary-related symptoms, the correct diagnosis was made by differential diagnosis with more immune markers. The patients underwent various surgical procedures, such as transuretral resection, transrectal ultrasound guided prostate biopsy (Bx), and transperineal ultrasound guided prostate Bx, with generally low PSA levels at diagnosis. Treatments ranged from chemotherapy and radiotherapy to conservative management, with mixed survival outcomes. IHC and histochemical staining revealed positive PAS results (2-4,8-9) and consistently negative PSA results (2,10) (Table 1). Despite the fact that PSMA, PSAP, and NKX3.1 were conducted in a limited number of cases (2-4,8) (Table 1), their negative results substantiated our diagnosis, as their positive results were prostate specific. Additionally, the patient's prostate biopsy and previous gastric tumor showed positive CK7 staining, which was unexpected in the prostate (4,10) (Table 1). Furthermore, we added a new marker to support

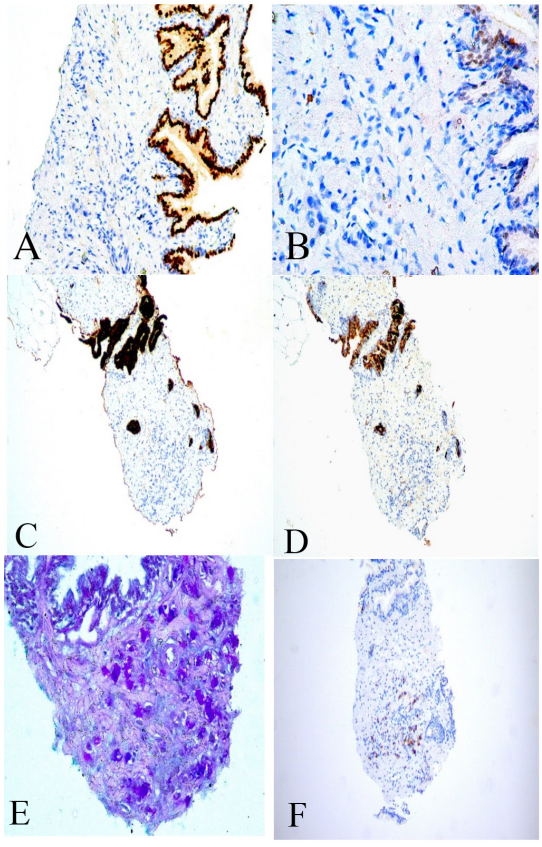

Figure 1. (A) Prostate needle biopsy stained negative for NKX3.1 in the same area with Figure 2C (B) Prostate needle biopsy stained negative for AR adjacent to slightly positive normal prostate glands in the same area as well. (C) Tumor cells stain negative for PSMA in the same area with Fig.2A, (D) Tumor cells stain negative for PSAP in the same area, (E) PAS-positive mucins in the same area, (F) Villin positivity in the same tumor cells as well. Magnifications: A: 400x; B:200x; C, D, E, F: 100x

AR: Androgen receptor, PSMA: Prostate-specific membrane antigen, PSAP: Prostate specific acid phosphatas, PAS: Prostate adenocarcinomas

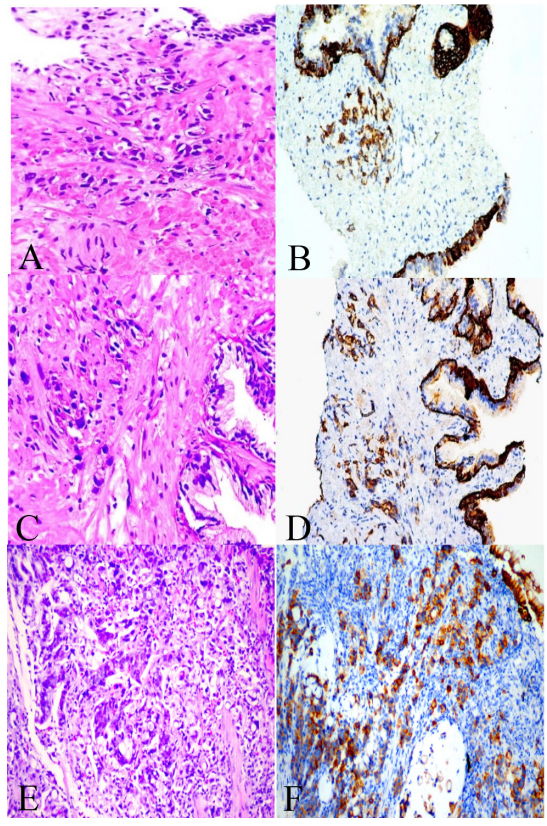

Figure 2. (A) Prostate needle biopsy had atypical signet ring-like tumor cells like the previous gastric biopsy, (B) Prostate needle biopsy stained positive for CK7 in the same area with A, (C) Prostate needle biopsy poorly cohesive signet ring cell like tumor infiltration, (D) Prostate needle biopsy shows CK7 positivity in the tumor cells in the same area, (E) Patient's previous gastric biopsy had atypical cells like in our case, (F) Patient's previous gastric biopsy stains positive for CK7 as well, Stains: A, C, E: Hematoxylin-Eosin; B, D, F: CK7; All pictures 200x Magnifications

Table 1. The summary of clinical information, special and immunohistochemical staining of cases in the literature

Case reports	Borum and Chen (2)	Roshni et al. (5)	Lin et al. (6)	Zhang et al. (3)	Plancke et al. (8)	Cobo Dols et al. (7)	Cimino et al. (4)	Ni et al. (9)	Presenting case
Age	80	56	70	51	60	60	52	60	61
Presentation	Urinary retention	Dysphagia and abdominal pain	Ureteral stone	Urinary retention	Urinary retention	Micturition	Lower urinary tract symptoms	Lower urinary tract symptoms	Lower urinary tract symptoms
Surgical procedures	TUR	Tru-cut biopsy	TRUS Bx.	TRUS Bx.	TUR	TRUS Bx.	TPUS Bx.	TUR	TRUS Bx.
PSA level at diagnosis	Not mentioned	1.94 (ng/dL)	9.7 (ng/dL)	Not mentioned	2 (ng/dL)	0.84 (ng/mL)	0.2 (ng/dL)	1.959 (ng/mL)	6 (ng/dL)
Treatment	Not mentioned	Palliative chemotherapy (EOX)	Conservatively	Not mentioned	Chemotherapy	Radiotherapy	Chemotherapy (5-FU, cisplatin, epirubicin+radiotherapy	Chemotherapy	Will get 3 courses of chemotherapy after that get prostatectomy
History	RCC,Prostate Ca.,Gastric A.Ca.	Gastric Adeno Ca.	Gastric Adeno Ca.	Gastric Adeno Ca.	Gastric Adeno Ca.	Gastric Adeno Ca.	Gastric Adeno Ca.	Gastric Adeno Ca.	GastricAdeno Ca., Prostate A.Ca.
Survival	Unknown	Lost after 3-course chemo.	Unknown	Unknown	A.t.m.l. (1994)	Absence recurrent	A.t.m.l. (2012)	Lost after 2 years	A.t.m.l. (2023)
PAS	+	NA	NA	+	+	NA	+	+	+
PSA	-	-	-	-	-	-	-	-	-
PSMA	NA	NA	NA	NA	NA	NA	NA	NA	-
PSAP	-	NA	NA	-	-	NA	-	NA	-
NKX3.1	NA	NA	NA	NA	-	NA	-	NA	-
CK7	NA	-	NA	NA	NA	NA	+	-	+
CK20	NA	NA	NA	NA	NA	+	+/-	-	+/-
VILLIN	NA	NA	NA	NA	NA	NA	+/-	NA	+

TUR: Transuretral resection, TRUS: Transrectal ultrasound guided prostate biopsy, TPUS: Transperineal ultrasound guided prostate biopsy, EOX: Epirubicin, Oxaliplatin, Capecitabine, 5-FU: 5-Fluorourasil, A.t.m.l.: At the moment live, PSA: Prostate-specific antigen, PAS: Prostate adenocarcinomas, PSMA: Prostate-specific membrane antigen, PSAP: Prostate specific acid phosphatas

our diagnosis. We decided to make an immun stain that showed that the patient's previous gastrointestinal carcinoma was positive, such as Villin. A study by Dum et al. (12) found that 63.4% of diffuse-type gastric adenocarcinomas were positive, and 36.6% were negative for Villin. In PACa, 1.3% were positive, and 98.7% were negative. On the other hand, there is an absence of acinar prostatic adenocarcinoma and HGPIN. The decrease in the serum PSA level compared to the patient's previous results, along with the presence of multiple new nodules in the lungs and suspicious wall thickening between the bladder and prostate on radiological imaging, strongly supported the diagnosis of metastasis. Also, another pathology center interpreted the case as we did, and the diagnosis of gastric adenocarcinoma with metastasis to the prostate was confirmed.

Conclusion

In conclusion, this case underscores the significance of a thorough histopathological evaluation and IHC analysis in diagnosing rare metastatic events. Awareness of unusual metastatic patterns, such as gastric adenocarcinoma metastasizing to the prostate, is crucial for timely and accurate diagnosis. We believe that our detailed analysis will provide valuable insights on similar cases in the future.

Footnote

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Authorship Contributions

Surgical and Medical Practices: K.E., Concept: E.E.A., O.E., Design: E.E.A., O.E., Data Collection or Processing: E.E.A., K.E., Analysis or Interpretation: E.E.A., O.E., R.A., K.E., Literature Search: E.E.A., O.E., R.A., K.E., Writing: E.E.A., O.E.

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