Case Report

Unveiling the Rarity: Primary Signet Ring Cell Carcinoma of the Prostate

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Abstract

Primary prostatic signet-ring carcinoma is a rare and aggressive histological variant of adenocarcinoma, characterized by mucin-filled signet-ring cells. While this type of carcinoma can occur in various organs, including the stomach, colon, pancreas, breast, thyroid, bladder, and prostate, it is most commonly found in the stomach and colon. We present the case of an 88-year-old male patient who presented with hematuria. On digital rectal examination, prostatomegaly was noted. A finger-guided prostate biopsy was performed, and histopathological examination revealed primary prostatic signet-ring carcinoma. This diagnosis is one of exclusion, as metastasis from other sites, such as the gastrointestinal or urogenital systems, must be ruled out. Comprehensive imaging and clinical assessment are essential to ensure the primary origin of the carcinoma. Given the rarity of the disease, there is no established treatment protocol for primary prostatic signet-ring carcinoma. However, aggressive multimodal treatment, including surgery, chemotherapy, and/or radiation, can be considered based on the individual case, extent of disease, and overall patient condition. Early detection and a tailored therapeutic approach may improve prognosis, but this remains a challenging condition to manage.

Keywords: Carcinoma prostate; Signet ring cell; Primary.

Introduction

Primary prostatic signet-ring carcinoma is a rare histological variant of adenocarcinoma [1]. This is an aggressive variant with mucin-filled signet-ring cell infiltration [1]. To call it a signet ring cell variant, mucin-filled signet ring cells should be more than 25% [1]. It is important to rule out signet-ring cell carcinoma of the gastrointestinal tract; an extensive GI workup includes computed tomography of the abdomen, a colonoscopy, and an esophagogastroduodenoscopy [1, 3]. Prostate cancer is the second most common malignancy in men. Incidence increases with an increase in age, with most common cases diagnosed in the 5th to 6th decade [2]. Signet ring cell carcinoma (SRCC) of the prostate is characterized by an intracytoplasmic vacuole compressing the nucleus into a crescent shape at the cellular level. SRCC is found in the stomach and colon, pancreas, breast, thyroid, bladder, and prostate, but primarily in the stomach and colon [3].

Case Report

Our patient is 88 years old with comorbidities of hypertension, chronic obstructive pulmonary disease (COPD), and deep vein thrombosis (DVT) on regular medication. The patient underwent an operation for benign prostate hyperplasia (BPH) in

2008. Currently, the patient presented with on-and-off haematuria for 6 months. On digital rectal examination, the patient was found to have prostatomegaly. His serum prostate-specific antigen (PSA) levels are 100 ng/ml.

Ultrasound of kidneys, ureters, and bladder (USG KUB) revealed grade-IV prostatomegaly with significant post-void residual urine. Pelvic MRI revealed an enlarged prostate measuring 98 x 83 x 82 mm with a 353 cc volume, lobulated outlines, and loss of zonal differentiation. Multiple well-defined nodules with lobulated margins are seen at the base of the prostate. These nodules show restriction of diffusion on Diffusion-Weighted Imaging (DWI/ADC). Prostate Imaging Reporting and Data System (PIRADS 5) lesion. Prostate-specific membrane antigen positron emission tomography (PSMA PET) revealed prostate-specific membrane antigen (PSMA) expressing lesions in the prostate gland, regional lymph nodes, and skeletal lesions.

Finger-guided biopsy of the prostate was done, and tissue was sent for histopathological examination. Received 08 grey-white tissue core biopsies, the largest measuring 2 cm. Microscopy revealed tumor cells arranged in sheets, infiltrating nests, and scattered singly. Tumor cells are round, show abundant eosinophilic cytoplasm at places with intracytoplasmic mucin, and indented nuclei forming crescents. Retraction artifacts were noted around the nests. The modified Gleason's score was 5+5=10 (Grade group-5). The tumor occupies 95% of the total volume of the submitted cores. No definite perineural invasion was seen. On immunohistochemistry, tumor cells are positive for panCK (AE1/AE3/PCK26) and NKX3.1 (EP356). Tumor cells are negative for CK7 (SP52), CK20 (SP33), CD68 (KP-1), CDX-2 (EPR2764Y), and SATB-2 (EP281). It was reported as a primary signet ring cell-like variant of the prostate.

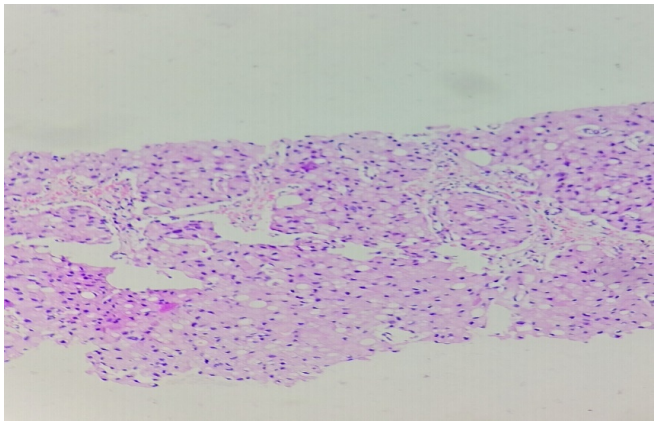

Figure 1: Shows a biopsy specimen showing infiltration by tumor cells (H and E; 100x).

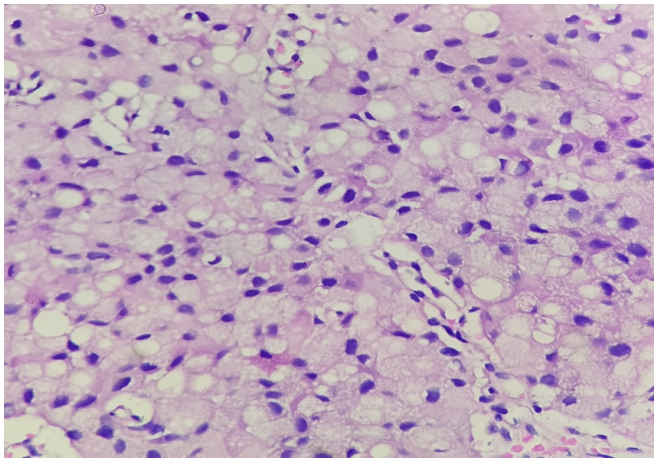

Figure 2: Signet ring cells with cytoplasmic vacuoles displacing nuclei (H and E, 400x).

Discussion

Signet ring-like cell variant of the prostate is classified as high-grade adenocarcinoma and was first described in 1979 [4]. It is a diagnosis of exclusion, so metastasis from the gastrointestinal tract or urogenital system must be ruled out [4]. Primary signet cell adenocarcinoma of the prostate is aggressive, less responsive to treatment, and has a poor prognosis [4]. It is a rare, high-grade (Gleason grade 5) acinar adenocarcinoma subtype characterized by its distinctive intracellular substance-containing vacuole, displacing the nucleus into the cell's periphery, giving it a crescent shape [11]. No universal agreement regarding the percentage of signet ring cells to diagnose it [5]. The diagnostic criteria of signet-ring cell adenocarcinoma

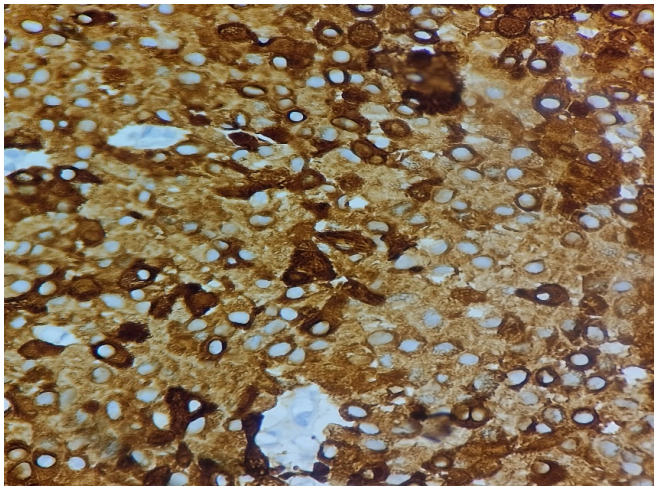

Figure 3: Shows tumor cells positivity for CK.

of the prostate are only when the vacuolated cells make up at least 25% of the entire tumor volume [12]. As it is a rare disease, there is no standard treatment for it, but aggressive multimodal treatment can be adopted [5]. A combined treatment modality of surgery, radiotherapy, chemotherapy, and hormonal therapy can promise a long disease-free period [5].

Table 1: Comparison of the pattern of patients with primary prostate cancer across different studies.

Serial no.	Age	sPSA level (ng/ml)	Metastatic pattern	Reference
01	88 years	100	No metastasis	Our case
02	78 years	100	cervical spine, right shoulder, upper ribs on both sides, left sacroiliac joint, right acetabulum, and left hip joint, pelvis soft tissue	Al Khadar et. al [1]
03	62 years	1.8	No metastasis	Sidhu SK et. al [2]
04	72 years	6.5	No metastasis	Gupta et. al [4]
05	63 years	16.39	No metastasis	Koufopoulos et. al [11]
06	65 years	1990	No metastasis	Tiwari et. al [7]
07	56 years	0.64	No metastasis	Kim et. al [13]
08	70 years	7.26	No metastasis	Gok A et. al [14]

Conclusion

This case highlights the importance of prompt and accurate diagnosis. The condition's rarity and diagnostic delay complicate treatment and prognosis.

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