

Case Report

Rare Case of Testicular Metastasis of Prostate Carcinoma After 13 Years of Prostatectomy: A Case Report and Review of the Literature

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Abstract

Metastasis of prostate cancer to the testes is a rare phenomenon, often indicating advanced-stage disease. This case report details a 79-year-old man with a history of prostate cancer, who underwent endoscopic-extraperitoneal radical prostatectomy and bilateral pelvic lymph node dissection. The patient subsequently received radiation therapy for local recurrences. Thirteen years post-surgery, a testicular ultrasound revealed a cystic mass in the left testis, initially suspected to be a primary neoplasm. However, pathology with immunohistochemical analyses confirmed metastasis from prostate adenocarcinoma. Testicular metastasis of prostate cancer is uncommon, underscoring the aggressiveness and potential spread of the tumor. Clinically evident testicular metastases develop in only a small percentage of prostate cancer patients. This case report highlights the importance of considering metastatic disease in the differential diagnosis of testicular masses and the necessity of clinicopathologic correlation in such evaluations. Early detection and accurate diagnosis are crucial for managing testicular metastasis and improving patient outcomes. The case also emphasizes the significance of long-term follow-up in prostate cancer patients, as metastasis can occur many years post-initial treatment. Furthermore, it illustrates the critical role of advanced imaging techniques and thorough pathological assessments in identifying and managing metastatic spread. This report contributes to the limited but growing body of literature on testicular metastasis from prostate cancer, providing insights for clinicians in recognizing and managing this rare but serious complication. It underscores the need for ongoing research to better understand the mechanisms of metastatic spread and develop targeted therapeutic strategies.

Keywords

Prostate Carcinoma, Testicular Metastasis, Orchiectomy, Secondary Neoplasms, Prostatectomy

1. Introduction

Metastasis of prostate cancer to the testes is a rare phenomenon, with an estimated incidence of less than 0.1% [1]. Prostate cancer is a prevalent malignancy in men globally and represents a significant contributor to cancer-related mortality

[2]. In 2020 were in Germany 16,487 deaths related to prostate cancer registered, making up to 2.35% of total deaths, with an age-adjusted death rate of 14.89 per 100,000 population [2]. Prostate cancer has a higher incidence rate in older

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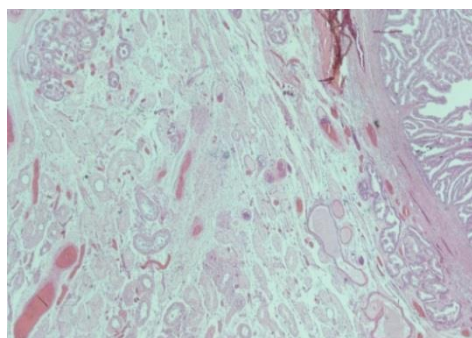
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men. Moreover, the prevalence of this cancer type is comparatively higher in developed countries [3]. Testicular metastasis is generally a rare event and typically remains asymptomatic until the advanced stages of the disease have reached and are frequently discovered incidentally after orchiectomy treatment [4, 5]. Despite advances in screening and treatment, prostate cancer can metastasize to other organs, including the bones, lungs, liver, and brain [6]. Solitary testicular metastasis from prostate cancer, although rare, can occur even after radical prostatectomy, as demonstrated in a case study by Janssen et al. (2010) where a patient developed isolated recurrence post-surgery [7]. Diagnosing testicular metastases originating from prostate cancer poses significant challenges, necessitating a high degree of clinical suspicion, particularly among individuals with a prior history of prostate cancer. Here, we present a unique case of left testicular metastasis from prostate cancer, which was diagnosed 13 years after the radical prostatectomy for prostate carcinoma.

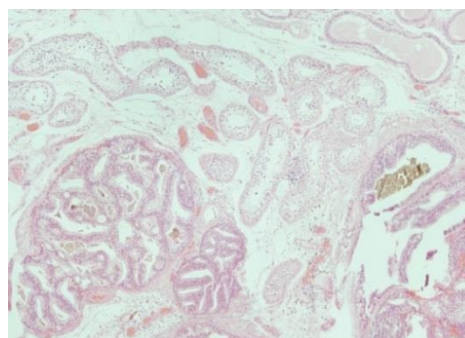
2. Case Report

A 79-year-old male with a past medical history of prostate cancer diagnosed in 2009 presented to the clinic. He had undergone endoscopic-extraperitoneal radical prostatectomy (EERPE) with bilateral pelvic lymph node dissection for his prior prostate cancer treatment. The final pathology report showed adenocarcinoma with perineural invasions, and the disease was staged as pT2cN0M0R0 with free surgical margins. After five years of surgery (in 2014), the patient experienced

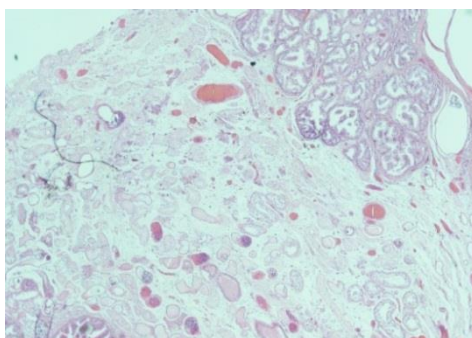
local recurrences, and pelvic radiation therapy was initiated. A follow-up CT scan of the thorax, abdomen, and pelvis showed no evidence of gross blastic osseous metastasis or organ metastasis. However, 8 years later (in December 2022), a testicular ultrasound revealed a cystic mass in the left testis, and a primary testicular neoplasm was suspected. The patient underwent an orchiectomy (2023), and the pathology report revealed left testicular involvement by an adenocarcinoma. The tumor cells were arranged in cribriform and papillary structures, as well as discrete round to oval glandular structures, with infiltrative growth between pre-existing testicular tubules, which showed extensive atrophy and hyalinization. Considering the long time interval between the radical prostatectomy and the detection of the present mass in the testis and the absence of detectable metastasis in other organs at the time of orchiectomy, a wide range of immunohistochemical analyses were performed to rule out a rare presentation of germ cell neoplasms of the testis and also other metastases to the testis from an unknown primary origin. The tumor cells showed strong specific reactions for PSA, Prostein, and AR (androgen receptor). The other immunohistochemical reactions were negative (CK7, CK20, calretinin, CDX2, Melan-A, WT1, OCT3/4, Glypican 3, AFP, and TTF1). The results of immunohistochemical evaluations confirmed the diagnosis of metastatic prostate cancer to the testis (Figure 1). The epididymis and the spermatic cord showed no infiltration. Following the orchiectomy, a chest and abdominal CT scan showed no other metastatic lesions. The patient was discharged with instructions for follow-up with his family physician.



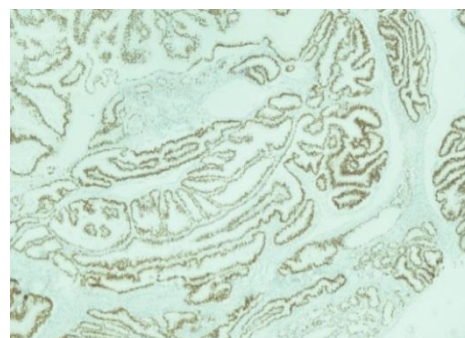
A



B



C



D

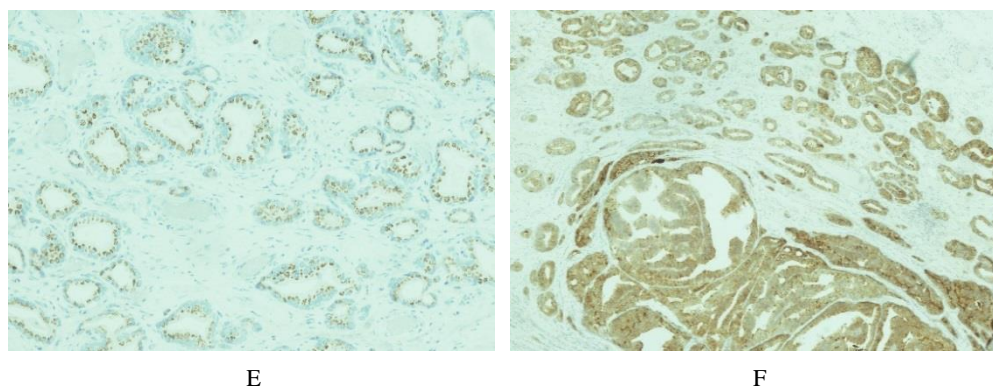


Figure 1. A, B, and C: H&E -stained sections: The pathological findings indicated prostate cancer with a Gleason score of 4+3 in atrophic testicular parenchyma; D: AR (androgen receptor) immunostain positive; E: Prostein immunostain positive; F: PSA immunostain strongly positive.

3. Discussion

Testicular metastasis by prostate cancer is a rare phenomenon that often signifies advanced disease and a poor prognosis. The diagnosis of testicular metastasis of prostate cancer is challenging and requires a high index of suspicion, especially in patients with a history of prostate cancer. In this case, the initial suspicion was for a primary neoplasm of the testis, but immunohistochemistry confirmed the diagnosis of metastatic prostatic adenocarcinoma. The epididymis and spermatic cord showed no infiltration, indicating a lack of direct spread from the prostate gland to the testis.

Bubendorf et al. conducted an autopsy-based study involving 1,589 patients with prostate cancer, revealing that bone metastasis occurred most frequently (89%), followed by lymph node metastasis (62%), liver metastasis (37%), and lung metastasis (33%). Testicular metastasis is rare, accounting for only 0.3% of cases. Kusaka et al. reported a case involving a patient diagnosed with a primary testicular tumor, which was later revealed to be a testicular metastasis originating from prostate cancer [8]. The patient underwent an orchiectomy, and pathology revealed metastatic prostate adenocarcinoma, similar to our case. The phenomenon of testicular metastasis from prostate cancer has been also documented in the literature, highlighting the importance of considering it in differential diagnoses [9-13]. Metastasis to the testes from other primary cancers, such as colon adenocarcinoma, further underscores the need for comprehensive evaluation of testicular masses [4, 5].

The mode of dissemination from the prostate to the testis is unclear, with possible variations. Direct extension from the prostate through the lymphatic system and bloodstream, as well as retrograde venous flow through the Batson venous plexus, are considered possible mechanisms [6]. In the present case, it is unclear which pathway was responsible for the testicular metastasis. However, since the patient had a history of pelvic lymph node dissection, it is possible that the lymphatic system played a role in this case. Nevertheless, the rare

occurrence of this phenomenon highlights the importance of careful monitoring and follow-up for patients with prostate cancer, particularly those who have undergone previous treatments or have advanced disease.

Testicular metastases can mimic clinically primary testicular neoplasms. In the present case, a cystic mass was detected in the left testis, and a primary testicular neoplasm was suspected. Considering the absence of detectable metastasis in other organs at the time of orchiectomy and the long interval between prostatectomy and orchiectomy we tried to apply a wide range of immunohistochemical analyses to rule out a rare presentation of germ cell neoplasms of the testis and also a metastasis to the testis from an unknown primary origin. In this case, we used PSA, AR (less specific), and Prostein (more specific) markers for immunohistochemical confirmation of the diagnosis, along with negative reactions for other markers. Other potential immunohistochemical markers for confirming the prostatic origin of carcinoma are PSMA and NKX3.1 [14]. Imaging studies, such as ultrasound and computed tomography, as well as serological examinations for detection of possible tumor markers, can also be helpful for an accurate diagnosis. However, the definitive method of diagnosis is histopathological and immunohistochemical analysis.

Considering the rarity of this situation, the management of testicular metastasis from prostate cancer remains controversial, with no established consensus on the optimal treatment approach. Orchiectomy is often performed for symptomatic relief and can provide diagnostic information through pathology. Abou Heidar et al. (2019) reported a similar case. Their patient underwent a left orchiectomy and adjuvant radiation therapy. He remained disease-free after 8 months of follow-up [13]. In our case, a chest and abdomen CT scan showed no other metastatic lesions. The patient was discharged after orchiectomy with no adjuvant treatment and with instructions for follow-up with his family physician. He remained disease-free after 5 months of follow-up. In general, the role of adjuvant therapy, such as chemotherapy or radiation in such cases remained unclear.

The present case highlights the importance of considering testicular metastases from prostate cancer in the differential

diagnosis of testicular masses, especially in patients with a history of prostate cancer and with unusual histomorphological findings. The long time interval between the radical prostatectomy and the detection of the present mass in the testis in the present case also emphasizes the need for long-term follow-up in prostate cancer survivors. To our knowledge, there are only 24 reported cases (including the present case) with isolated testicular metastasis and long intervals with initial diagnosis [12].

4. Conclusion

The occurrence of testicular metastasis from prostate cancer is an infrequent phenomenon; nonetheless, it remains crucial to consider this potential diagnosis in the list of differential diagnoses of a testicular masses, particularly in individuals with a prior history of prostate cancer. These metastases typically present in older patients and may have a poor prognosis. Our case report underscores the need for close clinical monitoring of patients with prostate cancer for early detection of possible testis metastases. The histopathological diagnosis of testicular metastasis from prostate cancer is challenging and requires generous embedding of tissue, a broad spectrum of immunohistochemistry and high index of suspicion. It is crucial for further follow ups and potential treatment options.

Abbreviations

| | |
|--------|--|
| EERPE | Endoscopic-Extraperitoneal Radical Prostatectomy |
| CT | Computed Tomography |
| PSA | Prostate-Specific Antigen |
| AR | Androgen Receptor |
| CK7 | Cytokeratin 7 |
| CK20 | Cytokeratin 20 |
| WT1 | Wilms Tumor 1 |
| OCT3/4 | Octamer-Binding Transcription Factor 3/4 |
| AFP | Alpha-Fetoprotein |
| TTF1 | Thyroid Transcription Factor 1 |
| PSMA | Prostate Specific Membrane Antigen |
| NKX3.1 | NK3 Homeobox 1 |
| H&E | Hematoxylin and Eosin |
| CDX2 | Caudal Type Homeobox Transcription Factor 2 |

Conflicts of Interest

The authors declare no conflicts of interest.

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