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Case Report
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A Case of Prostatic Calcification with Mesenteric Panniculitis: Presented with Prostatic Cancer

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Abstract

Background: The association between prostatic calculi/calcifications, widespread atherosclerosis, and the occurrence of mesenteric panniculitis (MP) has been proposed to share molecular vulnerabilities that may be linked to the development of prostate cancer.

Case Report: We present the case of a 61-year-old man who had severe lower urinary tract irritative symptoms for more than two years, along with intermittent and recurrent abdominal pain for five years, after applying exclusion criteria (post-prostatectomy, indwelling urethral catheter, and severe artefacts). The patient's medical history and laboratory findings were collected. The NIH-CPSI and I-PSS were used to measure symptom severity. The diagnosis of chronic bacterial prostatitis was confirmed in the patient reported in this study. Prostatic ultrasonography and unenhanced Pelvic Abdominal Computed Tomography (PACT) were performed on the patient. Prostatic calculi/calcifications and MP were detected by PACT. Atherosclerotic calcific plaques were also observed in the femoral, iliac, and aortic arteries. Prostatic calcification with CT attenuation values of 450 was discovered in the central zone of the 27-gram prostate. MP was diagnosed via a laparoscopic excisional biopsy. Moreover, biopsies guided by transrectal ultrasonography confirmed prostatic adenocarcinoma.

Conclusions: Our findings suggest that prostatic calcification, MP, and extensive atherosclerosis can occasionally co-occur with the underlying prostatic cancer, specifically prostate adenocarcinoma. Beyond the conventional risk factors for prostate cancer, prostatic calcification, MP, and atherosclerosis may be strong indicators of potential prostate cancer development.

Keywords: Prostatic Calcification; Prostatic Cancer; Mesenteric Panniculitis; Atherosclerosis

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Introduction

The application of pelvic ultrasound and CT has increased the findings of prostate calcifications, which are reported in 7.4-76.6% of prostate disease cases. Prostatic calcifications/calculi are commonly associated with Chronic Bacterial Prostatitis (CBP) and are a potential predictor of future prostate cancer incidences, although their exact pathophysiology remains uncertain [1, 2].

Prostate cancer is one of the most prevalent malignancies among elderly men and one of the most common worldwide representative malignant conditions. Age, race, and family history are documented as known risk factors for prostate cancer. Although they have been documented, additional risk factors such as Mesenteric Panniculitis (MP) and atherosclerotic factors are still debatable [1]. MP, an uncommon benign idiopathic inflammatory illness, is frequently discovered as an incidental finding on body CT images taken for other ailments in elderly males with prostatic calcification. Prostatic inflammation, suprapubic pain, lower urinary tract dysfunction symptoms, irritable bowel syndrome, and prostate cancer have all been linked to MP [3-7]. However, the clinical significance of these lesions - prostatic calcification, MP, and atherosclerosis - along with their correlation and occurrence with prostatic cancer, is yet unknown.

To better understand their influence as risk factors for the development of prostate cancer, we attempted to characterize and discuss the relationship between prostatic calcification in a male with Chronic Bacterial Prostatitis (CBP) and the development of prostate cancer in this case report, with both mesenteric panniculitis and widespread atherosclerosis.

Case Report

The patient, a 61-year-old man, presented with a chief complaint of urinary frequency and urgency, painful micturition, and difficulties with micturition for more than 2 years. At the same time, the patient presented with recurrent bouts of localized abdominal pain lasting from 30 minutes to 1 hour, associated with nausea, alternating constipation and diarrhea, with occasional deep-seated tenderness, mucus, and bloating for 5 years. Initially, he was diagnosed with irritable bowel syndrome, and he received conservative treatment (e.g., ondansetron) with temporary relief.

After applying exclusion criteria (post-prostatectomy, previous prostatic surgery or radiotherapy, indwelling catheters, cystostomy, ureterostomy, ureteral stents, severe artifacts, and software errors), and as well as through patient demographic data, laboratory findings, and imaging examinations combined with the National Institutes of Health Chronic Prostatitis Symptom Index (NIH-CPSI), and the International Prostatic Symptoms Score (IPSS), CBP was diagnosed [8]. Body Mass Index (BMI) was calculated (>32). The patient denied having a similar genetic and family history.

At the time of diagnosis, the patient's free PSA level was 0.116 ng/mL, and his total serum PSA level was 0.756 ng/mL; bacterial cultures of prostatic fluid and urine were negative. Examination of the urine flow rate suggested urinary tract obstruction. Digital Rectal Examination (DRE) demonstrated an enlarged prostate with a regular surface contour and firm consistency; no palpable nodular lesions were detected.

Imaging examination via pelvic ultrasound was performed by a radiologist, blinded to the patient's history, revealed that the patient's prostate was 27 gm, with central calcification (5.1 mm^3) (Figure A). Additionally, an abdominal ultrasound did not show any visible lesions. Unenhanced Pelvic Abdominal Computed Tomography (PACT) was performed, in addition to assessment of prostatic calcification, for the diagnosis of the causes of recurrent abdominal pain. PACT revealed central prostatic calculi/calcifications with CT attenuation values of 450 (Figure B). PACT also revealed hazy mesenteric fat, mesenteric root stranding, and separation of the mesenteric vessels, consistent with MP (Figure C). One of the key quantitative features extractable from PACT is the demonstration of the different distributions of atherosclerotic calcific plaques in the aorta, iliac, and femoral arteries, with attenuation values (< 225 HU) and volumes (< 2 mm^3) (Figure D).

Following a laparoscopic excisional biopsy, a diagnosis of MP was established. It is characterized by chronic inflammation, fat necrosis, and varying degrees of fibrosis. Owing to the severe symptoms of lower urinary tract dysfunction, a TRUS-guided biopsy was performed. A moderately differentiated prostatic adenocarcinoma was diagnosed with a Gleason score of 6 (3+3), and the pathological stage was pT1bN0M0I.

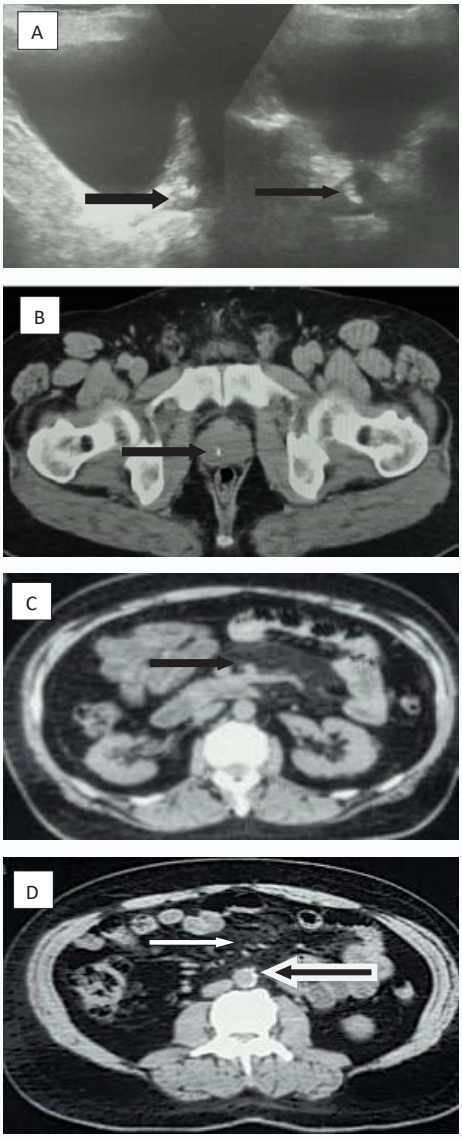

Figure: Prostate cancer in a 61-year-old patient with prostatic calcification, mesenteric panniculitis, and widespread atherosclerosis. **A:** Transabdominal ultrasound examination of the prostate. Both the Axial and the sagittal images demonstrate prostatic parenchymal calcification (Black arrows); **B**: Axial computed tomography (CT) view of the prostate shows central prostatic calcification (Black arrows); **C**: Axial CT scan at the level of the superior aspect of the kidneys illustrates mesenteric panniculitis characterized by hazy mesenteric fat and separation of the mesenteric vessels (Black arrows); **D**: Axial CT scan displays synchronous mesenteric panniculitis (White arrows), manifested by fat separating the mesenteric vessels, and calcified aortic plaque (Black arrows).

Discussion

This is the first case of prostate calcification in patients with prostate cancer utilizing computational methods to analyze abundant imaging data derived from contemporaneous ultrasonography and CT, particularly MP, alongside prevalent atherosclerosis. Two other aspects of the current case can be emphasized: calcification is not limited to the prostate but also involves the mesenteric fatty tissues and widespread calcified plaques in the arterial walls; this is the first reported case of prostate cancer demonstrating a significant difference in calcification distribution compared with previous studies. According to reports in the scientific literature, between 59% and 89% of cases of prostate cancer had prostatic calcification. Only prostatic calcification was found when all reported prostate cancer cases were reviewed. Moreover, 11.9% of cases of MP were linked to prostate cancer [1, 7]. The second aspect is the length of time between the diagnosis and the onset of urinary symptoms - five years before the MP diagnosis - which suggests the possibility that prostate cancer may have developed over time. Prostatic calcification may cause urinary symptoms and the development of stones. Depending on the severity of the problem and the locations of the calcifications/calculi,

they can be asymptomatic or result in pelvic symptoms. However, the interval between the development of MP and the onset of abdominal symptoms varies from 6 months to 16 years [9, 10]. Additionally, before the workup for the evaluation of abdominal symptoms and MP detection, this patient had not undergone any imaging studies of the abdomen.

Several mechanisms, in such a case, have been suggested for the development of prostate cancer. One of these processes involves osteoblast-like epithelial cells depositing hydroxyapatite, which accumulates on corpora amylacea and, with further deposition and mineralization, may lead to more clinically apparent prostate calcification and cancer. Moreover, the development of prostate cancer is influenced by the mechanical and chemical degrading impacts of prostatic calcification on the adjacent tissue, the resulting fibrosis and edema, local stagnation of prostatic fluid in the prostatic duct, the emergence of new stones, and the growth of prostatic calcification, all of which are intimately linked with chronic prostatitis and, eventually, prostate cancer [11]. Severe obesity is an additional factor that increases the risk of prostate cancer in such a patient. Several previous studies report a prevalence of systemic atherosclerosis among patients diagnosed with prostate cancer. Low androgen levels and androgen signaling associated with adiposity may also be a biological link for the onset of prostate cancer [12].

In this current case, we identified MP, which is in line with research showing a prevalence of MP among prostate cancer patients [7]. Additionally, MP is directly associated with some solid tumors and widespread metastases, including kidney cancer and lymphoma. Research shows that in up to 30% of cases, MP occurs either before or simultaneously with a cancer diagnosis. MP, an inflammatory disease affecting the mesentery's fatty tissue in the small intestine, is often categorized as a paraneoplastic condition. The inflammation could be a response of the immune system to an undetected cancer [6]. The presence of MP may trigger further screening and direct the investigation toward those malignancies.

Ultrasonography is a precise diagnostic method for hyperechogenic prostatic parenchyma. Since all calcifications are radiolucent, MP and prostatic calcifications can be detected with plain CT. The plain CT scan can identify prostatic calcification by demonstrating a prostatic stone alongside hyperechoic prostatic parenchyma that has served as a nidus for the deposition of radiopaque urinary salts [10]. CT is a highly sensitive diagnostic technique for MP and atherosclerosis when prostatic calcification is present [7, 10]. Moreover, CT is an important imaging biomarker for assessing the severity of atherosclerosis. This outcome is primarily explained by the increased prevalence of calcium calcification in the abdominal aorta, which facilitates the detection of calcified plaque lesions. Sharper contrasts are generated by the higher degree of calcification in the abdominal aorta, which facilitates the system's accurate identification and segmentation of calcified areas [13]. The quantity and position of prostatic calcifications were precisely mapped in this study; a significant percentage of these calcifications are more prevalent and develop in and around tumors.

In addition to excisional laparoscopic MP biopsy, CT-guided and echo-guided biopsies are possible methods for histological confirmation. Nonetheless, even with these methods, it can be challenging to access the mesentery and excise enough tissue samples, especially if there isn't a bulging mass. A retrospective study demonstrated that laparoscopic surgical excisional biopsy of a larger discrete tissue mass, a complete lymph node, or a targeted segment of mesenteric lesions was a safe and efficient alternative to CT-guided, echo-guided, and laparotomy biopsies for MP diagnosis. Conversely, pathological analysis and a needle biopsy of the prostate gland yielded a definitive diagnosis in this case report [9, 14].

Our findings in this current case support the idea that the presence of prostate calcification on imaging studies (US and CT) may be a significant predictor of future prostate cancer and MP development. In cases of dysfunctional voiding symptoms with a history of recurrent abdominal pain, prostate calcification may be used to guide screening procedures for the MP. Moreover, there was a high prevalence of atherosclerosis among men with prostatic calcification, which was linked with prostatic cancer, aside from traditional prostate cancer risk factors.

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