Case Report

Recurrence of mucinous prostate cancer in rectal wall due to needle-track seeding from previous transrectal prostate biopsy

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Abbreviations & Acronyms
MRI = magnetic resonance imaging
PSA = prostate-specific antigen

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Introduction: Needle-track seeding of prostate cancer into the rectal wall following transrectal prostate biopsy is exceedingly rare. We report a case of mucinous prostate cancer recurrence in the rectal wall due to biopsy needle seeding, discovered after robot-assisted radical prostatectomy.

Case presentation: A 67-year-old man underwent robot-assisted radical prostatectomy for mucinous prostate cancer (clinical stage T2cN0M0, Gleason score of 4 + 4, and initial prostate-specific antigen level of 8.8 ng/mL). Five years postoperatively, endoscopy revealed a rectal tumor, which was diagnosed as needle-track seeding from the previous transrectal prostate biopsy. Following resection of this rectal tumor, the patient's prostate-specific antigen level fell to <0.008 ng/mL. No signs of recurrence or metastasis were observed 3 months postoperatively.

Conclusion: While rare, transrectal prostate biopsies can pose a small risk of needle-track seeding into the rectal wall. Endorectal examination should be considered if biochemical recurrence of prostate cancer occurs following radical prostatectomy.

Key words: mucinous prostate cancer, needle-track seeding, prostate biopsy, prostate cancer, robot-assisted radical prostatectomy.

Keynote message

Transrectal prostate biopsy carries a small risk of needle-track seeding, potentially leading to implantation of prostate cancer cells in the rectal wall. In cases of biochemical recurrence following radical prostatectomy, endorectal examination should be considered to assess for possible seeding.

Introduction

A transrectal prostate biopsy is essential for the definitive diagnosis of prostate cancer. Reports of needle-track seeding into the rectal wall following such biopsies are extremely rare.[1] In this paper, we describe our experience with a case in which mucinous prostate cancer recurred in the rectal wall and was considered to be due to needle-track seeding from a previous transrectal prostate biopsy.

Case presentation

The patient, a 67-year-old man, had an elevated PSA level of 8.8 ng/mL but was asymptomatic. Digital rectal examination revealed that the prostate was elastically hard, but the surface of prostate was smooth and there were no findings suggesting invasion into the rectum. MRI revealed a 3-cm tumor in the center of the prostate's peripheral zone, displaying high signal intensity on T2-weighted images (Fig. 1a,b). The tumor did not show marked diffusion restriction on scans obtained with diffusion-weighted sequences (b value = 1800 s/mm^2). MRI showed no evidence of extracapsular or rectal invasion. We performed a transrectal

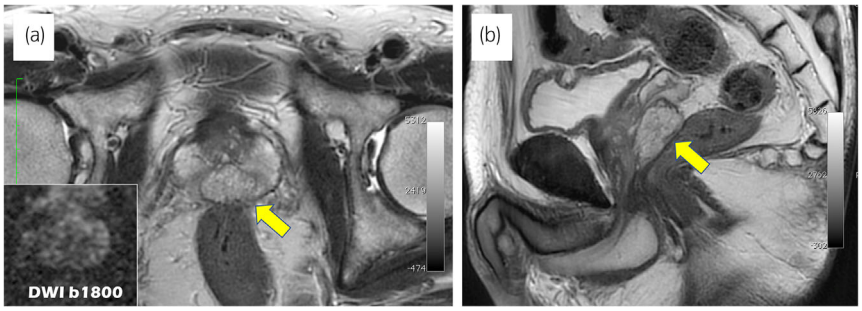

Fig. 1 MRI at the time of diagnosis of prostate cancer in this case. An approximately 3-cm tumor with high signal intensity on T2-weighted images was located in the center of the peripheral zone of the prostate (yellow arrow). (a) Transverse plane and diffusion-weighted scan (*b* value = 1800 s/mm^2). (b) Sagittal plane.

prostate biopsy under sacral anesthesia. A transrectal prostate biopsy revealed adenocarcinoma with mucinous features in 6 of 12 cores, with a Gleason score of 4 + 4. Clinical diagnosis of the current case was T2cN0M0, and the patient underwent robot-assisted radical prostatectomy and pelvic lymph node dissection. The procedure took 2 h 39 min blood loss was minimal at 50 mL, and no rectal adhesions were observed.

The postoperative pathological analysis revealed mixed mucinous and acinar adenocarcinoma with a downgraded Gleason score of 3 + 4, no extracapsular invasion, and negative resection margins (Fig. 2a,b). PSA immunohistochemical staining was positive (Fig. 2c), identifying the tumor as a primary mucinous adenocarcinoma of the prostate. No signet ring cells were observed. All 29 lymph nodes examined were free of metastasis.

However, 4 months postoperatively, biochemical recurrence was detected with a PSA level of 0.368 ng/mL. No lesions were visible on abdominal CT and pelvic MRI. Despite starting androgen deprivation therapy, the PSA level rose again. Five years later, a rectal tumor was discovered during rectal endoscopy after fecal occult blood was noted during a physical examination (Fig. 3a,b). At this point, PSA was 0.663 ng/ml. A biopsy of the rectal tumor revealed group 5 mucinous adenocarcinoma, with immunohistochemical staining suggesting prostate cancer metastasis or dissemination. Pelvic MRI showed a 1-cm tumor on the slightly left side of the anterior rectal wall, with abnormal signals on diffusion-weighted images (Fig. 3c,d).

Pathological examination suggested that the rectal tumor was very similar to the prostate cancer. Retrospective analysis indicated a protruding lesion on the posterior side of the left prostate lobe, likely a needle track from a previous transrectal prostate biopsy (Fig. 2a), aligning with the location of the rectal tumor on the ventral left side where the biopsy needle had passed. Although it is difficult to distinguish strictly from needle-track seeding or extracapsular invasion pathologically, the prostate cancer in this case did not show vascular or lymphatic invasion.

Similarly, it was difficult to prove which biopsy needle caused the needle-track seeding. Therefore, based on the following points, (1) there was a protruding lesion on the left dorsal side of the prostatectomy specimen that had a different morphology from normal extracapsular invasion, (2) the rectal tumor was located on the left ventral side, and (3) there was no vascular or lymphatic invasion in the primary lesion, it was considered that this rectal tumor was more likely to be needle-track seeding than direct invasion or vascular or lymphatic metastasis of prostate cancer.

Because no other obvious metastatic lesions were found, laparoscopic intersphincteric resection with transanal total mesorectal excision and pelvic lymph node dissection was performed. The operation lasted 2 h 46 min, and the blood

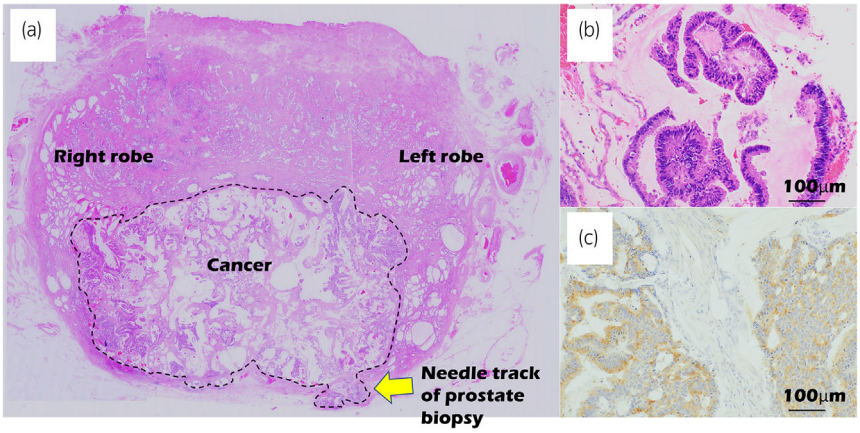

Fig. 2 Pathological findings of robot-assisted radical prostatectomy specimens. (a) Histopathologic specimen with hematoxylin–eosin staining: panoramic view of the mucinous adenocarcinoma of the prostate (black dotted line). The resected specimen contained a protruding lesion on the posterior side of the left lobe of the prostate (yellow arrow). (b) Histopathologic specimen with hematoxylin–eosin staining: photomicrograph of mucinous adenocarcinoma, composed of tumor cells arranged in trabecular and cribriform patterns and floating in an extracellular mucin lake. (c) Histopathologic specimen with immunohistochemical staining: PSA was positive in the cytoplasm of the cancer cells.

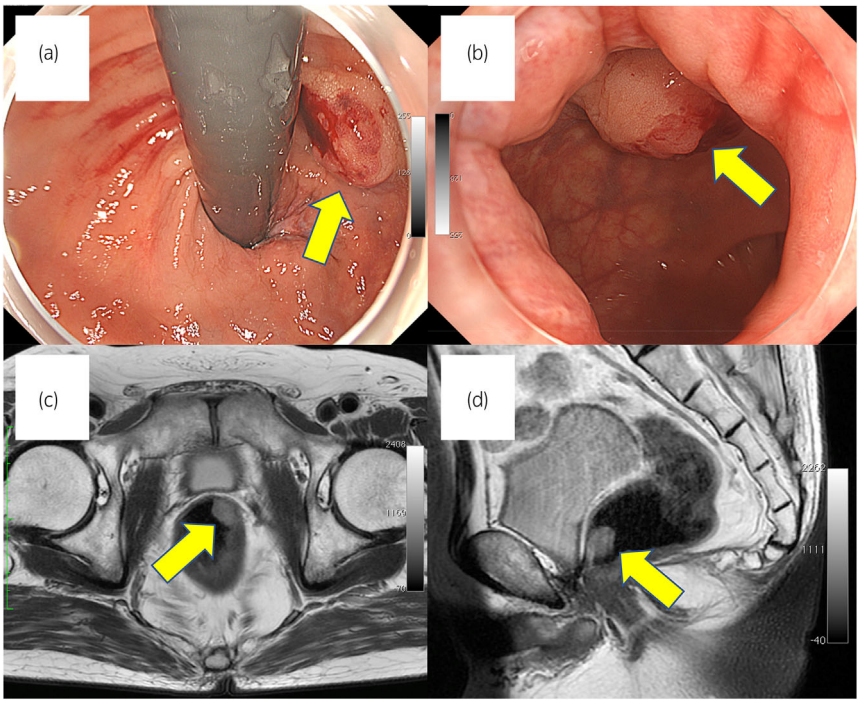

Fig. 3 Recurrent tumor found within the rectum. Rectal endoscopy and pelvic MRI revealed an approximately 1-cm tumor on the slightly left side of the anterior wall of the rectum (yellow arrow). (a, b) Rectal endoscopy. The tumor was located 1 to 2 cm from the anus. (c) Transverse plane of T2-weighted MRI. (d) Sagittal plane of T2-weighted MRI.

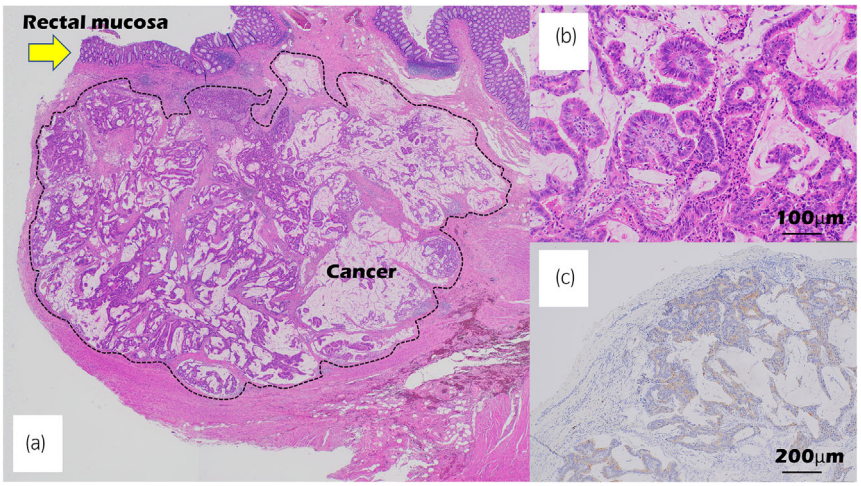

Fig. 4 Pathological findings of rectal tumor specimens. (a) Histopathologic specimen with hematoxylin–eosin staining: panoramic view of the mucinous adenocarcinoma of the rectal wall (black dashed line). This tumor had not progressed from the rectal mucosa (yellow arrow) but was present from the submucosa of the rectum to the muscularis propria. (b) Histopathologic specimen with hematoxylin–eosin staining: photomicrograph of mucinous adenocarcinoma. Histopathologically, the tumor closely resembled prostate cancer. (c) Histopathologic specimen with immunohistochemical staining: PSA was positive in the cytoplasm of the cancer cells.

loss volume was 62 mL. No complications occurred intraoperatively or postoperatively.

Postoperative pathology confirmed that the rectal tumor had originated not from the rectal mucosa but had extended from the submucosa to the muscularis propria (Fig. 4a), and its histopathology resembled that of prostate cancer (Fig. 4b). PSA staining was positive, supporting the diagnosis of mucinous prostatic carcinoma dissemination (Fig. 4c). The resection margins were clear, and no lymph node metastasis was present.

The history and pathological findings confirmed that the rectal tumor had resulted from needle-track seeding of mucinous prostate cancer during the previous transrectal prostate biopsy. Following the surgery, the PSA level dropped to <0.008 ng/mL (below the measurement sensitivity threshold), indicating effective treatment. No apparent recurrence or metastasis was observed 3 months postoperatively.

Discussion

Transrectal prostate biopsy remains the most commonly used method to confirm the diagnosis of prostate cancer. Recognized risks of prostate biopsy include pain, bleeding, fever, and dysuria; however, there is limited awareness regarding the potential for needle-track seeding of prostate cancer into the rectal wall due to the biopsy needle.[2] To date, only 42 case reports have documented tumor dissemination following needle biopsy of the prostate, including our current case. Of these, 75% involved tumor dissemination under the skin of the perineum, typically associated with transperineal biopsy.[1,3] Consequently, including our case, only 10 incidents involving needle-track seeding of prostate cancer to the rectal wall following a transrectal biopsy have been reported.

Previous studies have identified factors such as tumor size, grade of malignant potential, the type of biopsy needle, and the biopsy technique as potential risk factors for tumor dissemination following prostate needle biopsy.[4] None of these risk factors applied to the current case; however, a notable distinction from previous reports is the histopathological identification of mucinous prostate cancer.

Mucinous prostate cancer is a relatively rare histological subtype, representing approximately 0.04% to 0.20% of all prostate cancers.[5] While some studies suggest that mucinous prostate cancer has a prognosis similar to that of typical prostate cancer,[5–7] no prior reports have documented needle-track seeding of this subtype to the rectal wall following a biopsy. Given the nature of mucinous prostate cancer, in which the cancer cells are embedded in a mucin lake, it is conceivable that the risk of dissemination through biopsy could be higher than that for conventional adenocarcinoma.

To our knowledge, this is the first reported case of mucinous prostate cancer recurrence due to rectal wall seeding from a previous transrectal prostate biopsy. Typically, cases of tumor dissemination from prostate needle biopsies are managed with radiation therapy or surgical removal.[1] In this case, we opted for surgical resection of the rectal tumor, which was successfully removed without complications, achieving negative resection margins and no lymph node metastasis. The early detection and treatment of this needle-track disseminated lesion significantly contributed to the patient's favorable prognosis.

Conclusion

Prostate biopsy is crucial for diagnosing prostate cancer, although it carries a small risk of cancer dissemination. In cases of biochemical recurrence following radical prostatectomy, additional intrarectal screenings, such as digital rectal examinations or pelvic MRI, should be considered to rule out needle-track seeding of prostate cancer into the rectal wall.

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Author contributions

Tomoaki Hakariya: Conceptualization; methodology; software; data curation; formal analysis; validation; visualization; project administration; resources; investigation; writing – original draft. Kazune Teshima: Writing – review and editing. Daiyu Aoki: Writing – review and editing. Naoki Nishimura: Writing – review and editing. Tetsuro Tominaga: Writing – review and editing. Takashi Nonaka: Writing – review and editing. Shunsuke Sato: Writing – review and editing. Nozomi Ueki: Writing – review and editing. Masahiro Nakashima: Writing – review and editing; supervision. Ryoichi Imamura: Supervision; writing – review and editing.

Conflict of interest

The authors declare no conflict of interest.

Approval of the research protocol by an Institutional Reviewer Board

This case report was approved by the Ethics Committee for the Japan Community Health Care Organization, Isahaya General Hospital (Ethics No. 73).

Informed consent

Written informed consent was obtained from the patient.

Registry and Registration No. of the study/trial

Not applicable.

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