

Case Report

MRI Finding of Prostatic Ductal Adenocarcinoma

Kazuhiro Kitajima^a Shingo Yamamoto^b Takashi Yamasaki^c
Takako Kihara^c Yusuke Kawanaka^a Hisashi Komoto^a Neinei Kimura^c
Seiichi Hirota^c Koichiro Yamakado^a

^aDepartment of Radiology, Hyogo College of Medicine, Hyogo, Japan; ^bDepartment of Urology, Hyogo College of Medicine, Hyogo, Japan; ^cDepartment of Surgical Pathology, Hyogo College of Medicine, Hyogo, Japan

Keywords

Prostate cancer · Ductal adenocarcinoma · Magnetic resonance imaging

Abstract

Ductal adenocarcinoma is a variant of prostatic adenocarcinoma, originating from the epithelial lining of the primary and secondary ducts of the prostate. We report a 63-year-old male with prostatic ductal adenocarcinoma, presenting as urinary retention and a prostate-specific antigen (PSA) level of 11.71 ng/mL and biopsy-proven prostate cancer (Gleason score 3 + 3). MRI showed 2 hemorrhagic, multilocular cysts projecting into the bladder side from the prostatic inner gland and between the prostate and the right seminal vesicle. The prostate inner gland showed high signal intensity on the T2-weighted image and included tiny hyperintense spots on the fat-suppression T1-weighted image. In the part of the border of the hemorrhagic, multilocular cyst, a solid portion showing slight low intensity on T1-weighted imaging and markedly restricted diffusion was observed, suggesting prostate cancer. He underwent total prostatectomy, and ductal adenocarcinoma (Gleason score 4 + 4) in the prostate inner gland and multilocular cysts was pathologically diagnosed. After the operation, his PSA level gradually increased, and MRI 8 months after the operation showed a vesical multilocular cyst, suggesting local recurrence. After he underwent radiation therapy and hormonal therapy, PSA level decreased, and no re-recurrence was observed during 8 years. We suggest its inclusion in the differential diagnosis of cases of prostatic ductal adenocarcinoma's multiloculated cystic formation around the prostate and the bladder.

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Introduction

Ductal adenocarcinoma is the most common of the variants of prostatic adenocarcinoma, originating from the epithelial lining of the primary and secondary ducts of the prostate, with unique clinical and pathologic features. Pure ductal adenocarcinoma accounts for 0.4–0.8% of all prostate cancers, whereas mixed acinar and ductal adenocarcinoma accounts for 5% of all prostate cancers [1, 2]. Its presentation could be an exophytic endourethral lesion, and most of it tended to present as a papillary growth pattern that developed into a large cyst [3, 4]. We discuss magnetic resonance imaging (MRI) features of prostatic ductal adenocarcinoma.

Case Presentation

A 63-year-old man with a complaint of urinary retention visited a hospital, and a cystic mass around the prostate and bladder was detected on ultrasonography. For careful investigation and treatment, he was introduced to our hospital. His serum prostate-specific antigen (PSA) level was 11.71 ng/mL, and the biopsy proved prostate cancer (Gleason score 3 + 3).

Pelvic MRI demonstrated a hemorrhagic, 30 × 40 × 33 mm in size, multilocular cyst projecting into the bladder side from the prostatic inner gland, showing high signal intensity on the fat-suppression T1-weighted image and high signal intensity with shading on T2-weighted imaging (Fig. 1). Likewise, MRI demonstrated a hemorrhagic, 22 × 22 × 20 mm in size, multilocular cyst between the prostate and the right seminal vesicle, showing high signal intensity on the fat-suppression T1-weighted image and high signal intensity on T2-weighted imaging. The prostate inner gland showed high signal intensity on the T2-weighted image and included tiny hyperintense spots on the fat-suppression T1-weighted image. In the part of the border of the hemorrhagic, multilocular cysts, a solid portion showing slight low intensity on T1-weighted imaging and markedly restricted diffusion (low signal intensity on apparent diffusion coefficient and high signal intensity on diffusion coefficient imaging [DWI]) was observed, suggesting prostate cancer.

He underwent total prostatectomy. A pathologic examination revealed malignant cells (Gleason score 4 + 4) in the prostate inner gland and inner of the multilocular cysts (Fig. 2). The hematoxylin and eosin-stained slide demonstrated features of prostate ductal adenocarcinoma with cells with enlarged and hyperchromatic nuclei arranged in a papillary and glandular configuration, lined by variable stratified columnar epithelium.

After the operation, his PSA level gradually increased, and the pelvic MRI 8 months after the operation showed a 14 × 20 × 18 mm, vesical multilocular cyst (Fig. 3). Local recurrence was diagnosed. After he underwent radiation therapy and hormonal therapy, PSA level decreased, and no re-recurrence was observed during 8 years.

Discussion

Ductal adenocarcinoma of the prostate is a rare entity of prostate cancer, forming friable gray-white papillary or polypoid outgrowths that are visible cystoscopically [2]. It consists of papillary fronds with tumor cells lining fibrovascular stalks or cribriform masses with epithelial sheets of cancer cells punctuated by multiple lumens or trabecular spaces, resembling uterine endometrioid carcinoma histologically but subsequently proving to be exclusively of prostatic origin immunohistochemically. Patients with prostatic ductal adenocar-

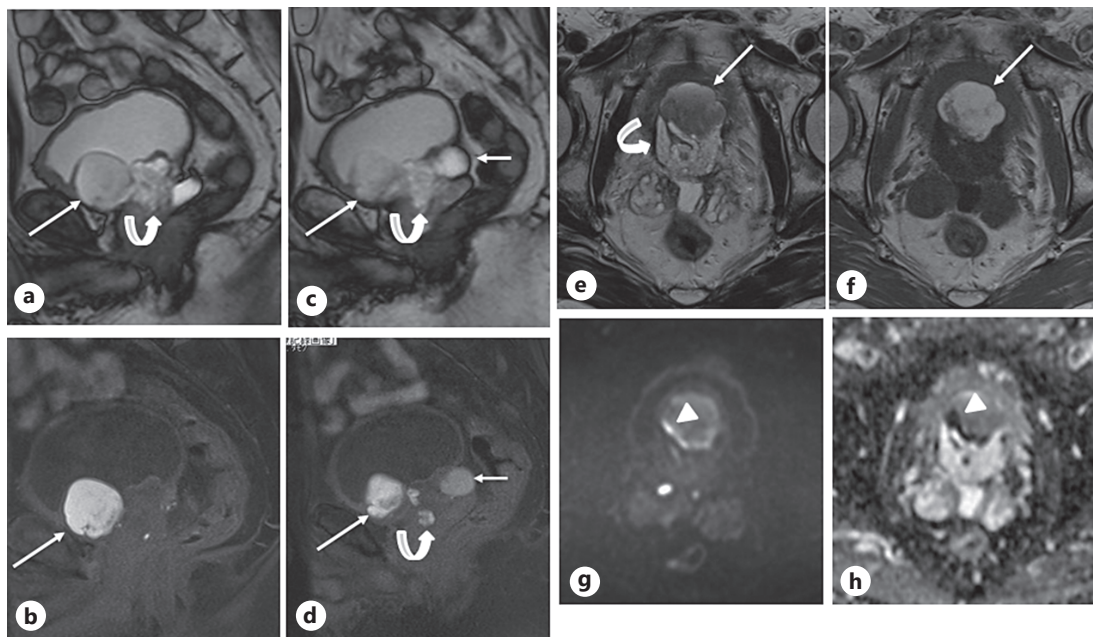


Fig. 1. Pelvic MRI finding. MRI demonstrated a hemorrhagic, 30 × 40 × 33 mm in size, multilocular cyst (long arrow) projecting into the bladder side from the prostatic inner gland, showing high signal intensity with shading on (a, c) T2-weighted imaging and high signal intensity on (b, d) the fat-suppression T1-weighted image. Likewise, MRI demonstrated a hemorrhagic, 22 × 22 × 20 mm in size, multilocular cyst (short arrow) between the prostate and the right seminal vesicle, showing high signal intensity on (c) T2-weighted imaging and high signal intensity on (d) the fat-suppression T1-weighted image. The prostate inner gland (curved arrow) showed high signal intensity on (a, c, e) the T2-weighted image and included tiny hyperintense spots on (b, d) the fat-suppression T1-weighted image. In the part of the border of the hemorrhagic, multilocular cyst projecting into the bladder side from the prostatic inner gland, a solid portion showing slight low intensity on (f) T1-weighted imaging and markedly restricted diffusion (high signal intensity on g diffusion coefficient imaging [DWI] and low signal intensity on h ADC) (triangle) was observed, suggesting prostate cancer. ADC, apparent diffusion coefficient.

cinoma have significantly more aggressive disease and worse prognosis when compared to patients with conventional acinar adenocarcinoma [1, 5]. Prostatic ductal adenocarcinoma has been shown to secrete less PSA than acinar adenocarcinoma, which may lead to delays in detection [5].

There have been little reports demonstrating the MRI features of prostatic ductal adenocarcinoma. Two groups [3, 4] have demonstrated the multiloculated cystic formation around the prostate and the bladder, similar to our series. Prostate cancer with cystic formation is classified into 2 groups [3]. One possibility is a primary cyst associated with cancer, and the other is a secondary cyst due to intracancerous tissue hemorrhage or central necrosis of the cancer tissue. Most of the previously reported cases of acinar adenocarcinoma associated with a prostatic cyst belonged to the latter pattern. In the initial stages, ductal adenocarcinoma presents as a cystic growth pattern, which was suggested to be due to occlusion of the prostatic duct and induction of cystic dilation because of its distinctive site of growth. Most of those ductal adenocarcinoma cases tended to present as a papillary growth pattern that developed into a large cyst, which is termed “papillary cystadenocarcinoma of the prostate.” De Gobbi et al. [4] demonstrated that the differential diagnosis should therefore take into consideration giant multilocular prostatic cystadenoma, adenoid

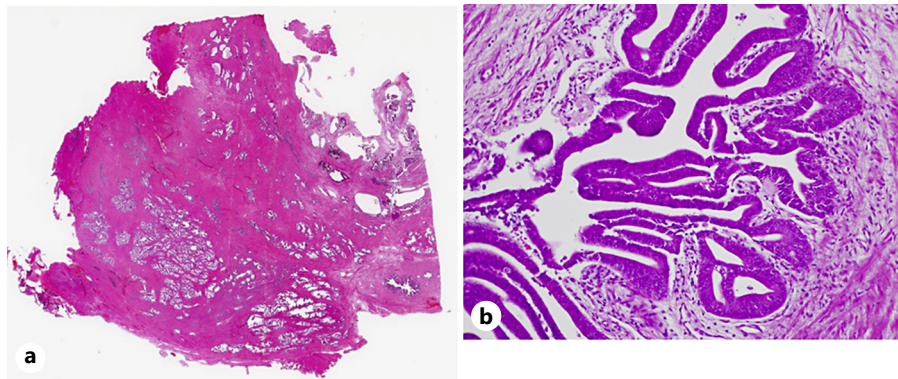


Fig. 2. Pathological finding. **a** A pathologic examination (loupe statue) revealed malignant cells (Gleason score 4 + 4) in the prostate inner gland and inner of the multilocular cysts. **b** The H&E-stained slide demonstrated features of prostate ductal adenocarcinoma with cells with enlarged and hyperchromatic nuclei arranged in a papillary and glandular configuration, lined by variable stratified columnar epithelium. H&E, hematoxylin and eosin.

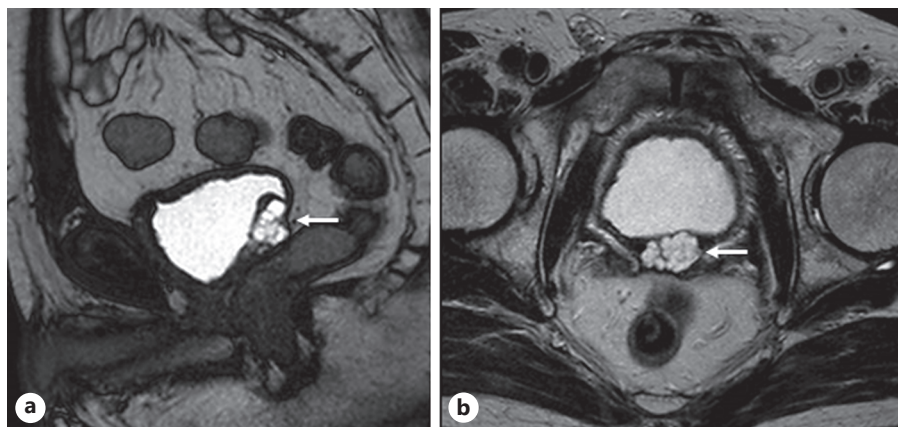


Fig. 3. Postoperative MRI finding. **a** Sagittal and **b** axial MRI 8 months after the operation showed a 14 × 20 × 18 mm vesical multilocular cyst (arrow), suggesting local recurrence.

cystic adenoma and cystadenocarcinoma of the prostate, seminal vesicle cysts or cystic tumor, sarcoma, cystic teratoma, cystic lymphangioma, cystic mullerian duct abnormality, cystic peritoneal mesothelioma, mesenteric cyst, Tarlov cyst, enteric abscess, and echinococcosis. Other groups have a noncystic pattern on MRI [6, 7]. Li et al. [6] reported a hyperintense encapsulated mass on T2-weighted imaging with markedly restricted diffusion on DWI. Schieda et al. [7] demonstrated that most prostatic ductal adenocarcinoma showed increased T2 signal intensity, closely resembling low-grade Gleason score 3 + 3 = 6 tumor on T2-weighted MRI.

Conclusion

Prostatic ductal adenocarcinoma shows 2 types of MRI findings: (1) multiloculated cystic formation around the prostate and the bladder and (2) noncystic pattern with increased T2 signal intensity and markedly restricted diffusion on DWI.

Statement of Ethics

This report complies with the guidelines for human studies and includes evidence that the research was conducted ethically in accordance with the World Medical Association Declaration of Helsinki. The authors have no ethical conflicts to disclose. Written informed consent was obtained from the patient for publication of this case report and any accompanying images. The study is exempt from ethics committee approval because the Institutional Review Board of the Hyogo College of Medicine admits case reports without ethics committee approval.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

K.K., S.Y., and T.Y. were involved in concept and design; S.Y., T.Y., T.K., Y.K., H.K., N.K., and S.H. were involved in acquisition of data; K.K. was involved in drafting of the manuscript; S.Y. and K.Y. were involved in critical revision of the manuscript for important intellectual content. All authors approved the final version of the manuscript.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further enquiries can be directed to the corresponding author.

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