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Case Report

CT-guided transperineal biopsy for prostate cancer in the absence of rectal access ☆

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ABSTRACT

This case report presents CT-guided transperineal biopsy as an alternative method for diagnosis of prostate cancer in a patient with anorectal stenosis. A 69-year-old male had a history of anorectal surgeries. Conventional transrectal biopsy was unfeasible due to anorectal stenosis. The CT-guided transperineal biopsy was successfully performed using a cranio-caudal puncture technique, revealing adenocarcinoma. After the biopsy, the patient received appropriate hormone therapy and radiation therapy. This case report highlights the feasibility and safety of CT-guided transperineal biopsy for the patients with anorectal complications.

Introduction

Prostate cancer is the second most common cancer in men [1]. Prostate cancer screening options include serum prostate specific antigen (PSA). When screening shows elevated PSA, US-guided transrectal biopsy is the standard method of needle biopsy for diagnosing prostate cancer [2]. In patients who have undergone anorectal resection or anorectal stenosis, however, there is concern regarding insertion of a needle via the transrectal approach and these patients require an alternative biopsy procedure [3–6]. In the past decade, alternative procedures that have been developed US- or MR-guided transperineal biopsy, and CT-guided transgluteal biopsy [2–4,7]. This case report describes the first use of CT-guided transperineal biopsy for detecting prostate cancer in a patient with anorectal stenosis, similar to the previously reported US-guided and MR-guided transperineal approaches [2,5–7]. The requirement of institutional ethics approval was waived for reporting this case.

☆ Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Case report

A 69-year-old man had undergone rectal and ileocecal resection for rectal cancer and cecal cancer 16 and 4 years ago, respectively. A permanent stoma was created after the rectal resection. During routine check-up, elevated PSA level (5.65 ng/mL) was noted 3 months before needle biopsy for prostate cancer. MRI of the prostate revealed a 4-mm nodule of high signal intensity on diffusion-weighted imaging, and a nodule of low signal intensity on T2-weighted imaging in the right peripheral zone at the 8 o'clock position before CT-guided biopsy (Fig. 1). The patient was not routinely taking anticoagulants, antiplatelets, or anticancer drugs. Due to the previous anorectal stenosis, transrectal access was not feasible for needle biopsy. The nodule could not be detected from any direction by US. As the transgluteal approach has the risk of inferior gluteal artery puncture and sciatic nerve injury [3,4], targeted biopsy was planned under CT guidance via the transperineal approach.

The patient was positioned on the CT table in the lithotomy position. After marking the entry site on the right perineum, the skin was cleaned and draped. Local anesthetic of 1% lidocaine and systemic fentanyl were administered to reduce pain during needle puncture. Under CT guidance, needle puncture was performed using the cranio-caudal puncture technique [8,9], in which the needle is inserted at a right angle to the transaxial plane of CT; i.e., in the cranio-caudal direction. Under CT guidance, a 17-gauge coaxial needle was advanced to the predetermined target corresponding to that on the MR images (Fig. 2). During this procedure, the position of the needle tip was confirmed by axial CT images and their sagittal reconstructions (Fig. 3). After confirmation of the appropriate location of the coaxial needle, the inner needle was exchanged for an 18-gauge spring-loaded biopsy needle (Bard Mission, Bard Medical, Covington, GA, USA) and core biopsy was performed, as previously reported [6]. The tip of the needle was then moved slightly in different directions and a further 6 specimens were obtained, for a final total of 7. The patient had momentary pain during the core biopsies, after which the pain resolved quickly. Total dose length product and effective dose were 687 mGy × cm and 10.3 mSv, respectively, for the 11 scans obtained during the biopsy procedure. Dose length product and effective dose under CT-fluoroscopy for the image obtained in the first needle puncture were 76.6 mGy × cm and 1.15 mSv, respectively. Total operation time was 93 minutes. No complications or adverse events occurred during or after the procedure. No analgesic agents were required after the procedure.

Of the 7 specimens, a pathological diagnosis of adenocarcinoma was confirmed in 1. The Gleason score was 4+5 = 9. A Gleason score of 9–10 indicates particularly aggressive disease [10]. Following diagnosis, the patient received hormone therapy followed by radiation therapy.

Discussion

US-guided transrectal biopsy is currently the most accepted method for establishing a definite diagnosis of prostate cancer in patients with high PSA values. However, transrectal biopsy is unavailable to men who have undergone anorectal resection for malignancy, or with inflammatory bowel disease causing anorectal stenosis or stricture. A previous report has explored the utility of US- or MRI-guided transperineal biopsy in this patient population [2,5–7].

In transrectal biopsy, the needle passes through the rectum and anus, and infection is a common complication [3,11]. Rates of bacteriuria and bacteremia are reported to be higher after transrectal biopsy without prophylactic antibiotics compared to when they are used [12]. In contrast, after transperineal biopsy, a systematic review demonstrated no significant difference in infection rates between patients with and without use of prophylactic antibiotics [5]. A recent randomized trial that included 567 participants demonstrated that there was marginally significant difference between infection rates of 0% (0/287) after transperineal biopsy without prophylactic antibiotics and 1.4% (4/280) after that with prophylactic antibiotics ($P = .059$) [13]. As infection is avoided by using the transperineal approach, we did not use preprocedural prophylactic antibiotics in the present patient.

Transrectal biopsy has also some disadvantages due to access through the rectum. Apical and anterior tissue of the prostate cannot be enough obtained by transrectal puncture with US-guided transrectal biopsy [14], and transrectal biopsy can damage the rectal artery [5]. Transperineal biopsy is more painful than transrectal biopsy, and it is considered

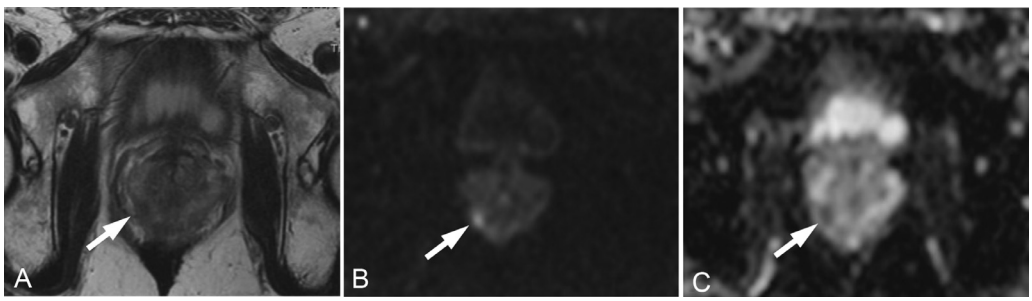

Fig. 1 – Prostate MRI. (A) T2-weighted image depicts a nodule of low signal intensity in the right peripheral zone at the 8 o'clock position. (B) Diffusion-weighted image shows a nodule of high signal intensity corresponding to that seen in the T2-weighted image. (C) Apparent diffusion coefficient value map depicts an area of low signal corresponding to the nodules seen on the T2-weighted and diffusion-weighted images.

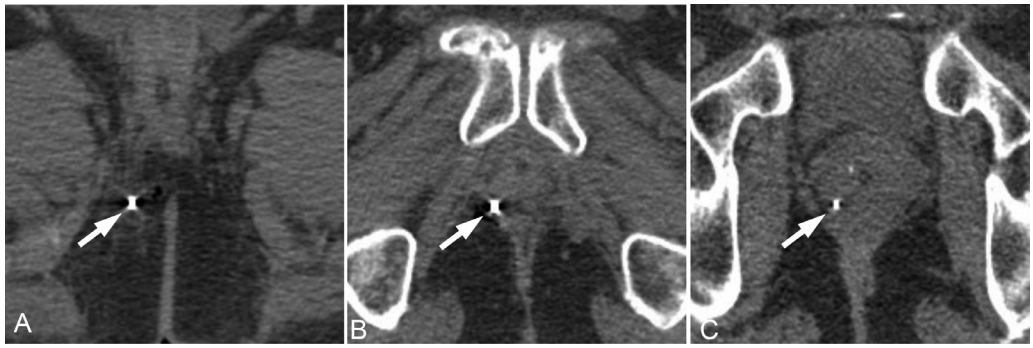

Fig. 2 – CT images obtained during the cranio-caudal puncture technique. The biopsy needle (white arrows) is inserted from the skin of the right perineum (A) via perineural fat (B) to the target lesion (C) in the right peripheral zone of the prostate at the 8 o'clock position, corresponding to the position in the MR images. The white arrowheads indicate a bladder catheter.

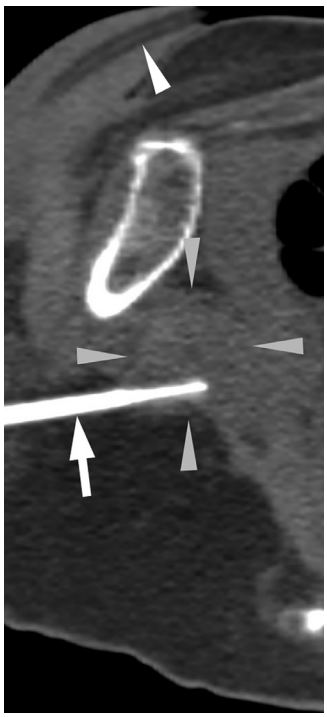

Fig. 3 – CT sagittal reconstruction image used to confirm the location of the needle tip (white arrow). The gray arrowheads outline the prostate gland, and the white arrowhead indicates a bladder catheter.

that systemic anesthesia is required for transperineal biopsy. However, a recent study reported that perineal nerve block was more effective than preprostatic block for transrectal biopsy [15]. A large-scale randomized study found a similar prostate cancer detection rate between MR-guided transperineal and transrectal biopsies (53% vs 50%) [13]. Accordingly, transperineal biopsy has been gaining in popularity for detection of prostate cancer in the past decade. Transperineal biopsy might cause nerve damage, bladder or rectal injury, and pudendal arterial bleeding. It is necessary to conduct a large-scale study in the future to assess complications due to transperineal biopsy.

CT-guided biopsy via a transgluteal approach was first performed in 1993 [16], with subsequent studies also using this approach [3,4]. However, there is no report of transperineal needle biopsy under CT guidance. In transperineal biopsy, the prostatic anatomy is clearly depicted in images obtained in 3 planes under CT guidance, which increases the safety of cranio-caudal puncture [8,9] and reduces the risk of injury to the bladder and tissue surrounding the prostate gland [3,4].

Radiation exposure associated with the use of CT guidance is a valid concern. The effective radiation dose in our case was 10.2 mSv, which is comparable to that from a typical abdominopelvic CT examination (range, 8-14 mSv) [3,4]. However, radiation exposure should be additionally reduced in a future biopsy.

This case report has some limitations. The accuracy of diagnosis and occurrence of complications have not been clarified for CT-guided transperineal biopsy for diagnosing prostate cancer. Large-scale study would be required in near future to prove the validity of this technique of CT-guided transperineal biopsy for diagnosing prostate cancer. Additionally, a comparison study would be needed between conventional techniques and our new technique.

Conclusion

In conclusion, CT-guided transperineal biopsy would be an alternative technique for diagnosing prostate cancer in patients with anorectal stenosis, where conventional transrectal biopsy is not feasible.

Patient consent

Written informed consent was obtained from the patient.

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