Hematoma in Retzius' space following US-guided prostate biopsy: evidence of the diagnostic accuracy using transrectal end-fire probe in the anterior prostate gland

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Abstract We report a rare case of hematoma in Retzius' space in a 62-year-old man who underwent transrectal prostate biopsy using an endocavitary, end-fire, convex probe. Clinical symptoms resolved spontaneously after catheter placement and appropriate antibiotic therapy. Transrectal ultrasound 1 month later showed partial resolution of the hematoma. Based on the analysis of this unusual complication, we demonstrate the effectiveness of transrectal biopsy as compared to transperineal biopsy in detecting cancer of the anterior prostate. We have also analyzed the various factors that may be the reason why core biopsy harvested in this "hidden" area may be inadequate.

Keywords Hematoma · Retzius' space · Transrectal prostate biopsy · Anterior prostate gland · Ultrasound

Riassunto Noi abbiamo riportato un raro caso di ematoma dello scavo del Retzius in un uomo di 62 anni sottoposto a biopsia prostatica transrettale ecoguidata con utilizzo di sonda convex "end-fire". Il quadro clinico si è risolto spontaneamente dopo posizionamento di foley ed adeguata terapia antibiotica. Dopo un mese all'ecografia prostatica transrettale si repertava parziale risoluzione dell'ematoma. Dall'analisi di questa insolita complicanza abbiamo cercato di dimostrare l'efficacia della tecnica biotica transrettale rispetto all'approccio transperineale nel tasso di rilevamento del carcinoma prostatico nella porzione anteriore della ghiandola ed abbiamo anche preso in esame i vari fattori che possono esser motivo in questa

zona anatomica "nascosta" di un campionamento biotico non adeguato.

Introduction

Prostate cancer (PC) is the most common malignancy among European and North American men, and the incidence is still rising [1]. Transrectal ultrasound-guided prostate biopsy (TPB) is the gold standard for the diagnosis of PC. TPB has thus become essential in the diagnostic investigation of patients with clinical suspicion of PC due to abnormal digital rectal examination (DRE) or due to increased or increasing prostate-specific antigen (PSA) levels [2].

Over the past decade, several saturation prostate biopsy schemes and extended schemes showing improved PC detection sensitivity have been introduced; however, the optimal number of cores and biopsy sites are still being debated [3, 4].

In recent years, many studies have reported a trend towards an increasing number of dominant anterior prostatic tumors [5, 6]. A significant percentage of these malignancies are located in the transition zone (TZ). They are typically more difficult to detect via DRE and they are poorly visualized on imaging, and many lesions furthermore require more than one biopsy session to establish a diagnosis [6, 7]. An adequate needle biopsy technique that permits anterior zone sampling of the prostate is therefore required. We report on an unusual case of acute periprostatic bleeding and hematoma formation in Retzius' space subsequent to TPB. With the presentation of this case report, we want to emphasize that TPB using an endocavitary, end-fire, convex probe is accurate in mapping the anterior prostate gland, as the biopsy needle reaches Retzius' space.

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Case report

A 62-year-old man was referred to the Department of Urology with a history of dysuria, supra-pubic pain and urinary frequency associated with a stinging sensation and pain during urination. The patient had been taking alpha-blocker for approx. 3 years. His medical history included gastroesophageal reflux and arterial hypertension. On physical examination, oral temperature was 36.0 °C (96.8 °F), blood pressure 135/90 mmHg, heart rate 88 beats/min and pulse oximetry 98 % on room air. Blood test outcome was within normal range: hemoglobin 13.5 g/dl, serum PSA level 8.2 ng/ml and free/total PSA 18 %. Prostate volume was 64 ml. Outcome of DRE and ultrasound (US) examination was normal. Urine culture yielded no growth. Cell count in the urine performed by flow cytometry revealed: white blood cells 8/uL, red blood cells 185/uL and normal epithelial cells. The patient had undergone one previous biopsy at our department: a 16-core biopsy including the TZ (TPB) using an endocavitary end-fire probe. Histological analysis revealed high-grade prostatic intraepithelial neoplasia in one core.

The patient underwent saturation biopsy 6 months after the first biopsy. Prostate saturation biopsy was performed using a Logic 7 GE using a 9–4 MHz convex end-fire probe; 22 cores were harvested using an 18-gauge automatic needle. The procedure was performed under local anesthesia using lidocaine spray (10 g/100 ml) 2 min before the procedure [7].

The patient was administered ciprofloxacin 1,000 mg 1 day before and for 4 days after TPB.

Biopsy cores were harvested in the following locations: 12 samples in the peripheral zone (4 apex, 4 mid, 4 base); 6 samples in the TZ and 4 samples in the anterior portion of the gland.

Due to progressive voiding difficulty, the patient was catheterized about 7 days after TPB. A Foley catheter 18 F was easily inserted and drainage amounted to about 350 ml of normochromic urine. Transrectal ultrasound (TRUS) showed a hypoechoic area containing inhomogeneous material representing a large hematoma between the prostate and symphysis pubis (in Retzius' space). The fluid collection had ill-defined borders and the size was calculated according to the formula: $D1 \times D2 \times D3$, where D1 is the transverse (4.8 cm), D2 the anteroposterior (2.8 cm) and D3 the cephalocaudal dimension (2.5 cm). (Figs. 1, 2).

As blood values were within normal range and the hematoma was well circumscribed, follow-up was planned. The symptoms resolved spontaneously with catheter insertion, removed after 4 days, and appropriate antibiotic therapy (orally administered co-amoxiclav, 1 g three times a day for 3 days).

Fig. 1 Transrectal sonography shows hematoma in Retzius' space as a large inhomogeneous fluid collection surrounded by a hypoechoic halo

Fig. 2 Longitudinal power Doppler image shows a hematoma between the prostate (star) and perilesional hypervascularity

Prostate TRUS 1 month later showed partial resolution of the hematoma. Our patient underwent regular follow-up for 3 months, but presented no further lower urinary tract symptoms. Histological analysis of the prostatic biopsy showed benign prostatic hyperplasia.

Discussion

Transrectal ultrasound-guided prostate biopsy is generally well tolerated, and the major complication rate reported in the literature is <2 %. However, minor complications are frequent, occurring in up to 60–79 % of cases. Minor complications include infection, bleeding and pain. Of these, bleeding is the most common complication and manifestation is usually hematuria, hematochezia and hemospermia [8].

To our knowledge, this paper reports the first case in the literature of hematoma in Retzius' space in a male. The

apex and anterior prostate gland is the most frequent location of PC, but prostate biopsy is plagued by high false-negative rates.

Numerous studies in the literature deal with this problem, the following are the most representative:

Orikasa et al. [9] investigated the utility of directing biopsy to the apical and anterior peripheral zone (AAPZ) of the prostate. The initial 12-core biopsies detected 50.8 % of cancers. Even though the increase of overall cancer detection in the apical anterior biopsies was modest, 5.2 % of cancers were detected only in AAPZ cores in the initial biopsy material. In repeat biopsy cores, 36 % of patients had cancer exclusively in the AAPZ cores, and the cancer detection rate in biopsy cores from this zone was significantly higher in repeat biopsy than in the initial biopsy cores.

Wright and Ellis [10] directed the biopsy more peripherally, approximately 3 mm below the capsule and demonstrated that this procedure makes inadvertent sampling of the TZ less likely. As a result, the AAPZ was found to be the most frequent site of unique cancer detection. When cores obtained in this way were included, the overall cancer detection rate reached 40.9 %.

Moussa et al. [11] showed that adding two cores taken from the extreme anterior apex to a standard 12-core biopsy achieved higher rates of cancer detection than ≤ 12 -core schemes, and that additional extreme anterior apical cores achieved the highest rate of unique cancer detection (i.e., in this core only) when all regions were considered.

The transperineal approach has so far been believed to be the best way of harvesting samples from the anterior prostate. Some authors have recently proposed a combination of TRUS and transperineal biopsy [12, 13], but this technique has some disadvantages and elevated costs. Anterior TPB was performed (under US guidance, longitudinal view) by pushing the needle into the prostate close to the anterior zone. The needle firing was activated to obtain samples from all tissues up to Santorini's venous plexus, including part of the anterior fibromuscular stroma.

Conclusion

Taking as clinical evidence the hematoma in Retzius' space, this case emphasizes that the TPB method using an end-fire probe is the most appropriate technique for performing biopsy in the anterior area of the gland. The end-fire probe permits biopsy cores to be taken more transversely (oriented along an anterior–posterior axis) and has a more oblique-angled trajectory, thereby allowing direct anterior sampling. End-fire probes permit more flexibility in maneuvering the biopsy direction than side-fire probes,

and the needle can pass more directly into the anterior portion of the prostate.

Based on our experience we can say that the TPB technique using end-fire probe can be used in all cases of repeat biopsy or transperineal saturation biopsy, as TPB provides biopsy schemes with higher PC detection rates as well as good patient tolerability and satisfaction.

Conflict of interest Lucio Dell'Atti declares that he has no conflict of interest related to this paper.

Informed consent All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. The patient provided written informed consent to enrolment in the study and to the inclusion in this article of information that could potentially lead to his identification.

Human & animal studies This article does not contain any studies involving animal subjects performed by the author.

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