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ORIGINAL ARTICLE

Value of ultrasound elastography versus transrectal prostatic biopsy in prostatic cancer detection

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KEYWORDS

Prostatic cancer;
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Abstract *Objective:* To detect the impact of ultrasound elastography in diagnosis of prostatic cancer, and to evaluate its capability in differentiating benign from malignant lesions.
Materials and methods: Fifty patients with different prostatic lesions suspicious for malignancy were included. All patients had a conventional B-mode ultrasound examination and color Doppler imaging, and then real time ultrasound elastography was performed in the same session. Finally, the results were compared to the histo-pathological results of those lesions.
Results: The addition of Strain ratio parameter for evaluating the elastography images showed the highest sensitivity of 74.2%, specificity of 73.7% and accuracy of 74.0% at a best cutoff point of 5.5 between benign and malignant lesions.
Conclusion: Based on our results, prostate US combined with elastography can be a helpful tool for finding malignant lesions. Also it can help in targeting the biopsy site.

1. Introduction

Prostate cancer is the 2nd most common cancer worldwide for males, and the 5th most common cancer overall (1). Because there is no effective way of detecting prostate cancer with current imaging techniques, systematic ultrasound-guided biopsy is used to detect prostate cancer in patients with elevated prostate specific antigen (PSA) levels. However, sampling errors are common, and many patients have to repeat biopsies before cancer is detected (2). Ultrasound elastography was developed in the early nineties as an alternative ultrasonographic technique able to visualize tissue stiffness (3). Prostate carcinoma is significantly stiffer than normal prostate tissue. Using sonoelastography to target biopsy sites has the potential to allow prostate cancer detection with fewer biopsy cores than systematic biopsy (4). The principle of elastography is that tissue compression produces strain (displacement) within the tissue and that the strain is smaller in harder tissue than in softer

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tissue. Therefore, by measuring the tissue strain induced by compression, we can estimate tissue hardness (5). In order to assess the Elastographic appearance of the prostate, Kamoi et al. proposed a subjective scoring system that takes into account both the grayscale appearance and the stiffness displayed by elastography. The key point in this scale is represented by the relationship between a hypoechoic lesion and a stiff prostatic area. Lesions scaled 3 and above are highly suggestive of malignancy (6). Strain ratio measurement is obtained by dividing the mean strain within the normal prostatic tissue by the mean strain from the lesion (7).

2. Patients and methods

2.1. Study population

2.1.1. Inclusion criteria

- The study was prospectively carried on 50 male patients with prostatic lesions (between June 2013 and February 2015). Male patients with abnormal digital rectal examination of the prostate and/ or value of PSA > 4 ng/ml were included in the study after obtaining informed consent. The study is IBR approved.

2.1.2. Exclusion criteria

- Patients with anal complications or rectal mass.
- Patients subjected to prostatic adenomectomy (TURP or open adenomectomy).
- Patients refusing the examination.
- Patients with bleeding tendency.

2.2. Equipment

- The study was performed on a digital ultrasound scanner (EUB-7500; Hitachi medical, Tokyo, Japan) with real time tissue elastography unit EZU-TE3, by placing a high frequency (7.5 MHz) endorectal end-fire transducer in close proximity to the prostate.

2.3. Techniques

- First, prostatic lesions were evaluated by conventional B-mode ultrasound and color Doppler imaging. On the same session, real time US elastography examination was performed. The probe was applied to the prostate and was compressed and retracted at a fixed speed in a direction perpendicular to the diagnosis area. The probe was applied with light pressure and used the "press indicator", which is a column of numbers displayed on the side of the image that shows the current amount of compression with the probe, as a guide. Lesions were biopsied by using US guided interventional procedures by true cut needle biopsy (via 22-gauge spinal needle). Imaging findings were correlated with sextant prostate biopsies and targeted biopsies on suspicious areas.

3. Elastography analysis

- We chose a color map in which red and green indicate softer areas, while blue indicate harder areas. We set the Region of

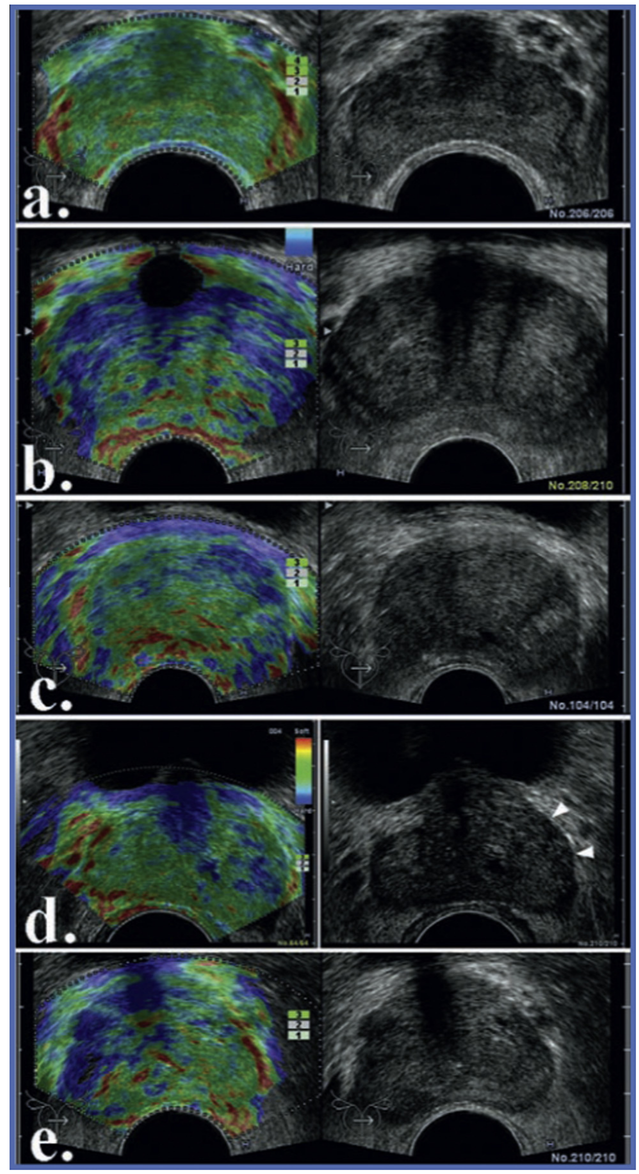

Fig. 1 Sonoelastographic scoring system proposed by Kamoi et al.: (a) score 1 – normal – homogeneous strain, the entire gland evenly shaded in green; (b) score 2 – probably normal – symmetric heterogeneous strain, the gland shows a symmetrical mosaic pattern of green and blue; (c) score 3 – indeterminate – focal asymmetric stiff lesion not related to hypoechoic area, the focal asymmetric lesion in blue, in the left lobe; (d) score 4 – probably carcinoma – hypoechoic lesion (bulging the contour of the left lobe, arrowheads) with stiffness in the center of the lesion and strain at the periphery; the peripheral part of lesion in green and the central part in blue; (e) score 5 – definitely carcinoma – stiffness in the entire hypoechoic lesion in the right lobe and in the surrounding area, the entire lesion in blue.