Transrectal Ultrasound-guided Systematic 13-Core Prostate Biopsy to Diagnose Prostate Carcinoma

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OBJECTIVE To evaluate the clinical value of transrectal ultrasound guided systematic 13-core prostate biopsy.

METHODS A total of 213 patients referred for abnormal digital rectal examination and/or with a prostate specific antigen of 4 ng/ml or greater underwent transrectal ultrasound guided systematic 13-core prostate biopsy. This procedure was conducted in addition to the standard sextant biopsies in which cores were taken from the far lateral and middle regions of the gland as described by Eskew. Pathological findings of the additional regions were compared with those of the sextant regions.

RESULTS Of the 213 patients 31% had cancer on biopsy (66/213). Of the 66 patients with prostate cancer 14 (21%) had carcinoma only in the additional regions, which would have remained undetected had the sextant biopsy technique been used alone ($P<0.05$). No severe complications occurred among the patients who underwent transrectal ultrasound guided systematic 13-core prostate biopsy.

CONCLUSION Our data demonstrated that transrectal ultrasound guided systematic 13-core prostate biopsy can significantly increase the cancer detection rate. It is safe and efficacious, and should be recommended for use clinically.

KEYWORS: prostate, prostatic neoplasms, biopsy, diagnosis.

Transrectal ultrasound (TRUS)-guided sextant biopsy of the prostate has been increasingly applied to diagnose prostate cancer in recent years. However, concern has arisen that the standard method may not include an adequate sampling of the prostate.[1-3] Recently many investigations have shown more extensive systematic sampling of the lateral aspects of the peripheral zone to increase cancer detection rates.[4,5] We have used a technique of prostate biopsy as described by Eskew et al.[4] to diagnose prostate cancer, which we call 13-core prostate biopsy. In this prospective study we determined if the 13-core prostate biopsy significantly increased the chances of finding carcinoma of the prostate compared to the standard sextant biopsy technique.

MATERIALS AND METHODS

Indications for biopsy included an abnormal prostate on digital rectal examination and/or an elevated prostate specific antigen (PSA, of more than 4 ng/ml). Patients with bleeding diathesis and those receiving anticoagulation therapy or suspected of having a urinary tract infection were excluded from the study. Informed consent was obtained from each patient after a detailed description of the study was provided. From August 2000 to December 2004, 213 consecutive men with

a mean age of 70 years (range 48~87) underwent transrectal ultrasound 13-core biopsy of the prostate. Of the 213 patients 77 had an abnormal digital rectal examination, 20 had a PSA of less than 4 ng/ml, 114 had a PSA greater than 10 ng/ml, 79 had a PSA of 4~10 ng/ml.

Patients received an enema and 500 mg of oral ciprofloxacin 2 h before biopsy. Antibiotic prophylaxis was continued with oral ciprofloxacin at 500 mg once a day for 2 days after biopsy. All the patients were examined in the left lateral decubitus position with a biplanar variable frequency (5.5~7.5 MHz) probe (Esaote Idea Company, USA). Biopsies were obtained transrectally using an 18 gauge biopsy needle (Bard Company, USA). The 13-core prostate biopsy technique includes taking sextant biopsies as described by Hodge et al.[6] In addition, 2 biopsies were obtained from each lateral aspect of the gland and 3 from the middle of the prostate (Fig.1).

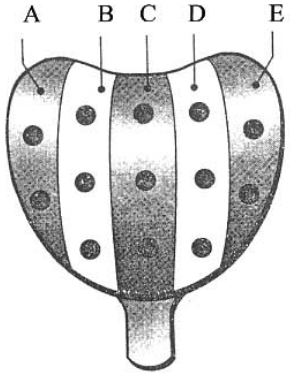

Fig.1. Posterior view of the prostate as seen through the rectal wall. A+B+C+D+E=13-core prostate biopsy; B+D=6 cores prostate biopsy

PSA were determined using the Abbott IMX assay. Statistical analysis comparing these zones was performed using the chi-square test given that the patients served as their own controls.

RESULTS

Of the 213 patients who underwent transrectal ultrasound guided 13-core prostate biopsy, 66 (31%) had prostate cancer. Of the cancer patients 28(42%) had an abnormal digital rectal examination, 6 (9%) had a PSA of less than 4 ng/ml, 40 (61%) had a PSA of greater than 10 ng/ml and 20 (30%) had a PSA of 4~10 ng/ml. Of the 66 patients with prostate cancer 14 (21%) had carcinoma only in regions A, C, E. These tumors would not have been detected if only the sextant biopsy technique had been used. This difference was statistically significant ($P<0.05$).

The complications of 213 patients included hematuria, 122 cases (57%), hematochezia 45 cases (21%) and hematospermia 12 cases (6%). There were no complications such as prostate abscesses, high fever (T>38℃) or septicemia in our investigation.

DISCUSSION

Transrectal ultrasound-guided sextant systematic prostate biopsy was first reported by Hodge et al.[6] in 1989. Currently this technique has been shown to outperform directed biopsies and has become the gold standard for diagnosing prostate cancer. Theoretical models indicate a direct correlation of diagnostic efficacy with prostate and /or tumor volume, and the number of biopsies that should be obtained.[7,8] However, this standard approach does not consider parameters such as tumour volume and multifocal distribution in the prostate. Reports have demonstrated that sextant biopsies may miss clinically detectable prostate cancer in 15% to 34% of the cases.[5]

Since studies have shown that the majority of prostate carcinomas arise from the peripheral zone, it seems logical that systematic biopsies should focus on better sampling of this zone. However, the standard protocal is not optimal for sampling of this area. In 1995, Stamey suggested moving standard sextant biopsies more laterally to better sample the anterior extension of the peripheral zone.[9] In 1997, Eskew et al.[4] reported on usage of transrectal ultrasound-guided 13-core systematic prostate biopsy to diagnose prostate cancer (Fig.1). Regions of biopsy included those of the standard sextant regimen between the lateral border and midline of the prostate on right and left sides (B and D) plus 2 biopsies from each lateral aspect of the prostate (A and E) and 3 from the midline at the apex, mid gland and base (C). The results demonstrated that the cancer-detection rate increased by 35% with this method compared to conventional sextant prostate biopsy($P<0.05$).[4] Our results were similar to those reported by Eskew et al.,[4] such that 21% (14/66) of the patients with prostate cancer may be missed if the patients undergo sextant prostate biopsy only. That is to say our data showed that the cancer-detection rate was increased by 21% with 13-core systematic prostate biopsy ($P<0.05$).

Reported complications of the transrectal ultrasound guided sextant prostate biopsy include hematuria, hematochezia and hematospermia. Serious complica-

tions such as prostate abscesses, high fever, septicemia were infrequent. Hammerer et al.[10] reported on 651 patients who underwent transrectal ultrasound guided sextant biopsy of the prostate. Complications included hematuria (14%), hematochezia (2%), hematospermia (6%) and infection (0.8%). The complications in our study included hematuria (57%), hematochezia (21%) and hematospermia (6%). There were no serious complications such as prostate abscesses or high fever septicemia in our series. Of our patients, 57% experienced gross hematuria after biopsy, which was self-limiting and no further surgical intervention was required to stop the bleeding. We believe that our high incidence of gross hematuria was due to obtaining biopsies in the middle region of the gland. Biopsies from this area risk penetration of the urethra by the biopsy needle and subsequent bleeding.

Our studies have found the 13-core prostate biopsy technique to be safe, efficacious and superior to sextant biopsies in diagnosing prostate cancer. This method should be recommended for use in clinics.

REFERENCES

1 Norberg M, Egevad L, Holmberg L, et al. The sextant protocol for ultrasound guided core biopsies of the prostate underestimates the presence of cancer. Urology. 1997; 50: 562–566.

2 Vashi AR, Wojno KJ, Gillespie B, et al. A model for the number of cores per prostate biopsy based on patient age and prostate volume. J Urol. 1998; 159:920–923.

3 Babaian RJ. Extended field prostate biopsy enhances cancer detetion. Urology. 2000; 55:453–456.

4 Eskew LA, Bare RL, McCullough DL. Systematic 5 region prostate biopsy is superior to sextant method for diagnosing carcinoma of the prostate. J Urol. 1997; 157:199–202.

5 Naughton CK, Miller DC, Mager DE, et al. A prospective randomized trial comparing 6 versus 12 prostate biopsy cores: impact on cancer detection. J Urol. 2000; 164:388–392.

6 Hodge KK, McNeal JE, Terris MK, et al. Random systematic versus directed ultrasound guided transrectal core biopsies of the prostate. J Urol. 1989; 142:71–74.

7 Karakiewicz PI, Bazinet M, Aprikian AG, et al. Outcome of sextant biopsy according to gland volume. Urology. 1997; 49:55–59.

8 Uzzo RG, Wei JT, Waldbaum RS, et al. The influence of prostate size on cancer detection. Urology. 1995; 46:831–836.

9 Stamey TA. Making the most out of six systematic sextant biopsies. Urology. 1995; 45:2–12.

10 Hammerer P, and Huland H. Systematic sextant biopsies in 651 patients referred for prostate evaluation. J Urol. 1994; 151:99–102.