

Trans-perineal Prostate Biopsy under Trans-rectal Ultrasound Guidance

Hui Xu¹, Nirmal Lamichhane²

¹Department of Urology, the Affiliated Hospital of Chengde Medical University, Chengde, PR China.

²Department of Surgical Oncology, B.P. Koirala Memorial Cancer Hospital, Bharatpur, Nepal.

ABSTRACT

Prostate cancer is the most common cancer in males in the western world and is an emerging malignancy in eastern world as well. It is less invasive and easily curable in early stages. It requires efficient and accurate diagnosis strategy to detect it early. To date, the standard diagnosis procedure involves a blind biopsy with a high rate of false negative results. Trans-perineal prostate biopsy is re-emerging after decades of being an underused alternative to trans-rectal biopsy guided by trans-rectal ultrasonography. In order to overcome these limitations, the paper proposes the method and advantages of trans-perineal prostate biopsy.

Keywords: Prostate cancer, transperineal, prostate biopsy, transrectal.

Introduction

Prostate cancer (PCa) is a significant health problem and a leading cause of death in men throughout the developed world.¹ PCa is the most common solid malignancy of western Europe and USA, with one out of six men being diagnosed during their lifetime.² Its mortality is second only to lung cancer.³ The early symptoms of PCa are not obvious, easy to be ignored, and may have been advanced in the later stage of the symptoms, distant metastasis and poor prognosis.⁴ Since it is a relatively low-grade malignancy, it can be effectively controlled or even clinically cured if it can be detected and treated early in time.

The elevated serum prostate-specific antigen(PSA) level measurement, abnormal digital rectal examination(DRE) finding and transrectal ultrasonography (TRUS), as widely opportunistic screening tools, have been widely used to diagnose patients at a high risk of PCa.⁵ The level of PSA in blood is often used to identify PCa, but it is not a definitive indicator as PSA level can also be affected by other factors such as inflammation and infection. At present, prostate biopsy is required for the specific diagnosis of PCa.⁶ By TRUS guidance, prostate biopsy had become a widely-accepted and routinely-performed technology to detect PCa.⁷ Prostate biopsy standards: 1. PSA > 10ng/ml. 2. PSA 4 ~ 10ng/ml,

and free PSA(fPSA)/total PSA(tPSA) ratio is less than 0.16 or PSA density(PSAD) > 0.15. 3. Hard nodules of the prostate detected by rectal examination (Figure 1). 4. Imaging examination (ultrasound, CT, MRI) detected abnormal prostate signal (Figure 2).⁸ Exclusion criteria: 1. History of PCa. 2. Local skin infection, severe infection, abnormal coagulation function or other diseases may not be accepted for the invasive examination. Only a few patients with hip arthropathy who are unable to maintain the translocation have to receive the trans-rectal (TR) prostate biopsy. In patients with severe anal disease or anal diversion, the method will be limited. A safe and accurate biopsy technique is essential for the management of PCa.⁹

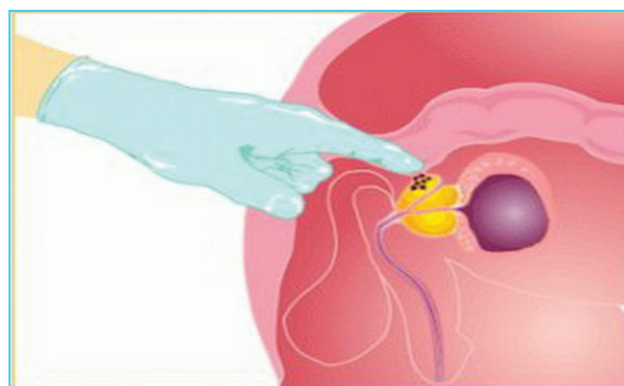


Figure 1: Hard nodules of the prostate detected by rectal examination.

Correspondence

Nirmal Lamichhane, Department of Surgical Oncology, B.P. Koirala Memorial Cancer Hospital, Bharatpur, Chitwan, Nepal, email: nlamichhane@hotmail.com

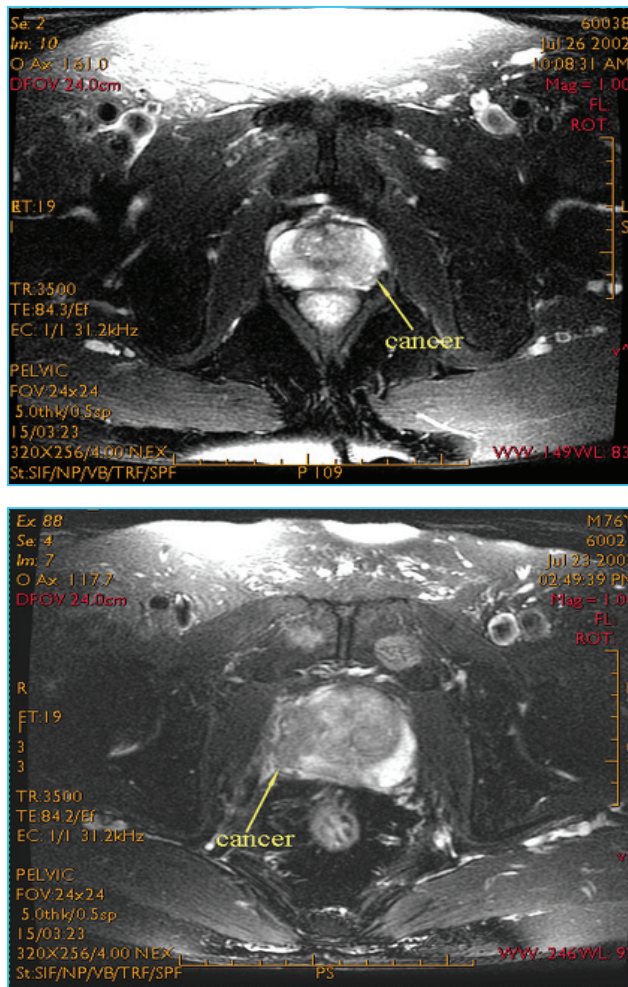


Figure 2: MRI- Tumor signal uneven, often on T1 Weighted as a low signal or equal signal.

Transperineal Prostate Biopsy Technique

It is reported that the trans-perineal (TP) prostate biopsy is more accurate, the positive rate is significantly higher than the rectal route (Figure 3). Because the biopsy needle is parallel to the rectum through the tip of the prostate, more prostate tissue samples can be obtained. And these parts are the major zones of the PCa. Ultrasound-guided TP prostate biopsy can biopsy the entire prostate under the guidance of ultrasound and biopsy the suspicious nodules as necessary. The direction of the needle in the TP prostate biopsy method is almost parallel to the direction of the urethra, which can reduce the probability of damage to the urethra. Preoperative preparation: patients with a history of anticoagulant medication such as aspirin, the anticoagulants should be stopped for at least 1 week before TP prostate biopsy and the hemostatic drugs may be used as appropriate after TP prostate biopsy. At 8 o'clock p.m. before the TP prostate biopsy and at 6 o'clock a.m. on the TP prostate biopsy day, the patient receives glycerol enema. Otherwise, the intestinal gas and feces will

affect the ultrasound examination. Clean the perineum before TP prostate biopsy, and antibiotics are not routinely used before prostate biopsy. For those with indwelling catheter, urinary tract infection, long-term daily use of corticosteroids, hypercortisolism, or the susceptible people with late tumor, preventive application of antimicrobial treatment before and after the time of TP prostate biopsy is still suggested. The patient is kept in lithotomy position, with raised buttocks, the scrotum is lifted up (or the adhesive cloth is up to pull the scrotum) to fully expose the perineal area and then disinfect the area, the buttock is spread with the sterile wipes. The area prepared is covered with thin film to isolate the anal secretion and the coupling agent. Gently massage around the anus, relax the anal sphincter, first conduct DRE and then routinely scan the prostate, rotate the probe to find the biopsy target and measure the distance between the target and the probe surface. Transverse scan the prostate first, measure the transverse diameter and anteroposterior diameter, and then longitudinally scan the prostate again, measure its axial diameter, observe the internal echo and prostate nodules or suspicious lesions when scanning. Record volume, form, internal echo and blood flow. Measurement of the volume of prostate gland: the volume of the prostate is calculated by the volume formula of the near sphere ($V = 0.52 \times \text{axial diameter} \times \text{anteroposterior diameter} \times \text{transverse diameter}$). The biopsy points are selected at the level of 1.0 cm above the anus 12 point, respectively. Then according to the 12 needle distribution sites presented by Gore, etc, carry out the TP systematic biopsy (namely the bottom, middle and tip of both sides of the central lobe of the prostate and those of both sides of the prostate peripheral zone), and take out 12 pieces of prostate tissue for pathologic examination.¹⁰

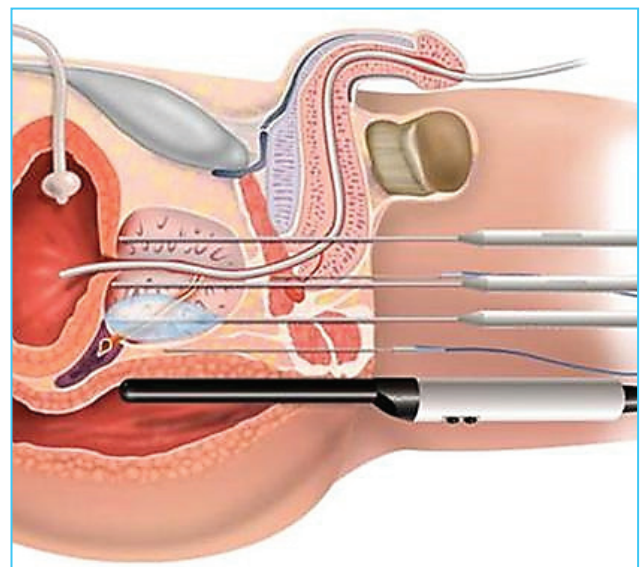


Figure 3: Transperineal prostate biopsy under transrectal ultrasound guidance

Discussion

With the wide application of TRUS in clinical practice, TRUS-guided prostate biopsy has become the gold standard for diagnosis of PCa.¹¹⁻¹² The field of Urology continues to change for better and there are new avenues. TP prostate biopsy has increased in popularity as the 2015 European Association of Urology guidelines on PCa recommended (Grade B) that either TR or TP biopsy could be used in the initial diagnosis of PCa. TP prostate biopsy has become favored over the TRUS prostate biopsy approach due to higher cancer detection rates, particularly in the anterior and transition zones, lower rates of sepsis, and decreased risk of rectal bleeding. The TP prostate biopsy can effectively avoid injuring rectum, can shorten the patients' waiting time for surgery of radical prostatectomy, and can reduce the surgical risk of rectal injury caused by ordinary laparoscopic or robotic assisted laparoscopic radical prostatectomy.¹³ Optimal performance of repeated prostate biopsy remains one of the most controversial dilemmas in urology.¹⁴ Patients with negative diagnosis by TRUS prostate biopsy may need repeat biopsy if the following findings are present: 1. First biopsy pathologic findings of atypical hyperplasia or high level PIN. 2. PSA > 10ng/ml, any f/t PSA or PSAD. 3. PSA 4 ~ 10ng/ml, review f/t PSA or PSAD value abnormality, or rectal or imaging abnormality. 4. PSA velocity (PSAV) > 0.75ng/ml/year should be suspected of PCa.⁸ PSAV is more suitable for younger patients with lower PSA. At least 3 PSA tests are detected in 2 years. PSAV calculation formula: $[(PSA_2 - PSA_1) + (PSA_3 - PSA_2)] / 2$. Compared with the TR prostate biopsy, there may be an advantage in TP prostate biopsy in safety because of no occurrence of serious infection. The reasons are: 1. Disinfecting perineal skin is much easier than disinfecting that of the rectum. As a result, the rate of biopsy-associated infection can be greatly reduced, and the risk of post-operative severe infection can be effectively controlled via the administration of prophylactic antibiotics taken one day prior to the operation.¹⁵ 2. The biopsy needle is always parallel to the ultrasonic probe in the rectum and the needle path and the depth of the needle can be observed in real time, thus avoiding the possibility of the needle tip migration into the rectum and causing the pollution.¹⁶ In TP prostate biopsy, there is no transgression of the rectal wall.

Therefore, the risk of causing sepsis is theoretically very low. As regards TP prostate biopsy advantage is represented by low complications rate whereas main disadvantages are necessity of anesthesia and complexity of execution; however, today refinement of brachytherapy techniques have made it more close relationship with this prostate biopsy approach.¹⁷

This project was funded by: Chengde science and technology and development project(N0:20142072)

References

1. Ferlay J, Parkin DM, Steliarova-Foucher E. Estimates of cancer incidence and mortality in Europe in 2008. *Eur J Cancer*. 2010; 46(4): 765-781.
2. Bianco F, Debruyne F, Martinez-Ballesteros C, et al. MRI/US fusion transperineal prostate biopsies under local anesthesia. *Eur Urol Suppl*. 2017; 16(3): e2091.
3. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2016. *CA Cancer J Clin*. 2016; 66(1): 7-30.
4. Sonn GA, Chang E, Natarajan S, et al. Value of targeted prostate biopsy using magnetic resonance-ultrasound fusion in men with prior negative biopsy and elevated prostate-specific antigen. *European Urology*. 2014; 65(4): 809-815.
5. Schröder FH, Hugosson J, Roobol MJ, et al. Screening and prostate-cancer mortality in a randomized European study. *N Engl J Med*. 2009; 360(13): 1320-1328.
6. Guo G, Xu Y, Zhang X. TRUS-guided transperineal prostate 12+X core biopsy with template for the diagnosis of prostate cancer. *Oncol Lett*. 2017; 13(6): 4863-4867.
7. Heidenreich A, Bastian PJ, Bellmunt J, et al. EAU guidelines on prostate cancer. part 1: screening, diagnosis, and local treatment with curative intent-update 2013. *Eur Urol*. 2014; 65(1): 124-137.
8. Na YQ, Ye ZQ, Sun YH, et al. China urological diseases diagnosis treatment guidelines. Beijing: People's Medical Publishing House. 2014: 61-65.
9. Cronin T, Neill L, Nelson J, et al. Complications of transperineal template-guided prostate biopsy: A single centre experience in 109 cases. *Surgical Practice*. 2017; 21(3): 103-106.

10. Gore JL, Shariat SF, Miles BJ, et al. Optimal combinations of systematic sextant and laterally directed biopsies for the detection of prostate cancer. *J Urol*, 2001, 165(5): 1554-1559.
11. Warlick C, Feia K, Tomasini J, et al. Rate of Gleason 7 or higher prostate cancer on repeat biopsy after a diagnosis of atypical small acinar proliferation. *Prostate Cancer Prostatic Diseases*. 2015; 18(3): 255-259.
12. Dorin RP, Wiener S, Harris CD, et al. Prostate atypia: Does repeat biopsy detect clinically significant prostate cancer?. *Prostate*. 2015; 75(7): 673-678.
13. Chang DT, Challacombe B, Lawrentschuk N. Transperineal biopsy Of the prostate—is this the future?. *Nat Rev Urol*. 2013; 10(12): 690-702.
14. Kaufmann S, Mischinger J, Amend B, et al. First report of robot-assisted transperineal fusion versus off-target biopsy in patients undergoing repeat prostate biopsy. *World J Urol*. 2017; 35(7): 1023-1029
15. Fiard G, Hohn N, Descotes JL, et al. Targeted MRI-guided prostate biopsies for the detection of prostate cancer: Initial clinical experience with real-time 3-dimensional transrectal ultrasound guidance and magnetic resonance/transrectal ultrasound image fusion. *Urology*. 2013; 81(6): 1372-13780
16. Pepdjonovic L; Tan GH; Huang S, et al. Zero hospital admissions for infection after 577 transperineal prostate biopsies using single-dose cephazolin prophylaxis. *World J Urol*. 2017; 35(8): 1199-1203.
17. Di Franco CA, Jallous H, Porru D, et al. A retrospective comparison between transrectal and transperineal prostate biopsy in the detection of prostate cancer. *Arch Ital Urol Androl*. 2017; 89(1): 55-59.

