

## Risk Factors Associated with Transrectal Ultrasound Guided Prostate Needle Biopsy in Patients with Prostate Cancer

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**Background:** Transrectal ultrasound (TRUS) guided prostate needle biopsy is a commonly used diagnostic procedure. We determined associated risk factors for patients who suffered major complications and required hospitalization after TRUS-guided prostate biopsy.

**Methods:** A total of 1,529 patients, 27 to 92 years old (mean 67.6 years) were included in this study conducted between January 2003 and July 2006. Each patient underwent sextant prostate biopsy under transrectal ultrasound guidance. Six-core transrectal biopsies were performed by urologists, consultant urologists and residents in training.

**Results:** The mean prostate-specific antigen (PSA) level and prostate volume were 113.2 ng/ml and 46.2 grams, respectively. One hundred forty-seven patients had complications. Some patients may have had more than one complication, but no major sequelae were seen immediately after biopsy. Sixty-two (4.1%) of these patients had gross hematuria, while 26 (1.7%) had acute urinary retention, 21 (1.4%) had urinary tract infection, 17 (1.1%) had hematospermia, 14 (0.9%) had anal bleeding and 7 (0.5%) had anal pain. Urinary tract infection and rectal preparation were found significantly associated with complications.

**Conclusions:** The results of our study demonstrate that minor complications occur without sequelae. Thus, TRUS-guided prostate needle biopsy is a safe and effective diagnostic tool. Urinary tract infection and rectal preparation might affect the complication rate.

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**Key words:** prostate biopsy, complications, prostate neoplasm

Prostate cancer continues to be the second most common cancer in men in the United States.<sup>(1)</sup> The value of the prostate specific antigen (PSA) level in the early detection of prostate cancer (CaP) is controversial because of its appreciable false positive rate.<sup>(2)</sup> Transrectal ultrasound (TRUS) guided

prostate needle biopsy has become the mainstay for tissue diagnosis of prostate adenocarcinoma. More than 500,000 prostate biopsies are performed yearly in the United States. The PSA level is comparatively high in the elderly, and in patients with prostatitis, and prostatic intraepithelial neoplasia. Some physi-

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cians use repeated TRUS guided prostate needle biopsies to rule out the possibility of malignancy, despite previous positive and negative histological findings.<sup>(3)</sup> Hence, we must understand the caveats of prostate biopsy procedures. Although it is the procedure of choice for detection of prostate cancer, complications can arise. In general, these biopsies are sometimes done with local anaesthesia, and usually without admission to the hospital.

In the present study, we evaluated the morbidity and complication rates for transrectal ultrasound guided prostate biopsy in a large screening population of the male patients. We also found and compared risk factors between older and younger subjects.

## METHODS

This study was performed between January 2003 and July 2006 with 1529 consecutive patients suspected of having prostate cancer. Indicators included high PSA levels (> 4 ng/ml), hypoechoic lesions on transrectal sonography and abnormal digital rectal exams. Patient age, PSA levels and prostate volumes are shown in Table 1. Patient informed consent was obtained. Acetylsalicylic acid and oral anti-coagulants were discontinued 7 days before prostate biopsy. All biopsies were performed with a spring-loaded biopsy gun and 18-gauge Tru-Cut needle. A 2102 Bruel and Kjaer 7.0 MHz biplanar ultrasound probe was used for diagnostic ultrasonography and sextant biopsy, which was done in all patients with local anesthesia. Sixty patients received 250 mg prophylactic ciprofloxacin every 12 hours one day before and three days after the procedures. All transrectal ultrasonography examinations and biopsies were performed by different urologists, junior and senior residents, and consultants. No cystoscopy was performed during the prostate biopsy procedures,

**Table 1.** Characteristics of Men Undergoing Prostate Biopsy

|                         | Range     | Mean ± SD      |
|-------------------------|-----------|----------------|
| Age (years)             | 27-92     | 67.6 ± 9.81    |
| PSA (ng/ml)             | 0.8-29772 | 113.2 ± 976.09 |
| Volume of prostate (cc) | 7.7-169   | 46.2 ± 21.77   |

**Abbreviations:** SD: standard deviation.

which were performed in day surgery. The major complications (Table 2) were further divided into fever (with sepsis or UTI), acute urinary retention, hematuria (requiring hospital admission), and rectal bleeding (requiring hospital admission). The parameters associated with risk factors are listed in Table 3. We divided the patients into two groups with the age of seventy as the cut-off point. Other parameters included the PSA level, prostate volume, underlying diseases, rectal preparation, urinary tract infection, Foley catheterization, and pre-biopsy antibiotics. For statistical analysis, the chi-square test was used with  $p < 0.05$  considered statistically significant.

## RESULTS

Complication rates were recorded and the

**Table 2.** Incidence of Adverse Events

| Complications           | No. of patients (%) |
|-------------------------|---------------------|
| Gross hematuria         | 62 (4.1)            |
| Acute urinary retention | 26 (1.7)            |
| Urinary tract infection | 21 (1.4)            |
| Hematospermia           | 17 (1.1)            |
| Anal bleeding           | 14 (0.9)            |
| Anal pain               | 7 (0.5)             |

**Table 3.** Risk Factors for Prostate Biopsy in 147 Patients with Complications

| Parameter                       | Group 1     | Group 2     | <i>p</i> -value* |
|---------------------------------|-------------|-------------|------------------|
| Age (years)/(%)                 | > 70 (46.3) | < 70 (53.7) | 0.82             |
| PSA (ng/ml)/(%)                 | > 20 (52.4) | < 20 (47.6) | 0.66             |
| Prostate volume (cc)/(%)        | > 40 (45.6) | < 40 (54.4) | 0.22             |
| Underlying disease, DM, H/T (%) | Yes (40.8)  | Nil (59.2)  | 0.18             |
| Rectal preparation (%)          | Yes (25.2)  | Nil (74.8)  | 0.01             |
| Urinary tract infection (%)     | Yes (73.5)  | Nil (26.5)  | 0.01             |
| Foley catheterization (%)       | Yes (53.1)  | Nil (46.9)  | 0.28             |
| Pre-biopsy antibiotics (%)      | Yes (40.8)  | Nil (59.2)  | 0.27             |

\*: The *p*-value was used for statistical analysis of differences between isolates of two groups.  $p < 0.05$  based on the chi-square test.

results are presented in Table 2. One hundred and forty seven patients had complications, for an overall rate of 9.6%. One-third of these patients required admission to the hospital and intravenous antibiotic therapy. All of these patients made a full recovery. Sixty-two patients (4.1%) had gross hematuria and fully recovered after admission. There were 26 cases (1.7%) of acute urinary retention, and all patients recovered after immediate catheterization. Twenty-one patients (1.4%) with urinary tract infections were admitted for further treatment and none had any sequelae. Seventeen patients (1.1%) with hematospermia were treated with a one-week course of ciprofloxacin. Fourteen patients (0.9%) with anal bleeding were admitted for bed rest. Active management was undertaken to stop the bleeding with Vaseline sponge packing, which was effective in all cases. Non-steroidal anti-inflammatory drugs were given to 7 patients (0.5%) who suffered anal pain. Minor complications were defined as adverse effects that did not warrant further treatment. Some patients might have had more than one complication.

Table 3 shows parameters associated with possible complications. We found that pre-biopsy UTI and rectal preparation had statistically significant associations with complications. There was no significant difference in the complication rate in relation to age ( $p = 0.82$ ). No major complications were seen for prostate biopsy and no patients died from complications.

## DISCUSSION

Transrectal ultrasound-guided prostate needle biopsy is a well-established procedure for the early detection of prostate cancer. Although PSA screening and digital rectal examinations have become the gold standard for prostate cancer detection, tissue proof is a useful tool to resolve ambiguous examinations. We sometimes find abnormal digital rectal examinations with normal PSA levels and vice versa. Therefore, it is essential that urologists understand the true morbidity, complications, and patient tolerance rates associated with the procedure. This retrospective study shows that although many patients have minor complications following TRUS guided prostate needle biopsy, severe complications are not often found.

For the sake of standardization, all prostate

biopsies were six-core biopsy. Berger et al., also found no difference in complication rates related to the number of cores taken.<sup>(2)</sup> Our incidence of rectal bleeding was just 0.9 percent, even though some authors have indicated that local periprostatic anesthesia decreases this risk.<sup>(4)</sup> The most common complication was gross hematuria, which is similar to transperineal prostate biopsy.<sup>(5)</sup> However, Sheikh et al., found the most common complication was anal pain and discomfort.<sup>(6)</sup> Akay et al., suggested that anal lavage with betadine prior to transrectal prostate biopsy is adequate for post-biopsy pain and infection control.<sup>(7)</sup> Our reported complications included gross hematuria for more than 3 days (4.1%) and hematospermia (1.1%), as well as major complications, including fever and UTI (1.7%) and urinary retention (1.4%). These results were compatible with those of other studies;<sup>(5,7)</sup> there was a significant difference in patients with UTI ( $p = 0.01$ ). In contrast, there was no significant difference in prostate volume, elderly and patient with urethral catheterization ( $p > 0.05$ ) between patients with and those without complications. There has been debate about antibiotic prophylaxis for TRUS prostate needle biopsy. Different regimens are available.<sup>(8,9)</sup> Complication rates for fever were not significantly different between those with 3-day usage and no usage of antibiotics ( $p = 0.27$ ). The efficacy of decreasing the infection rate with a rectal enema has been a topic of debate in the literature.<sup>(10)</sup> The patients in our study received rectal preparation; there was a significant difference in the complication rate between those with and without rectal preparation ( $p < 0.05$ ) in our study. Our overall complication rate (9.6%) was low compared with that of Miller et al., (20%) and Webb et al (50%).<sup>(5,11)</sup> The former author also found transrectal and transperineal ultrasound guided prostate needle biopsy to be equally safe. Mäkinen et al., and Chiang et al., also found prostate biopsy to be acceptable, despite the complications.<sup>(12,13)</sup> It is conceivable that large prostates cause more frequent infection complications.<sup>(14)</sup> However, we found no significant differences in the complication rate related to prostate size. The vascularity of the prostate varies significantly, despite the size. It should be noted that the severity of pain and discomfort was correlated with the complication rate in some studies.<sup>(15,16)</sup> The prevalence of post-biopsy complications has increased tremendously because the fre-

quency of this procedure is increasing.<sup>(14)</sup> Prostate cancer detection has increased because of PSA screening. We recommend rectal preparation, such as Fleet enema or bisacodyl as an important way to prevent infection in prostate biopsy.<sup>(10)</sup> The use of this procedure will continue to increase. TRUS-guided prostate needle biopsy is a safe and effective diagnostic tool, in male patients with and without systemic underlying disease. Patients with urinary tract infection should be informed of the complication rate. Age, prophylactic antibiotic use, underlying disease (diabetes, hypertension) and Foley catheterization are not associated with major complications after prostate needle biopsy.

### Conclusions

TRUS guided prostate needle biopsy is a feasible and effective tool in male patients with suspected prostate cancer. Patients with urinary tract infection should be informed of possible complications. Rectal preparation for transrectal prostate needle biopsy might decrease the complication rate.

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# 攝護腺癌男性病患利用經直腸超音波引導前列腺切片時之相關危險因子

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**背景：** 經直腸超音波引導前列腺切片是泌尿科醫師經常利用的診斷方法。在此報告中，我們評估了利用此診斷方式的病患，在切片後必須住院觀察的相關併發症之危險因子。

**方法：** 於 2003 年一月至 2006 七月間，共有 1,529 位病患，年齡為 27 至 92 歲 (平均年齡 67.6 歲)，每位病患皆接受了經直腸超音波引導前列腺切片，由不同的泌尿科醫師各採集了六處檢體。

**結果：** 前列腺特異性抗原 (prostate-specific antigen, PSA) 平均值與前列腺體積大小平均值分別為 113.2 ng/ml 與 46.2 gram。受檢病患中共有 147 位病患出現併發症，病患可能有一至多種併發症同時出現，但是不至於造成後遺症。62 位病患 (4.1%) 出現血尿，26 位病患 (1.7%) 有急性尿滯留，21 位病患 (1.4%) 有泌尿道感染，17 位病患 (1.1%) 出現精血症，14 位病患 (0.9%) 有肛門出血，7 位病患 (0.5%) 出現肛門疼痛現象。尿道感染及直腸清洗在併發症的發生與預防上，在統計學上是有差別意義的。

**結論：** 本研究統計顯示切片後只有少數病患會產生輕微併發症，且沒有出現後遺症。尿道感染及直腸清洗分別可以增加及減少經直腸前列腺切片的併發症。經直腸超音波引導前列腺切片仍是一項安全有效率的診斷方式。

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**關鍵詞：** 前列腺切片，併發症，前列腺腫瘤