The Effect of Urethral Catheterisation on Serum Prostate-Specific Antigen Levels in Male Patients with Acute Urinary Retention

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Urethral catheterisation is often used in acute urinary retention (AUR). In this study, we aimed to evaluate the effect of urethral catheterisation on serum prostate-specific antigen (PSA) levels in men with AUR. Our study subjects comprised 35 men with a mean age of 63.7 ± 7.35 years (range 55-80) who presented with AUR at our department between March 1999 and June 2000. Patients were randomly divided into two groups; 18 patients underwent urethral catheterisation in the first group (catheterisation group), while 17 underwent suprapubic percutaneous cystostomy in the second group (cystostomy group). Serum PSA levels before manipulation, and 2 and 12 hours and 7 days after treatment were determined. The change in median PSA values after manipulation was statistically significant in the catheterisation group ($p<0.05$), but not in the cystostomy group ($p>0.05$). The change in serum PSA was not clinically important in any of the patients. These results suggested that urethral catheterisation did not cause a significant alteration in serum PSA in men with AUR retention.

Key Words: Prostate-specific antigen, urinary retention, urinary catheterisation

INTRODUCTION

Prostate specific antigen (PSA) has a molecular structure of a glycoprotein which is extruded from acinar cells weighing 34000 Dalton. It is defined as one of the most important tumor markers in oncology. The wide use of PSA has led to the early diagnosis of prostate cancer and a decrease in patient mortality rate. Being an agent related to the organ rather than cancer is its main drawback in clinical applications. PSA levels may change not only in prostate cancer, but also as a result of different urological manipulations and physiological or benign conditions such as benign prostatic hyperplasia (BPH), prostatic intraepithelial neoplasia (PIN) and prostatic inflammations.

There have been controversial reports on the issue of changes in PSA levels caused by widely applied urethral catheterisation. Consequently, the purpose of this research was to investigate the effects of urethral catheterisation on PSA levels of patients with acute urinary retention (AUR).

MATERIALS AND METHODS

Thirty-five male patients, at a mean age of 63.7 ± 7.3, had previously applied to our clinic with AUR between March 1999 and June 2000 and been the subjects of this research. These patients were randomly split into two groups, 18 patients underwent Foley catheterisation of 16-18 F (catheterisation group) while the remaining 17 underwent suprapubic percutaneous cystostomy without any urethral manipulation (cystostomy group). Samples of blood were obtained from all patients before, and 2 and 12 hours and 7 days after the treatment. All samples were processed centrifugally and the collected serum was kept at -50°C. All frozen samples were defrosted simultaneously and their PSA levels were obtained by
applying the immulite chemiluminescent method. Exclusion criteria were infections, ex-urological operations, renal insufficiency (>2mg/dl level of serum creatinine), history of urolithiasis and any prior urological manipulations within one month. Subsequently, transurethral ultrasonography (TRUS) guide, sextant biopsy from prostate was applied to patients with PSA levels of > 4. Patients with benign disorders were subjected to transurethral resection (T.U.R) and open surgery for prostatic disease. Average levels for both groups were designated. Wilcoxon signed-rank test was used to define the statistical value of changes in PSA levels after catheterisation.

RESULTS

After histological examination of surgical specimens or needle biopsies, 24 patients with BPH, six with chronic prostatitis accompanied with hyperplasia, one with low grade PIN and four with prostate cancer were reported. Of the four with prostate cancer, three were from the catheterisation group. Serum PSA levels are presented in Table 1. When PSA values before and after the process were compared, the difference was significant for the catheterisation group (p<0.05) but not for the cystostomy group. When the value change in PSA levels for single patients was examined, there was no evident relationship between the existence of cancer and urethral catheterisation, or any PSA difference after cystostomy (p>0.05).

DISCUSSION

Prostate specific antigen is the main indicator in the diagnosis of prostate cancer, both in evaluation of its present stage and follow-up after the treatment. Its high level may bring cancer to mind at first, but only 38% of patients with high levels of PSA have been diagnosed with cancer. In prostate cancer, truly specified cancer tissues can produce more PSA than less specified ones. Less than 1% of the PSA which helps liquefaction of semen produced by the epithelial cells is dissolved in the blood. The pathology of PSA movement from the prostate to blood stream has not been fully elucidated. PSA moves into the blood from glandular tissue via blood or lymphatic stream. There are basal membrane, capillary basal membrane and endothelial layers to prevent PSA from passing into the blood stream. Any pathological problem damaging these structures may lead to an increase in PSA levels. The main reasons behind an increase in serum PSA level are prostate cancer and PIN. Inflammation (prostatitis), BPH that is characterized by an increase in prostate volume and proliferation of acinar cells, and trauma can increase PSA levels as well. Increasing PSA levels in BPH are known to be correlated with transitional zones. It has been shown that after urethral catheterisation, high levels of PSA of a patient with BPH may not only be related to the increased prostate volume, but also to the inflammation or infection that is caused by chronic urinary retention or obstructions. Nevertheless, there is no agreement on the interrelation of PSA level and trauma. Stanley reported that PSA values quadrupled after cystoscopy whereas Oesterling found minimal changes. Prostate biopsies and surgery have been found to increase the PSA levels 60 times above normal values. Massage of the prostate and transrectal ultrasonography can also increase PSA values. Rectal examination with the finger does not cause any change in PSA levels, as previously.

Table 1. Average Levels of PSA for Both Groups

<table>
<thead>
<tr>
<th>Patient Group</th>
<th>Pre-manipulation</th>
<th>2 hours after manipulation</th>
<th>12 hours after manipulation</th>
<th>After one week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catheterisation</td>
<td>4.5 (0.6-25.7)</td>
<td>4.8 (0.5-24.9)</td>
<td>4.7 (0.6-25.3)</td>
<td>4.9 (0.5-25.3)</td>
</tr>
<tr>
<td>Group (n=18)</td>
<td></td>
<td></td>
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<tr>
<td>Cystostomy</td>
<td>3.7 (0.4-19.2)</td>
<td>3.7 (0.4-19.2)</td>
<td>3.7 (0.4-19.4)</td>
<td>3.7 (0.5-19.4)</td>
</tr>
<tr>
<td>Group (n=17)</td>
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believed.\textsuperscript{10,12}

It has been widely recognized that prostatic ischemia and infarct, which cause AUR, increase PSA levels.\textsuperscript{13} However, such an increase is expected to drop back to its previous level within a couple of weeks.

The effects of traumatic incidents on PSA can cause diagnostic problems. Urethral catheters are frequently used in patients with AUR. It is debatable whether high levels of PSA are related to pathologic reasons or iatrogenic occasions. Matzkin, et al. found that patients who had had non-urological operation had no change in serum PSA levels after 5.5 days of indwelling catheterisations.\textsuperscript{9} Some authors could not find any changes in PSA levels in patients with BPH who had gone through long periods of indwelling catheterisation.\textsuperscript{7} Batishlam et al. found PSA levels twice the normal value in patients with BPH, and these patients were possible candidates for prostatalsmen, and in patients that had gone through long period of indwelling catheterisation, compared to the ones that were not subjected to such catheterisation.\textsuperscript{14} It is also known that open heart surgery and catheterisation cause an increase in PSA levels. Under these circumstances, there is no common agreement on the effects of urethral catheterisation on PSA levels. Nevertheless, based on our results we have come to believe that urethral catheterisation has little impact on PSA levels of elderly patients with urethral obstruction, and has no clinical significance, although it does represent a statistical value. Nonetheless, high PSA levels after urethral catheterisations must be seriously considered.

REFERENCES


