

A Comparative Study Of Level Of Prostate Specific Antigen In Males More Than 50 Years Of Age Presentingwith Lower Urinary Tract Symptoms Before And After Treatment

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Introduction

Prostate-specific antigen, or PSA, is a protein produced by normal, as well as malignant, cells of the prostate gland. The PSA test measures the level of PSA in the blood. For this test, a blood sample is sent to a laboratory for analysis. The results are usually reported as nanograms of PSA per milliliter (ng/mL) of blood.

The blood level of PSA is often elevated in people with prostate cancer, and the PSA test was originally approved by the FDA in 1986 to monitor the progression of prostate cancer in men who had already been diagnosed with the disease. In 1994, FDA approved the PSA test to be used in conjunction with a digital rectal exam (DRE) to aid in the detection of prostate cancer in men 50 years and older.

Until about 2008, many doctors and professional organizations had encouraged yearly PSA screening for prostate cancer beginning at age 50

Prostate-specific antigen (PSA) is an androgen-regulated serine protease produced by the prostate epithelium. PSA is normally present in low concentrations in the blood of all adult males.

PSA levels may be elevated in the blood of men with benign prostate conditions such as prostatitis and benign prostatic hyperplasia, as well as in men with prostate cancer.

PSA levels have been shown to be useful in evaluating the effectiveness of prostate cancer treatment and monitoring for recurrence after therapy. In monitoring for recurrence, a trend of increasing levels is considered more significant than a single absolute elevated value. Although PSA has been widely used for prostate cancer screening, the utility of PSA screening remains controversial.

Prostatic inflammation has probably a not clearly understood impact on PSA levels in the postoperative period. Although many studies suggest that the presence of prostatic inflammation can contribute to increasing serum PSA levels, the mechanism by which such histological changes induce the prostatic acinus marker to move to the systemic circulation is still controversial (10). The apoptosis of prostate tissue induced by alpha1-blockers may confer a considerable benefit in BPH, since it could alter the size and shape of the prostate over time, reduce its volume, or halt further growth.

Aims And Objectives

Aim- To study and compare the Prostate Specific Antigen (PSA) levels in males of more than 50 years of age presenting with lower urinary tract symptoms before and after treatment.

Objectives-

1. To measure PSA levels in males more than 50 years of age at presentation of symptoms.

2. To measure PSA levels in males more than 50 years of age after treatment.

Inclusion Criteria

1. All male patients above the age of 50 years.
2. Patients complaining of lower urinary tract symptoms.
3. Patients giving consent for taking part in the study

Exclusion Criteria

1. All male patients below the age of 50 years.
2. Patients not giving consent for taking part in the study

Materials And Methods

1. Study site: MGM Medical College and Hospital, Navi Mumbai
2. Type of Study: Prospective study
3. The study will be done at the Urology Department at MGM Medical College and Hospital, Kamothe
4. Study period: - From October 2022 to December 2023
5. Sample Size: - 50/100
6. Sample formula: $N = \frac{Z^2 \times p \times q}{L^2} = 100$
7. Informed, written and valid consent will be obtained from all patients before the start of Study
8. Institute Ethical committee approval taken before start of study

Patients who meet the inclusion criteria will be enrolled into the study. Clinical diagnosis will be made based on the presence of lower urinary tract symptoms such as voiding or obstructive symptoms such as hesitancy, poor and/or intermittent stream, straining, prolonged micturition, feeling of incomplete bladder emptying, dribbling, and storage or irritative symptoms such as frequency, urgency, urge incontinence, and nocturia.

Patients were given IPSS questionnaire and underwent investigations like urine analysis, digital rectal examination, uroflowmetry and transpubic sonography for prostate volume, renal insufficiency and post-void volumes. The patients were diagnosed clinically based on these investigations into

inflammatory condition due to any cause, Benign Prostatic enlargement, carcinoma prostate. They underwent a test for Prostate Specific Antigen levels before initiation of treatment.

In conditions with UTI, they were treated with antibiotic therapy for 2-3 weeks based on sonography and urine analysis.

In case of BPE, based on prostate volume and degree of LUTS they were treated either with medical management or surgical management.

The levels of Prostate Specific Antigen will be again determined and the pre and post treatment levels were compared and correlation between PSA levels was observed.

Results

Of all 90 cases that have completed the study, 64 cases were diagnosed as benign prostatic enlargement, 23 cases were diagnosed as urinary tract infection, and remaining 3 cases came to the OPD previously diagnosed as carcinoma Prostate.

Out of 64 cases that were diagnosed as benign prostatic enlargement, 5 cases have Sr PSA levels more than 10 ng/ml and were taken up for trans rectal biopsy. On histopathological examination one case was found out to be carcinoma prostate and rest of the cases were diagnosed benign prostatic enlargement.

Age Incidence: Most of the cases with prostatic enlargements were in the age group of 60-79 years (89.2%). Few cases were in the 50-59 years age group (9.8%).

Benign prostatic enlargement: Out of 63 cases that were diagnosed as benign prostatic enlargement, 40 cases were treated with endoscopic surgical management i.e TURP (Trans Urethral Resection of Prostate). Remaining 23 cases were treated conservatively or medically with Alpha-blockers.

Patients' ages ranged from 52 to 82 years (mean 67.0 ± 4 years). Preoperative Sr PSA ranged from 0.79 ng/mL to 33.46 ng/mL, mean 6.19 ± 7.06 ng/mL. Baseline prostatic volume, as measured by sonography, ranged from 29.0 cc to 110.0 cc, mean 56.8 ± 24.0 cc.

| VARIABLE | MEAN+-SD |
|-----------------|------------------|
| AGE IN YEARS | 67.0 +- 4 years |
| IPSS | 18.50 +- 2.9 |
| Sr.PSA | 6.19+-7.06 ng/mL |
| PROSTATE VOLUME | 56.8+-24.0 cc. |

Before surgery, mean Sr PSA was 6.19 ng/mL+-7.06 ng/mL, decreasing to 1.75+-1.66 ng/mL (71% reduction) on day 60. A significant difference was observed when preoperative Sr PSA was compared with postoperative values on day 60 ($p < 0.001$ for all comparisons). Age was not associated with the decline of PSA levels after TURP at all time points assessed ($p = 0.151$).

| BPE TREATMENT | PRE TREATMENT Sr PSA | POST TREATMENT Sr PSA |
|---------------|------------------------|-----------------------|
| TURP | 6.19 ng/mL+-7.06 ng/mL | 1.75+-1.66 ng/mL |

Before medical management, mean Sr PSA was 2.19 ng/mL+-0.06 ng/mL, decreasing to 1.85+-0.02 ng/mL (10% reduction) after 6 months. Not much significant difference was observed when pre-medical treatment Sr PSA was compared with post-medical treatment values after 6 months. Total prostate volume at baseline in this group was 31+-10cc. Post medical management with alpha blockers there was no significant difference in prostate volume 30cc+- 10cc. But the patient IPSS score decreased significantly post medical therapy.

| BPE TREATMENT MEDICAL | VALUES |
|--------------------------------|------------------|
| PRE TREATMENT Sr PSA | 2.19+-0.06 ng/mL |
| POST TREATMENT Sr PSA | 1.85+-0.02 ng/mL |
| PRE TREATMENT PROSTATE VOLUME | 31+-10cc |
| POST TREATMENT PROSTATE VOLUME | 30cc+-10cc |

Urinary tract Infection: Of all 23 cases that were diagnosed as urinary tract infection, pre antibiotic therapy, the mean age of the patients was 61.3 years (range, 50 to 76 years). The mean prostate size was 38.8±14.9cc (range, 22- 70cc). Of these patients, the mean serum PSA was 6.3±1.9 ng/ml and 4.8±2.4 ng/ml before and after antibiotic treatment, respectively. There was a significant difference in the serum PSA ($p < 0.05$) post treatment.

| URINARY TRACT INFECTION | PRE TREATMENT Sr PSA | POST TREATMENT Sr PSA |
|-------------------------|----------------------|-----------------------|
| ANTIBIOTIC THERAPY | 6.3±1.9 ng/ml | 4.8±2.4 ng/ml |

Catheterisation: out of 90 patients that were taken up for the study, 10 patients came with Acute urinary retention. These patients were catheterized and Sr PSA was done immediately and after 2 weeks with catheter in situ. The mean serum PSA immediately after catheterization was 6.2+-1.2ng/mL and after 2 weeks it was 4.8+-0.2ng/mL which was statistically significant.

| CATHETERISATION | Sr PSA |
|-----------------|---------------|
| IMMEDIATELY | 6.2+-1.2ng/mL |
| AFTER 2 WEEKS | 4.8+-0.2ng/mL |

Ca Prostate: out of 4 cases that were diagnosed with prostate cancer, 2 cases underwent bilateral orchidectomy whose Total PSA values were 127ng/mL and 98ng/mL respectively. Following the surgery total PSA values dropped significantly to 3.47ng/mL and 1.24ng/mL. one case came to OPD with previous history of TURP following which cancer was detected. In this case pre TURP total PSA value was 8.74ng/mL and post surgery it was 6.22ng/mL and on histopathological examination of TURP chips it shows carcinoma of prostate.

Discussion

Benign prostatic hyperplasia is one of the most frequent pathologies affecting men, and its prevalence rises progressively after the age of 40. Transurethral resection of the prostate is one of the surgeries most performed in men aged above 50 years. Its effectiveness in relieving symptoms in BPH patients has been extensively documented, and it is considered the gold standard for the treatment of BPH (1).

Vesey et al. (2) published one of the first studies evaluating the impact of TURP on PSA levels. They found a correlation between prostate size and preoperative PSA, noting that there is a temporary rise in PSA levels in the first few days following surgery. In this study, mean PSA before surgery was 6.19 ng/mL. Few studies mention that to reach baseline sr.PSA it is necessary to wait at least 2 months after surgery. Apparently, the low PSA levels found 60 days after surgery are sustained for years, resulting in a population with serum markers similar to those seen in men who did not develop BPH (3)

In the present study, we failed to find any significant treatment- related differences in serum PSA, TPV, with 0.4 mg tamsulosin. But there was significant

improvement in IPSS score with negative 4 point score on average. There is evidence that tamsulosin improves prostate perfusion, possibly by the antagonistic action on α 1A- and α 1D-adrenoceptors of vesical arteries (4, 5). A single RCT in OAB population reported increased perfusion up to +149%, hence the beneficial effect of tamsulosin on LUTS (6).

In a study, prostate volume and inflammation were reported to be the most important factors contributing to serum PSA elevation in men without clinically detectable prostate cancer (7). Baltacı et al. reported that although antibiotics therapy will decrease serum total PSA, it will not decrease the risk of prostate cancer even if the PSA decreases to less than 4 ng/ml therefore, prescribing antibiotics for asymptomatic men with a newly increased PSA may not be an appropriate method of management (8).

In our study, even though total PSA was decreased significantly after 2 weeks of treatment with antibiotics, and total PSA was normalized in approximately 50% of patients, the total PSA of all patient was not decreased to the normal range (less than 4 ng/ml).

Urethral catheterisation is common procedure performed to treat acute urinary retention. our study, we observed that serum PSA is not elevated in BPH patients and also non-traumatic urethral catheterisation has no impact on elevation of PSA.

Gazy F et al. (9) observed that indwelling catheter in patients with BPH who underwent urinary retention did cause a significant elevation of serum PSA in those patients having an elevated PSA at baseline and did not change significantly with normal baseline levels. This means elevation of PSA in the absence of

urinary tract infection or prostate pathology should not be attributed to catheterization.

Again, rise in serum PSA should follow standard protocols, as non-traumatic, aseptic catheterisation causes no rise in serum PSA levels. In our study, all patients who were catheterized had an average of PSA levels of 6.2ng/mL. After 2 weeks of catheterization before removing PSA levels were found to be 4.8 ng/mL which shows no significant raise post catheterization.

Conclusion

Our results confirm that PSA levels are clearly reduced after TURP, stabilizing after 2 months. There is not an absolute serum PSA value below which patients undergoing TURP can be surely free of developing cancer, because postoperative PSA depends on several factors like preoperative PSA, prostate volume and prostate volume resected.

However, PSA reduction may be estimated based on preoperative prostate volume and prostate volume resected.

PSA changes are mildly significant in patients receiving alpha blockers monotherapy .Few studies suggest that a large effect on TPV and sr PSA is observed after either 5-ARI monotherapy or after combination treatment with an α -blocker, but the reduction in the latter group is less.

Antibiotics treatment for at least 2-3 weeks in UTI patients with an increased PSA level (4-10 ng/ml), maybe chronic prostatitis, infection due to bladder outlet obstruction and normal DRE and sonographic findings may decrease serum PSA significantly.

However, because total PSA was not decreased to the normal range (less than 4 ng/ml) in all patients, it seems that antibiotics therapy should be used judiciously to avoid resistance.

Urethral catheterisation does not lead to rise in serum PSA, if it is performed using sterile precautions and atraumatically. Rise in PSA warrants investigation as per standard protocols, and it should not be correlated with catheterisation only.

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