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Original Research Article

A Clinical Study on Risk Factors Leading to Post-Operative Bladder Neck Contracture Following Transurethral Prostate Resection.

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Abstract:

Background: Benign prostatic hyperplasia (BPH) is prevalent in aging men, increasing with longer lifespan. Endoscopic procedures like bipolar TURP and Thulium laser (ThuP) surgery show effectiveness with reduced complications. Intraoperative bleeding and postoperative dysuria, linked to bladder neck contracture (BNC) at 2.2% to 9.8%, are common issues. Our study examines perioperative factors related to BNC after TURP or ThuP, assessing variations in BNC incidence across techniques.

Materials and Methods: The study, spanning July 2021 to April 2023, focuses on hospitalized TURP patients with a sample size of forty. Inclusions require dysuria concerns confirmed by cystoscopy with voluntary consent, excluding individuals with high flow rates, detrusor underactivity, previous surgeries, or urological malignancies. Data collection involves medical history, physical examinations, and a post-TURP diagnostic cystoscopy, with SPSS version 27 for analysis and adherence to ethical considerations.

Results: Key findings revealed that 92.5% of patients had benign prostatic hyperplasia (BPH), with a mean age of 62.95 ± 7.77 years. Mean PSA values were 6.04 ± 2.44 ng/ml, and mean IPSS scores were 18.04 ± 1.49. The surgery's mean duration was 62.99 ± 2.23 minutes, with a mean resected gland weight of 42.38 ± 0.44 grams and resection speed of 0.87 ± 0.04 g/min. The study reported incidences of urethral mucosal injury (13.33%), capsule perforation (6.66%), TUR syndrome (3.33%), re-catheterization (3.33%), and continuous infection (6.66%). Univariate analysis identified PSA levels, resected prostate weight, and urine culture as risk factors for the development of post-TURP bladder neck contracture.

Conclusion: High PSA, less Weight or smaller gland (<45) of prostate, pre- and post- operative positive Urine culture were established to be the risk factors for development of bladder neck contracture following TURP.

Keyword: Benign prostatic hyperplasia, bipolar TURP, ThuP, Bladder neck contracture.

Introduction

Men in their latter years are more likely to suffer from benign prostatic hyperplasia (BPH), a disorder that is becoming more common as people live longer. As lower urinary tract symptoms due to benign prostatic hyperplasia (BPH) worsen, they can cause serious genitourinary problems and have a major influence on day-to-day living. [1,2] Recent advancements in surgical techniques have resulted in fewer complications linked with effective endoscopic procedures such as bipolar TURP and Thulium laser surgery. The most common postoperative consequence, dysuria, is most often linked to bladder neck contracture (BNC), occurring in 2.2% to 9.8% of cases. [3,4] The most common issue is bleeding that occurs after surgery. Although the precise cause is unknown [5], the following factors may contribute, history of prostatitis, small prostate volumes, incorrect resectoscope diameters, lengthy surgery time frames, and postoperative infections. Our study aims to investigate perioperative parameters associated with BNC after TURP or ThuP, assessing variations in incidence rates between different techniques, specifically resection and enucleation approaches. This comprehensive exploration contributes to refining surgical practices for optimal patient outcomes, advancing our understanding of post-surgical complications in BPH management. The objectives of the study are to investigate the incidence of postoperative Bladder Neck Contracture (BNC) following Transurethral Resection of the Prostate

(TURP) and identify the risk factors associated with this complication.

Materials and Methods

Using a cross-sectional observational study design, the study will concentrate on patients who remain hospitalized following TURP and will run from July 2021 to April 2023. The selection of participants will follow a random sampling design, with a predetermined sample size of forty people.

Inclusion Criteria:

1. Patients expressing concerns of progressive dysuria or a gradual decline in maximal urinary flow (below 10 mL/s in the urodynamic study) will be considered for inclusion.
2. A definitive diagnosis will be established through cystoscopy.
3. Individuals who willingly provide consent for the study will be included.

Exclusion Criteria:

1. Participants with a maximum flow rate (Qmax) exceeding 20 mL/s will be excluded.
2. Detrusor underactivity (DUA) will lead to exclusion, defined as detrusor pressure at Qmax (PdetQmax) of <40 cmH2O with Qmax of <15 mL/s, secondary to neurogenic bladder dysfunction or other diseases.
3. Individuals with a history of prostatic and/or urethral surgery will not be considered.
4. Exclusion criteria also encompass those with a previous diagnosis or intraoperative detection of Urethral Stricture or Bladder Neck Contracture (BNC).
5. Participants diagnosed with prostatic, or bladder malignancy will be excluded from the study.

The data collection process will encompass a comprehensive approach. Firstly, a meticulous gathering of detailed patient history and drug history will be conducted to obtain a comprehensive understanding of each participant's medical background. Subsequently, a thorough physical examination will be carried out to assess and record relevant physical health indicators. Additionally, the data collection will involve performing a diagnostic cystoscopy three months after the Transurethral Resection of the Prostate (TURP). This procedure aims to provide insights into the postoperative outcomes and assess any changes or developments in the relevant physiological aspects. Together, these data collection methods aim to contribute to a holistic understanding of the study participants' health status and postoperative progress.

Statistical analysis using SPSS version 27 was used to analyse the dataset's associations and characteristics. To understand the averages and variation of the variables, descriptive statistics were produced, such as mean and standard deviation. The degree and direction of connections between various factors and the chance of developing bladder neck contracture (BNC) were assessed using the odds ratio for inferential statistics. In addition, the relationship between the binary outcome of BNC presence or absence and other predictor variables was predicted using an effective technique of logistic regression. Statistically significant predictors of the incidence of BNC after transurethral resection of the prostate (TURP) may be identified with this technique.

Results

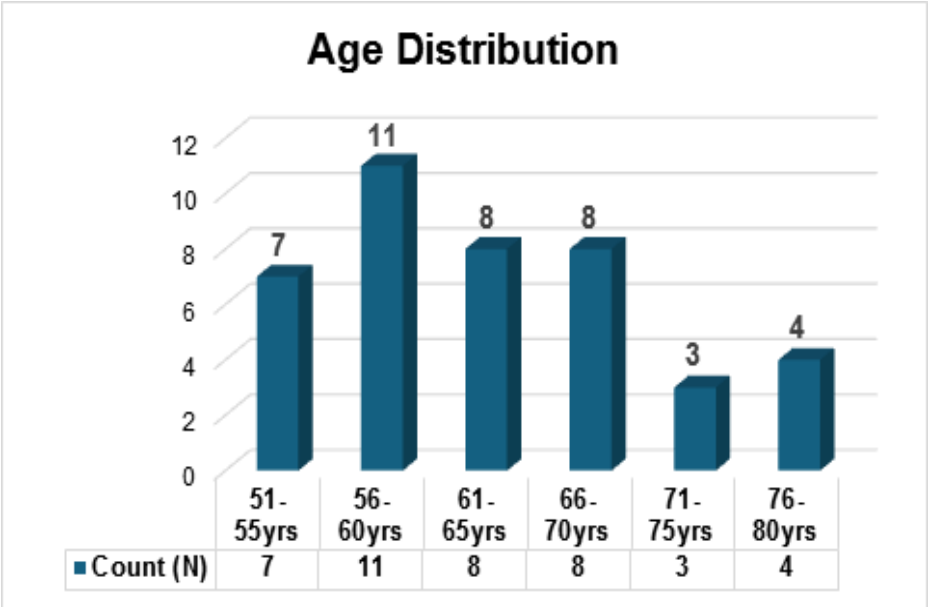

Table 1:Age Distribution of Study Participants

The distribution of study participants across various age groups is seen in the graph above. The count (N) is the total number of people in each age group. The participants in each of the age categories, which span from 51 to 80, are indicated by different counts. The population under research had a mean age of 62.95± 7.77 years.

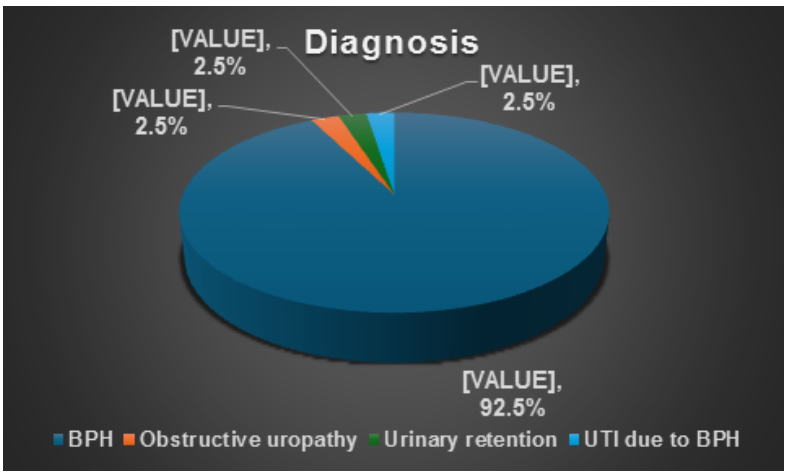

Table 2: Distribution of Diagnosis Among Study Participants

The proportionate distribution of diagnoses is well represented by this pie chart, which shows that 92.5% of cases were for Benign Prostatic Hyperplasia (BPH), with 2.5% of cases being for less common conditions such as Obstructive Uropathy, Urinary Retention, and UTI related to BPH.

Table 1: Descriptive Statistics of Key Variables

Variable	Mean	SD
PSA	6.04	2.44
IPSS	18.04	1.49
Duration of surgery	62.99	2.23
Resected weight of gland	42.38	0.44
Resection speed	0.87	0.04

The table provides descriptive statistics for major variables associated with prostate health and surgery. For each parameter, there is a mean and standard deviation (SD) that provide significant details about the dataset's variability and central tendency. The average amount and degree of fluctuation of the Prostate-Specific Antigen (PSA) are indicated by its mean value of 6.04 ± 2.44 ng/ml.

The average severity of symptoms and their distribution are shown by the International Prostate Symptom Score (IPSS), which has a mean of 18.04 ± 1.49. The average time spent during the surgical operation is indicated by the mean of 62.99 ± 2.23 minutes. The gland's mean weight after resection is 42.38 ± 0.87 grams, and its mean resection speed is 0.87 ± 0.04 g/min.

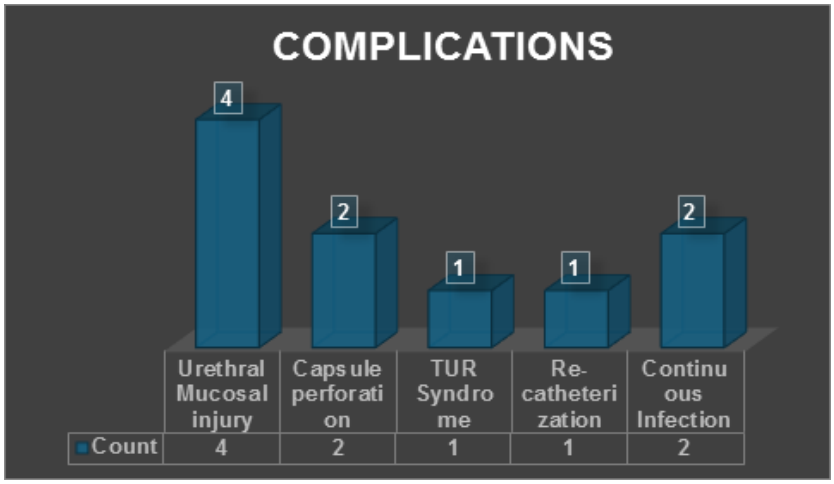

Table 4: Incidence of Complications Following Transurethral Resection of the Prostate (TURP)

The graph presents a detailed summary of the various issues that can arise after Transurethral Resection of Prostate (TURP), along with their corresponding frequencies. Out of 40 cases, 10% of cases had urethral mucosal injuries, which is a notable incidence. The presence of capsule perforation was noted in 5% of cases, indicating a relatively lower frequency of occurrence. Only 2.5% of cases had TUR Syndrome, a less common compl cation, and 2.5% of cases had an identical incident that necessitated re-catheterization. In 2.5% of instances, persistent infections were found. In order to help healthcare providers evaluate and manage potential risks related to TURP procedures, this presentation makes it possible to quickly understand the prevalence of each problem.

Table 5: Logistic Regression Analysis of Factors Influencing Postoperative Complications

Criteria	ORORatio(95%CI)	p value
Age in years	0.987	0.710
PSA ng/Ml	0.821	**0.0001**
Surgery duration in min	0.993	0.062
Post-operative weight of resected prostrate, in grams	0.752	**0.002**
Hemoglobin	0.842	0.21
Urine culture positive	0.566	**0.003**
p value ≤0.05 is considered to be significant.		

The table presents the findings of a logistic regression analysis that looked into a number of variables that might have an impact on postoperative complications after surgery. A non-significant p-value of 0.710 indicates that there is no significant correlation between age and postoperative complications, according to the odds ratio (OR) of 0.987 with a 95% confidence interval (CI) of 0.710. But PSA levels have a significant effect as well, with an OR of 0.821 and a very significant p-value of 0.0001, suggesting a strong correlation with problems. There is no statistically significant correlation between the length of surgery (indicated by an OR of 0.993 with a p-value of 0.062) and any outcome. On the other hand, an OR of 0.752 and a p-value of 0.002 show that complications are highly influenced by the weight of the removed prostate. With an odds ratio of 0.842 and a p value of 0.21, haemoglobin levels do not significantly correlate with problems following surgery. A low p-value indicates that a positive urine culture has a significant impact on the likelihood of postoperative complications. This thorough study supports clinical decision-making in the management of surgical cases by helping identify potential risk factors leading to postoperative problems.

Discussion

Age plays a major role in the prediction of LUTS and BPH . According to studies, the prevalence of BPH rises linearly with age and affects 50% of men over 50.[6,7] According to the results of the literature, participants in the current study (mean age: 62.95 ± 7.77 years) were divided into age groups. Similar mean ages are found when comparing this study to others. (Table 6) Age-related decline in testosterone levels and the possible functions of oestrogens could be the causes of the greater incidence of BPH in older men. For definitive results, more investigation is required [8].

Table 6: Age Profile in Benign Prostatic Hyperplasia: A Comparative Examination Across Multiple Studies and Our Research

STUDY	MEANAGE
Mendez-probstet.al. [9]	68 years
Chen Qetal. [10]	69.7years
Changetal. [11]	64.91 years
Tolgaet al. [12]	67.4years
Ourstudy	62.95∓7.77years

BPH was diagnosed in 37 out of 40 patients in the present study giving a percentage of 92.5%. Associated obstructive uropathy was diagnosed in 2.5% of the cases, urinary retention in 2.5% and UTI in 2.5% of the population. Similar findings were seen in studies done by Ng M et al[6] and Skinder D et al[8] .

The American Urological Association Symptom Index was modified to create the IPSS score, often known as IPSS, which is used to evaluate subjective symptoms in people with benign prostatic hyperplasia (BPH). Through the use of a questionnaire, it assesses both the degree of Lower Urinary Tract Symptoms (LUTS) and the quality of life. Before tests, patients can fill out the IPSS form with little assistance from medical staff. Mild symptoms are shown by a score of 7 or less, moderate symptoms

are shown by a score of 8 to 19, and severe symptoms are shown by a score of 20 to 35. When evaluating symptoms and choosing a course of treatment, the AUA index and IPSS are both sensitive instruments. The average IPSS score in this investigation was 18.04 ± 1.49, which is similar to previous research.

Table 7: Comparative Analysis of IPSS Scores in BPH: Insights from Existing Studies and Our Research

STUDY	MEAN IPSS SCORE
Mendez-probstet.al. [9]	20.5
Chen Qetal. [10]	21.8
Changetal. [11]	22.75
Tolgaet al. [12]	18.5
Ourstudy	18.04∓1.49

It is recommended that patients who have an AUASI/IPSS score of 8 or higher and who exhibit moderate to severe symptoms have their postvoid residual volume measured. [8]

The mean PSA levels in our study were 6.04∓2.44ng/ml. These results correlated well with studies in literature. [7,13] In a study by Chen Q et. al., the mean PSA levels were 5.17±7.02 ng/ml. [10]

The average surgical duration in our study was 62.99 ± 2.23 minutes. Geavlete et al. [13] reported notably shorter procedure times for BPVP (bipolar plasma vaporization of the prostate) patients compared to TURis (bipolar transurethral resection in saline) and monopolar TURP patients (39.7 vs. 52.1 and 55.6 minutes). Additionally, BPVP patients exhibited significantly reduced catheterization times (23.5 vs. 46.3 and 72.8 hours) and shorter hospital stays (1.9 vs. 3.1 and 4.2 days) compared to TURis patients. These findings highlight the efficiency of BPVP in terms of both surgical and postoperative aspects. [13]

In our study, the average resected gland weight was 42.38 ± 0.44 grams, and the mean resection speed was 0.87 ± 0.04 g/min. In contrast, Xie et al.[14]reported different findings in their study, with mean gland weights of 52.23 ± 12.84 in M-TURP and 55.39 ± 17.79 in PK-TURP (plasmakinetic). The operation times also varied, with 60.01 ± 20.06 minutes for M-TURP and 55.03 ± 16.30 minutes for PK-TURP. These results highlight the differences in resection outcomes and procedural efficiency between the two studies. [14]

In the context of benign prostatic hyperplasia (BPH) treatment, the widespread adoption of current endourological techniques has substantially reduced postoperative complications. However, a notable concern is the increased occurrence of bladder neck contracture (BNC) associated with these interventions. The literature review reveals varied data on BNC frequency, its pathogenesis, and associated risk factors. The prevalence of BNC after transurethral procedures can reach up to 10%, influenced by the energy type used. Factors such as chronic prostatitis, urinary tract infections, and small volume BPH elevate the risk. Additionally, a history of smoking, advanced age, cardiovascular disease, type 2 diabetes, obesity, and being overweight are considered extra risk factors. [15] In our study, urethral mucosal injury, infection, capsule perforation, TURS, and re-catheterization were observed in varying percentages within the study population.

Chen Q et al.'s univariate analysis revealed significant differences in patients with bladder neck contracture (BNC) compared to those without. Patients with BNC had smaller prostates (43.0 ± 18.95 vs. 57.2 ± 19.84 ml, p <0.001), lower resection weights (11.64 ± 11.75 vs. 16.67 ± 12.84 g, p = 0.01), shorter operative times (43.0 ± 30.9 min. vs. 57.2 ± 34.5 min, p = 0.001), and a higher rate of recatheterization after surgery [7/55 vs. 2/122, p = 0.01, OR 5.6 (1.02–30.6)]. [10] Similar findings were seen in our study.

In the broader context of BPH treatment, minimally invasive surgical techniques (MISTs) have seen increased utilization, offering various outcomes. While MISTs come with significant adverse effects, particularly when compared to more invasive procedures, their impact on sexual function is less severe. Urologists need to stay well-informed about the available surgical procedures for BPH, considering the latest guidelines from the American Urological Association (AUA). Ongoing research assessing efficacy, safety, and impact on sexual functioning will contribute to shaping future care and advancing current practices. [16]

Conclusion

The study identified several risk factors associated with the development of bladder neck contracture (BNC) following transurethral resection of the prostate (TURP). Specifically, high levels of prostate-specific antigen (PSA), a smaller prostate gland (weighing less than 45 grams), and positive urine cultures both before and after the surgery were established as significant contributors to the risk of BNC.

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