PREVALENCE OF URINARY TRACT STONES IN PATIENTS WITH BENIGN PROSTATIC HYPERPLASIA (BPH) UNDERGOING TRANS URETHRAL RESECTION OF THE PROSTATE (TURP) OPERATION

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ABSTRACT

Objective: *This study aims to determine the prevalence of urinary tract stones in BPH patients undergoing TURP surgery.* ***Material & Methods:*** *This research is a descriptive study using secondary data with medical records of BPH patients who underwent TURP at Saiful Anwar General Hospital (RSSA) for the period of 2018 – 2022.* ***Results:*** *From the results of the 169 patient samples BPH undergoing TURP, there were 35 samples, who experienced urinary tract stones. The most frequent incidence of urinary tract stones in patients with BPH at the age of 60 – 70 years of 15 samples (42.90 %), with the highest prostate volume being >50 mL, there are 15 samples (42.90 %), and the location of the most urinary tract stone were in the lower urinary tract with the bladder stone type being 30 samples (85.7%).* ***Conclusion:*** *From the results, it can be concluded that the prevalence of urinary tract stones in BPH patients undergoing TURP surgery is 20.7%, which is an absolute indication for TURP.*

Keywords: *Benign prostatic hyperplasia, urinary tract stone, age, prostate volume.*

ABSTRAK

Tujuan: *Penelitian ini bertujuan untuk mengetahui prevalensi batu saluran kemih pada pasien BPH yang menjalani operasi TURP.* ***Bahan & Cara:*** *Penelitian ini merupakan penelitian deskriptif dengan menggunakan data sekunder berupa rekam medis pasien BPH yang menjalani TURP di Rumah Sakit Umum Daerah Saiful Anwar pada tahun 2018-2022.* ***Hasil:*** *Dari 169 sampel pasien BPH yang menjalani TURP, terdapat 35 subjek yang mengalami batu saluran kemih. Kejadian batu saluran kemih pada pasien BPH yang paling banyak terjadi pada usia 60 - 70 tahun yaitu sebanyak 15 sampel (42.90 %), dengan volume prostat terbanyak adalah >50 mL sebanyak 15 sampel (42.90 %), dan lokasi batu saluran kemih terbanyak adalah pada saluran kemih bagian bawah dengan jenis batu kandung kemih sebanyak 30 sampel (85.7 %).* ***Simpulan:*** *Dari hasil penelitian dapat disimpulkan bahwa prevalensi batu saluran kemih pada pasien BPH yang menjalani tindakan TURP sebesar 20.7% yang merupakan indikasi mutlak untuk dilakukannya TURP.*

Kata kunci: *Benign prostatic hyperplasia, batu saluran kemih, usia, volume prostat.*

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INTRODUCTION

Indonesia's elderly population is increasing in number. Several retrospective studies in Indonesia have concluded that the highest incidence of BPH cases is in the age range 60-69 years.[1] BPH is the second most common urological diagnosis experienced by men in the elderly group after urinary tract stones.[2]

BPH patients who are not treated properly can cause complications, one of which is urinary tract stones. An enlarged prostate causes pressure on the prostatic urethra. This can result in stasis of urine flow which then results in urine supersaturation. Substances dissolved in urine are salts and oxalates, uric acid, cysteine and magnesium ammonium phosphate. If the salt concentration is high accompanied by reduced urine volume, it will result in crystallization which will ultimately become urinary tract stones.

Based on the problems described, researchers are interested in knowing the prevalence

of urinary tract stones in BPH patients undergoing Trans Urethral Resection of the Prostate (TURP) surgery in RSUD Dr. Saiful Anwar (RSSA) Malang as well as other related factors.

OBJECTIVE

This study aims to determine the prevalence of urinary tract stones in BPH patients undergoing TURP surgery.

MATERIAL & METHODS

The design of this research is descriptive by using secondary data as research subjects. This research was carried out in RSSA Malang for 2 – 3 months. The research subject is medical record data patients who meet the criteria such as patients diagnosed with BPH who underwent prostate TURP surgery and were treated at RSSA Malang for the 2018-2022 period and had complete medical record data according to the factors studied, namely age, prostate volume and indication for surgery. Samples were taken with total sampling method.

Ethical approval for this study was obtained from The Health Research Ethics Committee, Faculty of Medicine Universitas Brawijaya, Malang with approval number of No. 104/EC/KEPK-S1-PD/05/2023.

RESULTS

The research sample was taken from secondary data, which is medical record data of BPH patients who underwent TURP surgery who experienced urinary tract stones and were treated at RSSA Malang for the period 2018 – 2022. During this period there were 169 samples, and from this data, we obtained a total of 35 samples that had urinary tract stones.

Table 1. Subject characteristics

Variable	Category	n	%
Age	≤ 50 years	4	2.4
	51-60 years	33	19.5
	61-70 years	67	39.6
	71-80 years	54	32.0
	81-90 years	11	6.5
	Total	169	100
Prostate Volumes	< 30 mL	24	14.2
	31-40 mL	25	14.8
	41-50 mL	22	13.0
	> 50 mL	98	58.0
	Total	169	100
Indication of Operation	a. Urinary tract		
	- Recurrent urinary retention	90	53.2
	- Urinary tract stone		
	1. Upper tract stone		
	• Kidney Stone	5	2.95
	• Ureteral Stone	-	-
	2. Lower Tract Stone		
	• Bladder Stone	30	17.75
	• Urethral Stone	-	-
	- Severe LUTS	19	11.2
	b. Renal insufficiency	7	4.1
	c. Non-urinary tract		
	- Hemorrhoid/ hernia	9	5.3
	d. Failure of medication	9	5.3
	Total	169	100

The distribution and percentage of urinary tract stone incidence in samples based on age can be seen in Figure 1. The age group of 61–70 accounts for the majority of the participants, with the least number being in the 81–90 age group.

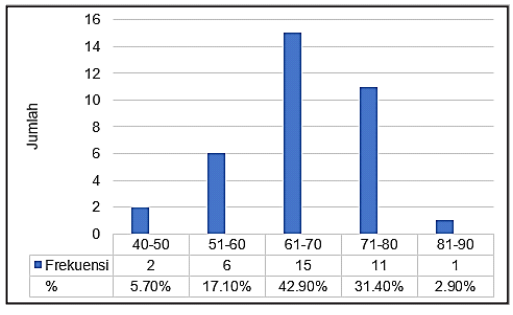

Figure 1. Distribution of urinary tract stone by age.

Figure 2 shows the distribution and proportion of urinary tract stones in samples based on prostate volume. Prostate volumes larger than 50 mL were present in 42.90% of the subjects.

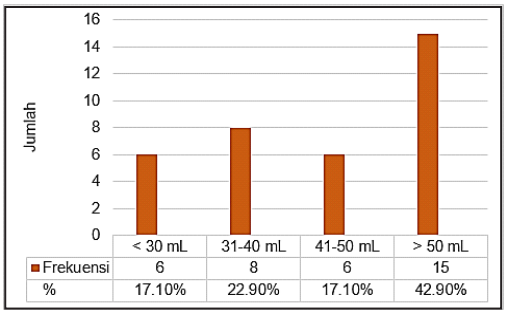

Figure 2. Distribution of urinary tract stone based on prostate volume.

The distribution and percentage of incidence of urinary tract stones in samples based on stone location can be seen in Table 2. A bladder stone affected 30 of the 35 participants (85.7%).

Table 2. Distribution of stone location on BPH patients who underwent TURP.

Variable	Category	n	%
Operation Indications	a. Upper Tract Stone		
	- *Kidney Stone*	5	14.3
	- *Ureteral Stone*	0	0
	b. Lower Tract Stone		
	- *Bladder Stone*	30	85.7
	- *Urethral Stone*	0	0
	Total	35	100.0

DISCUSSION

The results of this study show that BPH patients who underwent TURP surgery were mostly in the age range 61 – 70 years (39.6%), with prostate volume dominated by volume > 50 mL (58%), as well as indications for TURP surgery in BPH patients who frequently experienced is recurrent urinary retention (53.2%). In general, the prevalence of BPH increases with age. It was observed in autopsy studies that the histological prevalence of BPH increased by 8% in the 4th decade of life, 50% in the 6th decade of life, and 80% in the 9th decade of life.[3]

However, in this study, TURP surgery was mostly performed on patients aged 60 - 70 years. These characteristics show the same results as research by Prasetyo et al., where it was found that the highest incidence of BPH patients undergoing TURP surgery was in the age range 61 – 70 years with a mean age of 68.1 years.[2] This is also in line with research by Zuhirman et al., which showed that the largest age group for BPH patients undergoing TURP was 60 - 69 years old, namely 108 patients (38.6%).[4]

However, in this study, BPH patients with an age range of ≤ 60 years rarely underwent TURP, this may be due to the effect of using medical therapy which is able to treat LUTS, reduce prostate volume and inhibit disease progression as the first line of BPH treatment, thereby causing surgery. Invasive procedures such as TURP are decreasing in this age group.[2,5] Meanwhile, in patients ≥ 70 years of age, TURP procedures are fewer than those in the 61 - 70 years age group, this could be because not many patients reach the age of > 70 years and the number of hospital visits is indeed fewer.

In this study, BPH patients who underwent TURP surgery were dominated by prostate volume >50 mL (58%). Based on the 2021 IAUI Clinical Management Guide for BPH, TURP is the gold standard for surgery that can be performed on BPH patients with a prostate volume of 30 – 80 mL.[6] This is in line with research by Prasetyo et al, where BPH patients undergoing TURP surgery were dominated by volumes >50 mL with a mean prostate volume of 57.7 ± 29.2 mL.[2]

The surgical indication that ranks first for TURP in BPH patients is urinary retention, which is one of the absolute indications for surgical treatment (TURP). Based on the 2021 American Urological Association (AUA) Guidelines, the condition of recurrent urinary retention as a result of BPH is recommended for surgery.[7]

One of the complications of BPH is urinary tract stones, especially bladder stones. There were 5 risk factors for urinary tract stones in BPH patients that were tested statistically, which were hypertension, obesity, diabetes mellitus, hyperuricemia, and the use of antihypertension drugs.[8] Stone formation is caused by the large increase in uric acid, calcium, and oxalate excretion in the urine that occurs with hypertension.

Obesity also known to be associated with urinary tract stones incidence. Because obese people excrete more uric acid, oxalate, and calcium in their urine, they are at higher risk of developing kidney stones. Additionally, there is a strong correlation between a higher body mass index and a much lower urine pH.[9]

Urinary tract stones can occur as a result of elevated blood uric acid. Urinary tract stones are more likely to occur in those with greater blood urate levels. Due to the decreased urine pH caused by hyperuricemia, uric acid stones may result.[9]

In this study, the number of BPH patients who experienced urinary tract stones as an indication for TURP surgery was 35 people, all of whom were male with the largest age range being between 61 - 70 years. In this age range, a person is more susceptible to experiencing problems with blood circulation which can lead to the formation of stones in the urinary tract.[10] In addition, the maximum size of the proximal tubule is reached in this age range. This is quite in accordance with research in other research conducted at RSAU dr. Esnawan Antariksa regarding the factors related to the incidence of urinary tract stones, where it was found that the risk of experiencing urinary tract stones in early adulthood - seniors was 81 times higher than in early adulthood - late adulthood.[11]

Tjahjodjati et al also showed that in BPH patients at Hasan Sadikin Hospital in 2015-2018, half of them had urinary tract stones, with the most locations were in the lower urinary tract (47.3%), followed by both upper and lower urinary tract (32.4%), and only upper urinary tract (20.3%).8 Gender is known to be associated with increased risk of urinary tract stone formation. The male group has a risk of suffering from urinary tract stones that is 27 times higher than women.[11]

This can be caused by the fact that in the male group there is a higher testosterone hormone, which results in an increase in endogenous oxalate production in the liver.[12] Anatomically, men have a longer urinary tract compared to women, and the muscle mass in men is greater than in women so that the metabolic waste resulting from the breakdown of muscle cells is also greater and predisposes to the formation of urinary tract stones.[13]

In this study, it was found that urinary tract stones most often occurred in prostate volumes > 50 mL and was dominated by the bladder stone type. This is in accordance with Jung et al's research which examined the relationship between BPH and the presence of lower urinary tract stones. It was found that prostate volume which increases with age is an independent risk factor only for the formation of bladder stones.[14]

In BPH patients there is an increase in the ratio of stromal to epithelial components. The ratio of stroma to epithelium in a normal prostate is 2 to 1, but in BPH patients the ratio increases to 4 to 1. This situation will result in an increase in prostate smooth muscle tone. In general, the cause of prostate obstruction can be caused by 2 main components, namely enlarged prostate volume as a static component and increased prostate smooth muscle tone as a dynamic component.[15] TURP is one of the most common therapeutic modalities used to treat prostate enlargement, because it provides minimal effects when compared to other invasive procedures.[16] Apart from that, the advantages offered by TURP are shorter hospital stays, better symptom improvement based on the International Prostate Symptom Score (IPSS), and improved urine flow rate.[17]

CONCLUSION

Based on the results of this study, it was found that the prevalence of urinary tract stones in BPH patients undergoing TURP surgery for the period 2018-2022 in RSSA it was 20.7%, which was dominated by the age range 60 – 70 years, with the prostate volume being the most at >50 mL, and the location of the most stones being in the lower urinary tract with the most dominant type being bladder stones. We suggest conducting additional research and focusing on the composition of urinary tract stones.

The limitations of the research that has been carried out are that the completeness of secondary data is very dependent on the completeness of filling in medical records, does not explain the composition of stones, metabolic disorders, and the comorbid of the patients, and is only limited to one research location.

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