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EVALUATION OF STONE FREE RATE IN URETERAL STONE PATIENTS POST URETEROSCOPY AND LASERTRIPSY AT DR. M. JAMIL TERTIARY HOSPITAL, PADANG

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ABSTRACT Urinary tract stones are one of the most common diseases found in the field of urology. There is various choice of management of ureteral stones. Two minimally invasive surgical procedures commonly performed on patients with ureteral stones are extracorporeal shock-wave lithotripsy (ESWL) and ureteroscopy (URS). Ureteroscopy is a method of managing ureteric stones using the principle of endoscopy. Current clinical trials have found that effectivity and stone free rates of ureteroscopy are comparatively better compared to shock-wave lithotripsy with less side effects. This was an observational descriptive study using a cross-sectional approach. The study was conducted at Dr. M. Jamil Tertiary Hospital, Padang, during the period of 2017-2018. The subject of the study was every patient diagnosed with ureteral stones who underwent ureteroscopy and lasertripsy (URS) in Dr. M. Jamil Tertiary Hospital. The variables measured were age, sex, ureteral stone size, stone-free rate (SFR). SFR in patients with ureteral stones undergoing ureterorenoscopy lasertripsy was found to be 78,8%. SFR was found to be significantly different by stone length ($p = 0.01$), width ($p < 0.01$), and hydronephrosis grade ($p = 0.01$). The stone-free rate was correlated with stone size and hydronephrosis grade. Further research with a longer study period and larger sample size needs to be carried out.

KEYWORDS : ureterolithiasis, ureteroscopy, lasertripsy, stone free rate

INTRODUCTION

Urinary tract stones are one of the most common diseases found in the field of urology.[1] In the past 30 years, the prevalence of urinary tract stones continued to grow in both sexes. At the age of 70, 12% of male and 6% of female Caucasians has experienced urinary tract stones.[2] Urinary tract stones still occupy the largest portion of urology patients in Indonesia. Rahardjo and Hamid reported that in 1997-2002, 2439 patients presented to Cipto Mangunkusumo Tertiary Hospital (RSCM) with kidney stones. The prevalence of urinary tract stones in Indonesian men and women is estimated to be 3:1, with peak incidence in the fourth and fifth decade.[3]

Urinary tract stones are divided into several types based on the composition and location of the stone. Based on the composition, they can be divided into calcium stones, struvite or infection stones, uric acid stones, cystine stones and drug-induced stones. Based on the location of the stone, they can be divided into kidney calyx stones; pyelum stones; ureteral (proximal and distal) stones, and bladder stones.[1]

Ureteral stones are the cause of most complaints in patients. If the stone is small-sized, it can pass through the ureter without causing any symptoms (passing stone). However, if the stone is large (>4 mm), this will pose a variety of complaints in patients ranging from mild pain mild to decline of the ipsilateral kidney function.

There are various choice of management of ureteral stones, including watchful waiting, medical expulsive therapy, and surgery.[4] Two minimally invasive surgical procedures commonly performed on patients with ureteral stones are extracorporeal shock-wave lithotripsy (ESWL) and ureteroscopy (URS).[3] Several factors influence choice of procedure on ureteral stones: the characteristics of the stone (location and size), characteristics of the patient (body hiatus, obesity, abnormal clotting of blood, pregnancy) and the patient's preference.[1]

Ureteroscopy is a method of managing ureteric stones using the principle of endoscopy. Ureteroscopy destroy stones by insertion along the ureter until it reaches the kidney. Ureteroscopy is also sometimes equipped with a laser to increase the destruction factor to the stone. Current clinical trials have found that effectivity and stone free rates of ureteroscopy are comparatively better compared to shock-wave lithotripsy with less side effects.[2]

The purpose of our study is to evaluate the stone-free rate of ureterorenoscopy (URS) using a laser litotriptor for ureteral stones in Dr. M. Jamil Tertiary Hospital in Padang during the period of 2017-2018.

MATERIALS AND METHODS

This was an observational descriptive study using a cross-sectional approach. The study was conducted at Dr. M. Jamil Tertiary Hospital, Padang, during the period of 2017-2018. The subject of the study was every patient diagnosed with ureteral stones who underwent ureteroscopy and lasertripsy (URS) in Dr. M. Jamil Tertiary Hospital and met the inclusion and exclusion criteria. Patients with incomplete medical record and patients who received interventions other that URS lasertripsy were excluded.

The variables measured were age, sex, ureteral stone size, stone-free rate (SFR). The size of ureteral stones was measured by units of millimeters (mm). The measurements were conducted using radiologic modalities such as CT urography, abdominal CT-scan, and plain abdominal photo. Stone-free rate (SFR) is determined by size of residual stone fragments after URS lasertripsy. Patients were labelled free of stone when the post-intervention residual stone fragments averaged <3 mms, they were asymptomatic, and did not show signs of infection.

Data were collected from the results of observation and recordings, tabulated, processed, and presented descriptively in the form of tables, diagrams and narratives. Numerical data were tested for normality distribution using Shapiro-Wilk (n <50) and Kolmogorov Smirnov (n> 50)

equation. If the distribution was proven normal, then the data was reported in mean ± SD. If otherwise, the data was reported as median.

RESULTS

This study was carried out during the period of 2017-2018 at Dr. M. Jamil Tertiary Hospital, Padang, West Sumatra. Of the total 33 subjects of the study, 75.8% (n=25) were male. The average age of the study subjects was 49.70 ± 11.01. The characteristics of study subjects are presented in Table–1.

Normality test found that only age was normally distributed. Stone-free rate was not significantly different between sex (p = 1.00) and age (p = 0.94). Stone-free rate was found to be significantly different by stone length (p = 0.01), width (p <0.01), and hydronephrosis grade (p = 0.01). The median length and width of the stone was found to be significantly bigger in the group where stone persisted after intervention.

We divided the patients into group of patients with hydronephrosis grade 1 and 2, and patients with hydronephrosis grade 3 and 4 before URS and lasertripsy. In patients with hydronephrosis grade 1 and 2 we found that 11.5% had residual ureteral stones, but the number was significantly

Table – 1 Characteristics Of Subjects

Variable	Frequency (n)	Percentage
Gender		
Male	25	75,80%
Female	8	24,20%
Age (mean±SD)	49,70±11,01	
Length (median (min-max))	8,00 (6,00-13,00)	
Width (median (min-max))	3,00 (2,00-6,00)	
Hydronephrosis grade		
1	15	45,50%
2	11	33,30%
3	5	15,20%
4	2	6,10%
Stone-Free Rate		
Stone free	26	78,80%
Residual stone	7	21,20%

Table – 2 Comparison Of Stone-free Rates By Gender

Variable	Stone-free (n = 26)	Residual stone (n = 7)	p-value
Male	20 (76,90%)	5 (71,40%)	1,00
Female	6 (23,10%)	2 (28,60%)	

Exact Fisher test found no difference in SFR by gender

Table – 3 Comparison Of Stone-free Rates By Age

Variable	Stone-free (n = 26)	Residual stone (n = 7)	p-value
Age (mean±SD)	49,62±11,76	50,00±8,35	0,94

Unpaired t-test found no difference in SFR by age

Table – 4 Comparison Of Stone-free Rates By Stone Length

Variable	*Stone-free (n = 26)*	*Residual stone (n = 7)*	*p-value*
Stone length (median (min-max))	8,00 (6,00-11,00)	11,00 (7,00-13,00)	0,01

Mann-Whitney test found a significantly different SFR by stone length

Table – 5 Comparison Of Stone-free Rates By Stone Width

Variable	Stone-free (n = 26)	Residual stone (n = 7)	p-value
Stone width (median (min-max))	3,00 (2,00-5,00)	4,00 (4,00-6,00)	< 0,01

Table – 6 Comparison Of Stone-free Rates By Hydronephrosis Grade

Variable	Stone-free (n = 26)	Residual stone (n = 7)	p-value
Grade 1 and 2	23 (88,50%)	3 (42,90%)	0,02
Grade 3 and 4	3 (11,50%)	4 (57,10%)	

Exact Fisher test found a significantly different SFR by hydronephrosis gradehigher in 57.1% of patients with hydronephrosis grade 3 and 4 (p = 0.02).

DISCUSSION

The definition of stone-free rate in various studies are not always uniform. Some studies define stone-free as no residual stone left behind after treatment.[19,20] Other studies propose using a scale based on the size of residual stones, evaluated using post-surgery ultrasound, CT-scan, or plain abdominal BNO.[21] Experts initially argued that stone-free means patients with residual fragments of stone measuring <4-5 mm who were asymptomatic and did not show symptoms of infection. However, in long-term follow-ups it was found that 40% of patients with residual stone measuring <5 mm returned complaining of symptoms and needed further intervention. In our study, we define patients as stone-free when residual fragments measured <3 mm, patients were asymptomatic, and did not show symptoms of infection.

We found a stone- free rate of 78.8%, which was a relatively good figure compared to past research. Ghani et al.[9] who reviewed 9 different studies on mean SFR, found that patients with ureteral stones who were treated using URS had SFR of 84.5% (57-97%). Three other studies who defined stone-free as zero fragment rate found 76% (59-94%) stone-free patients post-treatment using URS.

We found that gender and age did not influence post-treatment SFR. This is in line with previous research stating that there is no significant correlation between sex, age, and stone-free rate in patients with ureteral stones.

We found that initial size of the stones was one of the most important factors predicting and influencing stone-free rate in patients with ureteral stone undergoing lasertripsy using URS. This is in line with previous studies stating that higher stone burden is correlated with lower stone-free rate in patients with ureteral stones.[19,20] In 2012, a meta-analysis by Aboumarzouk et al. collecting data from 10 studies, examined the use of URS in patients with large-sized urinary tract stones. They reported a relatively low stone-free rate in patients with residual stone measuring <4 mm who underwent a single URS. From this meta-analysis it was found that SFR in single and first URS measured only 56.8% (23-74%), with SFR of 86.3% (47-97%) after repeated URS.[18]

Our study is also in line with research conducted by Kaygizis et al. in 2015 on correlation between stone size and URS success. Kaygizis et al. divided their research subjects into 2 groups of patients with initial stone size measuring <2 cm and >2 cm. Patients with initial stone size of <2 cm had SFR of 96.5%. In contrast, the numbers declined drastically to 58.3% in patients with initial stone size measuring >2 cm.[4]

We found that hydronephrosis grade also significantly affected stone-free rate in patients with ureteral stones. In patients with hydronephrosis grade 1 and 2 we found that only 11.5% had residual ureteral stones after URS, which was significantly different when compared to patients with hydronephrosis grade 3 and 4, where 57.1% still had residual stones after lasertripsy using URS. This was different compared to earlier research which did not find any correlation between hydronephrosis grade and stone-free rate. Somani et al. in 2014 found that hydronephrosis grade

was not correlated with effectivity of lithotripsy in patients with urinary tract stones.[21] Atmoko et al. in 2016 also found that in Indonesian patients with ureteral stones, hydronephrosis grade was not correlated with stone-free rates.[20]

This study has several limitations. We included a relatively small number of subjects. A longer period of research may generate better validated data. Several variables suspected to affect stone-free rate in patients with ureteral stones was not included in the study. We did not perform multivariate analysis to observe the effect of interaction between variables and which variables are more influential in our subset of patients.

CONCLUSIONS

Stone-free rate in patients with ureteral stones undergoing ureterorenoscopy lasertripsy at Dr. M. Jamil Tertiary Hospital, Padang, Sumatera Barat, was found to be 78,8%. The stone-free rate was correlated with stone size and hydronephrosis grade. Further research with a longer study period and larger sample size needs to be carried out. Other potentially confounding variables needs to be explored. Multivariate analysis needs to be done to observe the effect of interaction between variables.

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