

STONE FREE RATES OF KIDNEY STONE WAS LOWER THAN THE ONE OF URETER STONE PATIENTS MANAGED BY ESWL AND THE ONE OF URETER STONE MANAGED BY URETEROLITHOTRIPSY

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ABSTRACT

Objective: To evaluate the stone free rates of kidney and ureter stone patients managed by Extracorporeal Shockwave Lithotripsy (ESWL), and the ureter stone free rate managed by ureterolithotripsy. **Material & method:** We reviewed the medical records of kidney and ureter stone patients managed by ESWL and ureter stone patients managed by ureterolithotripsy in Arifin Achmad Regional General Hospital Pekanbaru Riau Province, Indonesia, from January 2010 - December 2016. ESWL and ureterolithotripsy stone free rates were examined by the control of KUB röntgens. **Results:** There were 891 kidney and ureter stone patients consisting of 325 (36.5%) were kidney stone patients and 566 (63.5%) were ureter stone patients. The pyelum stones were the most (78.2%) in kidney stones and the lower ureter stones were the most (57.2%) in ureter stones. There were more male patients than the female ones in which most of the patients were in the group age of 49-59 years. The amount of patients increased each year. The kidney stone free rate managed by ESWL was lower (71.7%) than ureter stone free rate (84.1%) by ESWL, while the stone free rate of ureter stone patients managed by ureterolithotripsy was 100%. **Conclusion:** The ESWL stone free rate of the kidney stone patients was lower than the one in ureter stone patients while the ureterolithotripsy stone free rate was 100%.

Keywords: Extracorporeal shockwave lithotripsy, kidney stone, ureter stone, ureterolithotripsy, stone free rate.

ABSTRAK

Tujuan: Tujuan penelitian ini adalah untuk mengevaluasi angka bebas batu pada pasien batu ginjal dan pasien batu ureter yang ditatalaksana dengan Extracorporeal Shockwave Lithotripsy (ESWL), dan angka bebas batu pada pasien batu ureter yang ditatalaksana dengan ureterolithotripsy. **Bahan & cara:** Kami melihat kembali semua rekam medis pasien batu ginjal dan pasien batu ureter yang ditatalaksana dengan (ESWL) dan pasien batu ureter yang ditatalaksana dengan ureterolithotripsy di RSUD Arifin Achmad Pekanbaru Provinsi Riau Indonesia dari January 2010 - December 2016. Angka bebas batu dua minggu setelah ESWL dan ureterolithotripsy diperiksa dengan röntgen BNO kontrol. **Hasil:** Terdapat 891 pasien batu ginjal dan batu ureter yang terdiri dari 325 (36.5%) pasien batu ginjal dan 566 (63.5%) pasien batu ureter. Batu pyelum adalah paling banyak (78.2%) pada batu ginjal dan batu ureter distal adalah yang paling banyak (57.2%) pada batu ureter. Pasien laki-laki lebih banyak daripada pasien perempuan dimana yang terbanyak adalah kelompok usia 49-59 tahun. Jumlah batu ginjal dan batu ureter meningkat setiap tahun. Angka bebas batu pada pasien batu ginjal ditatalaksana dengan ESWL lebih rendah (71.7%) dibanding angka bebas batu ureter (84.1%) yang ditatalaksana dengan ESWL, sedangkan angka bebas batu pada pasien batu ureter yang ditatalaksana ureterolithotripsy adalah 100%. **Simpulan:** Angka bebas batu yang ditatalaksana dengan ESWL pada pasien batu ginjal lebih rendah daripada angka bebas batu yang ditatalaksana dengan ESWL pada pasien batu ureter, sedangkan angka bebas batu yang ditatalaksana dengan ureterolithotripsy pada pasien batu ureter adalah 100%.

Kata kunci: Extracorporeal shockwave lithotripsy, batu ginjal, batu ureter, ureterolithotripsy, angka bebas batu.

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INTRODUCTION

Urinary tract stone had been known since the beginning of human civilization proven by the discovery of urinary tract stone in pelvis Egyptian's mummy from 4800 years before Christ.¹ In Indonesia, the incidence of urinary tract stone were not known exactly but an estimated 170.000 cases per year and this disease was the third of the most prevalent in the field of urology after urinary tract infection and benign prostatic hyperplasia.²

The management of urinary tract stones can be: (1) Observation (also called expectant management and watchful waiting), (2) Extra-corporeal Shockwave Lithotripsy (ESWL), (2) Percutaneous Nephrolithotripsy (PNL), (3) uretero-lithotripsy, and (4) open surgery.³ Following its clinical introduction by Chaussy et al,⁴ in 1980 ESWL became the most common treatment modality with the safe and successful results in kidney and ureter stones.⁵

OBJECTIVE

In this study, we reviewed the stone free rates of kidney and ureter stone patients managed by Extracorporeal Shockwave Lithotripsy (ESWL),

and ureter stone patient stone free rate managed by ureterolithotripsy.

MATERIAL & METHODS

This was a descriptive retrospective study by reviewing the medical records of kidney and ureter stone patients managed by ESWL and ureter stone patients managed by ureterolithotripsy in Arifin Ahmad Regional General Hospital Pekanbaru, Riau, Indonesia, from January 2010 to Desember 2016. In this hospital the piezoelectric type was used for ESWL and lithoclast was used for ureterolithotripsy. Two weeks after the managements, ESWL and ureterolithotripsy stone free rates was examined by the control of KUB röntgens. Statistical analysis of univariate was used. Approval on the study was obtained from the Ethical Review Board for Medicine and Health Research, Medical Faculty, University of Riau.

RESULTS

There were 891 kidney and ureter stone patients consisting of 325 (36.5%) were kidney stone patients and 566 (63.5%) were ureter stone patients (Table 1). There were more male patients than the

Table 1. Kidney and ureter stone patients according to sex.

	Sex				Total	
	Male		Female			
	N	F (%)	N	F (%)	N	F (%)
Kidney Stone	199	61.2	126	38.8	325	100
Ureter Stone	369	65.2	197	34.8	566	100
Total	568		323		891	100

Table 2. Kidney and ureter stone patients according to age.

Age group (year)	Kidney stone		Ureter stone		Total
	N	F (%)	N	F (%)	
< 20	0	0	10	1.8	10
20-29	17	5.1	58	10.4	75
30-39	69	21.6	162	28.5	231
40-49	113	34.5	165	29.2	278
50-59	81	24.9	110	19.4	191
60-69	35	10.8	48	8.4	83
≥ 70	10	3.0	13	1.5	23
Total	325	100	566	100	891

Table 3. Patient managements according to year.

Year	Management				Total	
	Ureterolithotripsy		ESWL			
	N	F (%)	N	F (%)	N	F (%)
2010	11	100	0	0	11	100
2011	12	80	3	20	15	100
2012	6	10.5	51	89.5	57	100
2013	10	7.6	121	92.4	131	100
2014	5	1.6	250	98.4	255	100
2015	11	100	0	0	11	100
2016	15	3.6	396	96.4	411	100
Total	70	7.7	821	92.3	891	100

Table 4. Patient characteristic according to stone locations.

Location	Stone location	N	F (%)	Total F (%)
Kidney Stone	Pyelum	254	78.2	28.5
	Calyx	36	11	4.0
	Pelviocalyx	35	10.8	3.9
Total		325	100	36.5
Ureter Stone	Upper ureter	206	36.4	23.1
	Middle ureter	18	3.2	2.0
	Lower ureter	344	60.4	38.4
Total		566	100	63.5

Table 5. ESWL stone free rate based on the control KUB röntgent in kidney and ureter stones.

Diagnosis	Control of KUB röntgent				Total
	Residual stone		Stone free		
	N	F (%)	N	F (%)	
Kidney Stone	92	28.3	233	71.7	325
Ureter Stone	79	15.9	417	84.1	496
Total	171	20.8	651	79.2	821

Table 6. Ureterolithotripsy stone free rate based on the control of KUB röntgent in ureter stones.

Diagnosis	Control of KUB röntgent				Total
	Residual stone		Stone free rate		
	N	F (%)	N	F (%)	
Ureter stone	0	0	70	100	100
Total	0	0	70	100	100

female ones in which most of the patients were in the group age of 49-59 years (Table 2). The amount of patients increased each year (Table 3). The pyelum stones were the most (78.2%) in kidney stones and

the lower ureter stones were the most (57.2%) in ureter stones (Table 4). The kidney stone free rate by ESWL was lower (71.7%) than ureter stone free rate (84.1%) by ESWL (Table 5), while the stone free

rate of ureter stone patients managed by ureterolithotripsy was 100% (Table 6).

DISCUSSION

This study showed kidney and ureter stones suffered more male than women (Table 1). Previous study by Suka (2006) in Arifin Achmad Regional General Hospital, Pekanbaru, Riau province, Indonesia in 2002-2006 found kidney and ureter stones suffered more (81.7%) male patients than (24.5%) in female patient.⁶ This study suited several studies stated that kidney stones were more found in men with the incidence three times higher than in women.⁷

Anatomically the male urinary tract which is longer than the female results in the sedimentation process of stone formation becoming more possible in male urinary tract. Other significant causes are the concentration of calcium in the urine as the main material for the formation of the stone found less in women, and the concentration of urine citrate which inhibits the formation of the stone are more in women. Besides that, the estrogen level in women can inhibit the aggregation of calcium crystal. Higher level of testosterone in men may cause the increase of endogen oxalate produced by the liver resulting in the stone crystallization.⁸

This study showed that most patients with kidney and ureter stones were mostly (34.5%) in the age group of 40-49 years old and the least (1.8%) were in the group of less than 20 years old (Table 2). The result suited the previous study by Suka (2006) in this hospital found the most (24.4%) patients were in the group age 40-49 years old.⁶ This study suited other studies showing that stone disease commonly suffered the patients in the third until the fifth decades of lives.^{3,6} Urinary stone is a chronic disease which can take quite a long time and slowly will damage the urinary system itself. As the age of a person passed it can cause some disturbances for the blood flow such as hypertension and high cholesterol. Hypertension may cause calcification of the kidney that can lead to stone, and as for high cholesterol can stimulate the aggregation of the calcium oxalate crystal and the calcium phosphate resulting in stone is easily formed.⁸

There were increases of managements of kidney and ureter stone patients with ESWL and stone patients with ureterolithotripsy in our hospital each year from 2010 until 2016. The most (411) patients underwent those therapies in 2016 and the

least (11) patients underwent those in 2010. There were increases on the number of kidney and ureter stone patients underwent those two managements in our hospital (Table 3).

The annual increase of the kidney and ureter stone patient amount underwent ESWL or ureterolithotripsy might be due to the availability of ESWL and holmium laser equipments in our hospital. The change of lifestyle such as low fluid intake the urine volume resulting urinary supersaturation and decreasing the urine output, high animal protein and carbohydrate, the increase of calcium, dairy product, oxalate (such as tea, coffee, peanuts, and spinach), vitamin C or vitamin D intakes have been known participating in urinary stone incidence.⁶

This study showed that the pyelum stones were the most (78.2%) in kidney stones and the lower ureter stones were the most (57.2%) in ureter stones (Table 4). Previous study in our hospital (2010) showed the locations of urinary tract stones were renal stone 28.3%, ureter stone 51%, bladder stone 17.7% and urethral stone 3%. Ureter stones were the most.⁹

Ureter is a small tube that connects the kidney and bladder. The ureter has three normal narrow parts, namely in uretero-pelvic junction, the point as it passes iliac vessels, and at the meeting point with bladder. In general, a 4-5 mm diameter size of ureter stone may be able to pass spontaneously through ureters and usually come out with urine. Stones can get stuck in these three normal narrow parts resulting in colicky pain (ureter colic).¹⁰ It may cause obstruction and hydronephrosis even resulting in damage of the kidney.

The kidney stone free rate by ESWL was lower (71.7%) than ureter stone free rate (84.1%) by ESWL (Table 5), while the stone free rate of ureter stone patients managed by ureterolithotripsy was 100% (Table 6). These results suited previous study by Ardila (2012) showed the stone free rate on ESWL treatment of ureter stones was 94.7% and the one of kidney stone was 73%. A study by Glenn (2007) the stone free rate of ureteral stone managed by ureterolithotripsy was 97%.¹⁰ The kidney stone free rate with ESWL in our study was lower than the one in Ardila's study in the same hospital but the ureter stone free rate with ureterolithotripsy was 100%.

The outcome of treating kidney and ureter stone is to achieve complete stone clearance with minimal patient morbidity. ESWL and ureterolitho-

tripsy have become the standard management of kidney and ureter stones. However, the optimal choice of the treatment depends on various factors, including stone size, composition and location, clinical patient factors, equipment availability and surgeon capability.¹¹ ESWL is effective to be used as a first-line treatment for patients with ureter stones measuring 10mm. According to The American Association Guidelines Panel Stone, ESWL is a first-line therapy for kidney and ureteral stones measuring less than 20 mm.¹² The weakness in our study could be the impairment of the ESWL equipment in 2015 resulting in no data of ESWL management in that year and we did not gain various factors such as the composition and clinical factors might be influencing the stone free rate.

CONCLUSION

The ESWL stone free rate of the kidney stone patients was lower than the one in ureter stone patients while the ureterolithotripsy stone free rate was 100%.

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