Original Article

Evaluation of calcium oxalate stones size using kidney, ureters and bladder, fluoroscopy and post lithotripsy procedures

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Abstract

Objectives: This study aimed to measure renal stone using different modality (kidney, ureters and bladder [K.U.B], fluoroscopy and intravenous urography [I.V.U]), to compare these three methods of measurements and to detect the variation of stones size after each lithotripsy shock for the same type of stones. **Materials and Methods:** A total of 26 patients males (19) and females (7) their age ranged between 18 and 70 years with renal stones, I.V.U, K.U.B were done for all cases. In Al Nelain Medical Centre, The size of renal stone was measured in K.U.B and I.V.U by using the Ruler exposure. Staghorn stones which were >4 cm needed >4 times of exposure to. **Results:** The findings were found to be that stone <1 cm can be measured but does not disintegrated by lithotripsy and most of the stones that were >1 cm were properly measured when using the fluoroscopy and were treated effectively after 2nd time of the shock waves. **Conclusion:** This study concluded that the surface area, site, number of stones after extracorporeal shock wave lithotripsy (ESWL) could be detected using K.U.B, I.V.U and fluoroscopy, and could help in prospective selection of patients who will respond well to ESWL.

Key words: Fluoroscopy, lithotripsy, oxalate, renal stone

INTRODUCTION

Urolithiasis is a problem that has confronted clinicians since the time of Hippocrates, and many family physicians have extensive experience in its clinical management. The prevalence of urolithiasis is approximately 2–3% in the general population, and the estimated lifetime risk of developing a kidney stone is about 12% for white males.[1] Approximately, 50% of patients with previous urinary calculi have a recurrence within 10 years.[2]

In the United States, the prevalence of kidney stones has risen over the past 30 years.[3] Eleven percent of men and 5.6% of women, will have a stone by 70 years of age; the risk is about 3 times higher in Caucasians than African Americans. About 80% of stones are composed of calcium oxalate with variable amounts of calcium phosphate. Diagnosis of a calcium stone requires analysis after passage or removal of the stone. After the first stone, the risk of recurrence is 40% by 5 years, and 75%

Access this article online	
Quick Response Code:	Website: www.sudanmedicalmonitor.org
	DOI: 10.4103/1858-5000.149833

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by 20 years. Among recurrent calcium stone formers (e.g. those in the placebo arms of randomized controlled trials of interventions), 43–80% formed new stones within 3 years.[4-11] Hospitalizations, surgery, and lost work time due to stones cost over $5 billion yearly in the United States.[12] Stone formation is associated with increased rates of chronic kidney disease and hypertension,[13,14] which are not completely explained by obesity, a risk factor for each of these conditions.[15] Although many inherited and systemic diseases are associated with calcium kidney stones.[16]

Extracorporeal shock wave lithotripsy, which was first conducted in Germany during 1980, is a noninvasive treatment of renal stone disintegration by shock waves, with a high success rate and approximately 90%.[1] The mechanism dependent on the destruction the stone in small pieces to become easy to bass outside the body by the ureter in renal stone or by common bile duct in gall stone.[17]

Before the procedure of lithotripsy, the patient must do intravenous urography (I.V.U) or kidney, ureters and bladder (K.U.B) or ultrasound for kidney to measure stone size and localize the stone.

This study aimed to measure renal stone using K.U.B and fluoroscopy to compare between the three methods for measurement and to detect the variation of size after each shock for the same type of the stone and correlate for each reading the age of the study population was categorized in six groups as shown in Figure 1.

MATERIALS AND METHODS

Equipments

Fluoroscopy machine: C-arm, and two Conventional machine: Major types of machines made by Toshiba Company- maximum MA is 500, maximum KV is 150-minimum MA is 50-minimum.

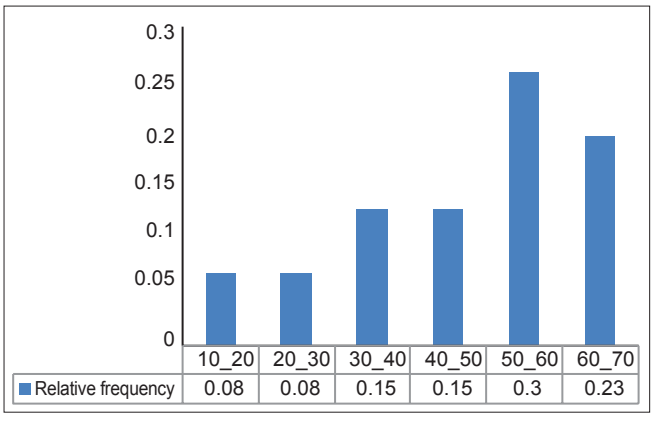

Figure 1: A frequency of cases according to age (from researcher source)

Methods

A total of 26 patients males (19) and females (7) their age ranged between 18 and 70 years with renal stones, I.V.U, K.U.B were done for all cases [Table 1]. In Al Nelain Medical Centre.

Measurement procedure

The size of renal stone was measured in K.U.B and I.V.U by using a ruler.

RESULTS

The study population composed of 19 males and 7 females who complicated renal stones (calcium oxalate). Statistical tests were used to analyze the data which presented in tables and figures. The confidence interval selected value (*P*-value) was 5%, values less than 5% were considered to be significant.

DISCUSSION

This research aim to measure renal stone using (K.U.B, I.V.U and fluoroscopy), to compare between the three methods

Table 1: Patients sex, age and the size using different radiological examination (K.U.B, I.V.U and fluoroscopy) among the study population

Sex	Age	Type of stone	K.U.B	I.V.U	Fluoroscopy
Female	60	Calcium oxalate	1.3	1.3	1.95
Male	40	Calcium oxalate	1.7	1.7	2.55
Male	65	Calcium oxalate	2	2	3
Female	58	Calcium oxalate	1.5	1.5	2.55
Male	53	Calcium oxalate	3	3	4.5
Female	38	Calcium oxalate	4	4	6
Female	62	Calcium oxalate	2.5	2.5	3.75
Male	65	Calcium oxalate	2.2	2.2	3.3
Male	25	Calcium oxalate	1.8	1.8	2.7
Male	70	Calcium oxalate	3.5	3.5	5.25
Female	41	Calcium oxalate	2.6	2.6	3.9
Male	51	Calcium oxalate	2.1	2.1	3.15
Male	18	Calcium oxalate	1.8	1.8	2.7
Male	22	Calcium oxalate	2.2	2.2	3.3
Male	50	Calcium oxalate	1.6	1.6	2.4
Male	36	Calcium oxalate	1.9	1.9	2.85
Male	42	Calcium oxalate	1.8	1.8	2.7
Male	56	Calcium oxalate	1.2	1.2	1.8
Female	31	Calcium oxalate	1.8	1.8	2.7
Male	60	Calcium oxalate	2.1	2.1	3.15
Male	27	Calcium oxalate	1.9	1.9	2.85
Male	63	Calcium oxalate	2	2	3
Male	54	Calcium oxalate	3.1	3.1	4.65
Male	20	Calcium oxalate	2	2	3
Male	49	Calcium oxalate	1.8	1.8	2.7
Female	70	Calcium oxalate	1.6	1.6	2.4

K.U.B = Kidney, ureters and bladder, I.V.U = Intravenous urography

Table 2: The relation between size of stones and number of ESWL procedures among the study population

Sex	Age	Size of stone before lithotripsy	Stone's size after lithotripsy procedures			
			1st procedure	2nd procedure	3rd procedure	4th procedure
Male	25	3	2.3	0.5	0	0
Male	50	4.9	3.7	2.4	1.3	0.4
Female	43	2.6	1	0.4	0	0
Male	37	2.7	1.9	1	0	0
Female	46	3.08	2.01	0.9	0	0
Male	57	4.32	3.2	1	0	0
Male	54	4.02	3.07	2	1.3	0.6
Female	50	2.6	1.09	0	0	0
Male	65	4	3.1	2.08	1.2	0.5
Male	60	4.63	3.5	2.4	1.5	0.4

Zero means no stones were detected or can be measured; ESWL: Extracorporeal shock wave lithotripsy

Table 3: The mean and SD and significant value of the selected sample among the study population

Sample	Mean	SD	*P*
Pre	3.5	1.0	0.00
Post 1	2.4	1.0	0.00
Post 2	1.2	0.9	0.00
Post 3	0.5	0.6	0.00
Post 4	0.1	0.2	0.00

SD = Standard deviation

for measurement and to detect the variation of size after each shock for the same type of the stone and correlate for each reading. A group of 26 patients were selected with different sex and ages between 18 and 70 years old, complained of renal stones that were analyzed as calcium oxalate type. The radiological investigations which were done to measure the size of renal stones were K.U.B with which the sizes of stones detected measuring (1.2-4 cm), I.V.U which is similar to K.U.B and fluoroscopy which is different from K.U.B and I.V.U and the of stones size detected between (1.8 and 6 cm). The relationship between frequency of occurrence of renal stones and different ages of patients which was shown in Table 2, as being as follows: (10–20 years) its frequency was 2, (20-30 years) its frequency was also 2, (30–40 years) its frequency was 4, (40–50 years) its frequency was also 4, (50–60 years) its frequency was 8, (60–70 years) its frequency was 6. The occurrence of renal stones is common in the ages between 50 and 60 years for different patient's sex. The ability of formation of renal stones is more common in males (19 patients) than females (7 patients) as Table 3 showed. In Table 2 shows ten patients with different size of stones (4.9–2.6 cm), ages (25–65 cm) and sex (7 males and 3 females). These patients have done different numbers of procedures, the number of cases which need one procedure was one case, two procedures were five cases, three procedures were zero, four procedures were four cases (the stag horn stone which is approximately 4 cm was observed to be decrease about 1 cm after each procedure).

CONCLUSION

The measurement of the renal stone using K.U.B, I.V.U and fluoroscopy and to use the fluoroscopy as excellent detection modality to measure the stone size, for further studies ultra sound can be used to measure the stone size.

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How to cite this article: Ayad CE, Yousef M, Gamaraldin M, Omer FA, Abdalla NM, Babiker SH, *et al*. Evaluation of calcium oxalate stones size using kidney, ureters and bladder, fluoroscopy and post lithotripsy procedures. Sudan Med Monit 2014;9:113-6.

Source of Support: Nil. **Conflict of Interest:** None declared.