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Urology

EFFICACY OF ESWL IN THE MANAGEMENT OF LOWER URETERIC CALCULUS

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ABSTRACT

INTRODUCTION : The usual indications for intervention in case of lower ureteric calculus are intolerable or intractable symptoms, infection, obstruction, and a stone that is unlikely to pass spontaneously. Both ESWL and ureteroscopy are considered to be highly effective. In situ ESWL provides optimal first line therapy for distal ureteral calculi, while ureteroscopy is better reserved as a salvage procedure should ESWL fail. The success rate of ESWL is dependent upon multiple factors such as stone size, composition, location, presence of obstructive changes and anatomical anomalies. Stone composition determines the fragility of calculus and its susceptibility to ESWL.

AIM AND OBJECTIVES :

1) To analyze the efficacy of ESWL in the management of lower ureteric stone
2) To find out target patients for ESWL in the management of lower ureteric calculus.

MATERIALS AND METHODS: Patients included in the study were divided into 2 groups based on stone size. Group 1:≤10 mm and Group 2: >10 mm. Patients again divided based on C.T –H.U into Groups A and B, Group A: ≤1000 HU & Group B :> 1000 H.U.

RESULT:

1. ESWL is a safe method to treat stones with proper indication.
2. HU measurement of calculi may be beneficial for selecting the preferred treatment option for urinary calculi.
3. For patients with lower ureteric calculus size ≤ 10 mm and CT – H.U <1000, ESWL may be considered as the primary treatment option.
4. Other modalities of treatment may be helpful in cases with stone size >10mm and CT-H.U >1000.

KEYWORDS : Eswl, Calculus, Ursl, Hu, Ureteric

INTRODUCTION :

The usual indications for intervention in case of lower ureteric calculus are intolerable or intractable symptoms, infection, obstruction, and a stone that is unlikely to pass spontaneously.

Minimally invasive treatment modalities are now so widely available with the clear advantage to the patients in terms of decreased morbidity, low overall cost, earlier return to home and work, and comparable stone clearance rate.

Hence, it is many a times perhaps better option to go for these modalities than to perpetually waiting for the ureteric stone to come out spontaneously relying on not so much reliable pharmacotherapy.

As per Lingeman and associates, SWL or URSL is less costly than in hospital pharmacotherapy. However, many patients will pass the stone spontaneously.

Both ESWL and ureteroscopy in the management of patients with distal ureteric calculi are considered to be highly effective.

The width of the stone is the most significant factor which determines the likelihood of stone passage, provided there is no external ureteric compression or internal narrowing (Ueno et al, 1977).[1]

The likelihood of spontaneous stone passage was also related to location of the calculus at the time of presentation.

Segura and associates reported that for 1patients with stones of 5 mm or less, conservative management should be considered, whereas for larger stones intervention is recommended.[2]

The greatest dilemma for the urologist is "to blast or not to blast" (i.e., to choose between—SWL and ureteroscopy).

Success of ESWL has been correlated with radio density of the stone on plain X-ray KUB.

The density of stone is measured by NCCT in Hounsfield Unit (HU determines the fragility of a calculus and therefore the clinical outcome in ESWL. ESWL is noninvasive, associated with less morbidity than ureteroscopy.

AIM AND OBJECTIVES :

1) To analyze the efficacy of ESWL in the management of lower ureteric stone
2) To find out target patients for ESWL in the management of lower ureteric calculus.

MATERIALS AND METHODS :

This is a prospective study done in the Institute of urology, Madras medical college, Chennai, over a period of 1 year (Jan 2018 to Jan 2019).

INCLUSION CRITERIA:

1. Patients with unilateral lower ureteric calculus willing for extracorporeal shockwave lithotripsy
2. Patients with normal renal parameters
3. No previous treatments for the same ureteric calculus

EXCLUSION CRITERIA:

1. Unwilling for ESWL
2. Bilateral ureteric calculi
3. Ureteric obstruction distal to calculus
4. Coagulation abnormalities
5. Pregnancy
6. Sepsis
7. End stage renal disease.

All patients were explained in detail regarding different treatment modalities and their complications–medical expulsion therapy, URSL & intracorporeal lithotripsy and extracorporeal lithotripsy.

Patients included in the study were divided into 2 groups based on stone size. Group 1:≤10 mm and Group 2: >10 mm.

Patients again divided based on C.T –H.U into Groups A and B,
Group A: ≤1000
Group B :> 1000 H.U.
Hence study group contains,
Group 1A: ≤10 mm and H.U:≤1000,
Group 1 B: ≤10mm and H.U > 1000,
Group 2A: >10 mm and H.U:≤1000,
Group 2 B: >10mm and H.U > 1000.

RESULTS

The study comprised of 72 patients who had satisfied the inclusion and exclusion criteria.

Table-1: **AGE DISTRIBUTION**

Age of the patients ranged from 17-70 yrs, most patients were in 21-50yrs

AGE (YRS) NO	NO OF PATIENTS
<20	8
21-30	29
31-40	12
41-50	15
51-60	6
>60	2

Table-2: SEX DISTRIBUTION

There were 53 male and 19 female patients in our study

Gender	Group 1(≤10 mm)	Group 2(>10 mm)	Total
Male	29/ (78.4%)	25/(71.4%)	54/75.0%
Female	8/(21.6%)	10/30.4%	18/25.0%
Total	37/ (100.0%)	35/100.0%	72/100.0%

Table-3: STONE SIZE DISTRIBUTION

Size	No of patients
Group1(≤10mm)	37
Group2(>10mm)	35

Table-4: CT HU DISTRIBUTION with PERCENTAGE

HU	GROUP 1(≤10mm)	GROUP 2(>10mm)	TOTAL
≤1000	36/(97.3%)	24/(68.6%)	60/(83.3%)
>1000	1/ (2.7%)	11/(31.4%)	12/(16.7%)
total	37/ (100.0%)	35/(100%)	72/(100.0%)

Table-5: STONE FREE RATE –SIZE

Stone free rate in ≤10mm group was 33/37 patients (89.2%) and in >10mm group was 20/35 patients (57.1%).This difference was statistically significant (p-<0.01).

ESWL	GROUP 1(≤10mm)	GROUP 2(>10mm)	TOTAL
SUCCESS	33(89.2%)	20(57.1%)	53(73.6%)
FAILURE	4(10.8%)	15(42.9%)	19(26.4%)
Total	37(100.0%)	35(100.0%)	72(100%)

Table-6: STONE FREE RATE IN GROUP 1(≤ 10 mm)

In Group 1(≤ 10 mm) stone free rate based on C.T-H.U showed : when C.T H.U was ≤1000, success rate significantly higher than > 1000 H.U.

STONE FREE RATE	**≤1000 H.U GROUP 1 A**	**> 1000 H.U GROUP 1 B**	**TOTAL**
SUCCESS	33(91.7%)	0	33(89.2%)
FAILURE	3(8.3%)	1(100%)	4(10.8%)
TOTAL	36(100%)	1(100%)	37(100%)

Table-7: STONE FREE RATE IN GROUP 2(> 10 mm)

In Group 2 (> 10 mm) stone free rate based on C.T –H.U showed: when C.T -H.U was ≤1000 success rate was 75%, significantly higher than > 1000 H.U. (P<0.01)

STONE FREE RATE	**≤1000 H.U GROUP 2 A**	**> 1000 H.U GROUP 2 B**	**TOTAL**
SUCCESS	18(75%)	2(18.2%)	20(57.1%)
FAILURE	6(25%)	9(81.8%)	15(42.9%)
TOTAL	24(100%)	11(100%)	35(100%)

Table-8: STONE FREE RATE –HU

When CT-HU increases success rate decreases, when HU was ≤1000 (Group 1A & Group 2A) 51 patients (85%) successfully cleared their stones, failure occurred only in 9 patients (15%).

When HU > 1000(Group 1B &Group 2 B) only two patients cleared the stone (16.7%), failed in 10 patients (83.3%), this difference was statistically significant (P<0.001).

Stone free rate:	**≤1000HU**	**> 1000**	**TOTAL**
SUCCESS	51(85.0%)	2(16.7%)	53(73.6%)
FAILURE	9(15.0%)	10(83.3%)	19(26.4%)
Total	60(100.0%)	12(100.0%)	72(100.0%)

DISCUSSION

The introduction of extracorporeal shock wave lithotripsy (ESWL) in the early 1980s revolutionized the treatment of patients with urolithiasis. Patients who once required major surgery to remove their stones could be treated with ESWL.

ESWL involves the administration of a series of shock waves to the targeted stone. The shock waves, generated by a lithotripter, are focused by x-ray onto the stone , thereby breaking it into small fragments. For several weeks following treatment, those small fragments are passed out of the body in the urine.

Shock wave lithotripsy has become a widely used modality for treating urinary calculi due to its noninvasive nature and ease of application. Although success rates are reasonable, there is room for improvement. With appropriate patient selection, significant improvements in stone-free rates may be achieved [3].

ESWL is less effective than ureteroscopy but it may prevent the need for more invasive treatment in a substantial proportion of patients. It should only be considered as initial treatment in patients with stones less than 10mm in size. [4]

Evaluation of patients prior to ESWL is especially important, and the use of imaging in the decision process, with the use of computed tomography attenuation values and skin-to-stone distance, can help improve our ability to identify suitable patients for shock wave treatment.[5]

The primary goal of ESWL is a stone-free state, and the **AUA/EAU guidelines panel's meta-analytic study[6]** reported that with ESWL in distal ureteric stone <10mm, in 17 groups containing 1684 patients stone free rate was 86% (80-91) % ; in our study , the stone free rate was 89.2 %. In >10mm groups containing 966 patients stone free rate was 74 %; in our study it was only 57.1%.

Ghafoor et al studied the efficacy of ESWL in the treatment of lower ureteric stones & concluded that for distal ureteric stones <10 mm in diameter, the clearance rate is more than 70% and ESWL can be considered as a primary treatment, while for stones larger than 10 mm in diameter, endoscopic removal should be the preferred treatment [7]

In a study by Nakasato et al.(2014), treatment success rates were significantly higher for stones <815 HU than with stones >815 HU (P < 0.0265). Evaluation of stone HU values prior to ESWL can predict treatment outcome and aid in the development of treatment strategies [8].

Joseph et al assessed the susceptibility of stone fragmentation by ESWL according to HU in renal stone, they found that the success rate for stone with attenuation value < 1000 HU was significantly higher than that for stone with value >1000 HU [9].

In our study, when HU was ≤1000 (Group 1A & Group 2A) 51 patients (85%) successfully cleared their stones, failure occurred only in 9 patients (15%).

When HU > 1000(Group 1B &Group 2 B) only two patients cleared the stone (16.7%), failed in 10 patients (83.3%), this difference was statistically significant (P<0.001).

CONCLUSION

1. ESWL is a safe method to treat stones when proper indications are followed.
2. HU measurement of urinary calculi on pretreatment non-contrast computerized tomography may be beneficial for selecting the preferred treatment option for patients with urinary calculi.
3. Patients with lower ureteric calculus size ≤ 10 mm and CT – H.U <1000 had high expulsion rate with ESWL. Hence ESWL may be considered as the primary treatment option.
4. Other modalities of treatment may be helpful in cases with stone size >10mm and CT-H.U >1000.

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