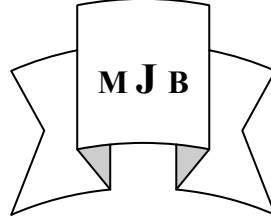


Extracorporeal Shock-Wave Lithotripsy (eswl) for The Treatment of Urolithiasis

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Abstract

Extracorporeal shock-wave lithotripsy (ESWL) has proved to be an optimal therapy for renal and ureteric calculi.

We report on 226 patients (17-75 years old) treated with the Siemens Modularis lithotripter. There were 157 males and 69 females. 218 calculi were located in the kidneys while only 28 calculi were in the ureters.

In situ treatment was performed in 205 cases without instrumentation and in 21 after placement of a ureteral catheter. All ESWL treatments were performed with the patient under conscious sedation and on an outpatient basis.

The overall success rate of initial treatment with ESWL for small calculi ≤ 1 cm was 86% versus 43% success rate for calculi larger than 1 cm which necessitate 1-2 re-treatments.

Ureteric stenting during treatment had no influence on the stone free rate in our patients.

Complications were infrequent with the most common being renal colic in 8.8% of the cases all of which were managed conservatively.

In conclusion extracorporeal shock-wave lithotripsy is a safe and highly effective method of treating urinary calculi particularly those less than 1 cm in size.

الخلاصة

اجريت دراسة على (٢٢٦) حالة اصابة بحصى المسالك البولية (١٥٧ ذكرو ٦٩ انثى) في مستشفى الشيخ زايد للفترة ما بين ايلول ٢٠٠٣ وحزيران ٢٠٠٥. ظهرت اصابة (٢١٨) مريضاً بحصى الكلى بينما اقتصر وجود حصى الحالب على (٢٨) مريضاً.

تم تقطيع الحصى باستخدام مفتاح الحصى من نوع سيمنس باعث للموجات الصدمية من خارج الجسم مع الحاجة في (٢١) مريض فقط الى اجراء قنطرة الحالب قبل التقطيع. اجريت جميع جلسات التقطيع في العيادة الخارجية وباستخدام المسكنات البسيطة.

اثبتت الدراسة ان معدل نجاح جلسات التقطيع الاولى للحصى الصغيرة (الاقل من ١ سم) هو ٨٦ % بالمقارنة مع ٤٣ % للحصى (الاكبر من ١ سم) مما استلزم اجراء جلسات اخرى لاكمال تقطيع هذه الحصى الكبيرة.

كما اوجدت الدراسة ان وجود قنطرة الحالب اثناء التقطيع لا تثير لهما على درجة تخلص المريض من الحصى.

كانت اختلاطات التقطيع قليلة الحدوث واكثرها شيوعاً هو المغص الكلوي حيث لوحظ وجوده في ٨,٨ % من الحالات وقد تمت معالجتها جميعاً تحفظياً.

في الخاتمة يمكن الاستنتاج بان تقطيع حصى المسالك البولية بالموجات الصدمية من خارج الجسم هو علاج امين وذو قدرة وفعالية

عالية على الاخص في تقطيع الحصى التي هي اقل من ١ سم حجماً.

Introduction

Initially extracorporeal shock-wave lithotripsy (ESWL) was used only to treat small pelvic stones. Later, with accumulation of experiences, the

indications for ESWL were broadened to include virtually all types of stones [1].

Shock wave lithotripsy may be done to manage calculi at any location

throughout the urinary tract. However its success rate varies according to stone size and location [2]. Ureteral stones are known to fragment less effectively than renal stones but ESWL remains the preferred treatment method for ureteral stones at many centers due to its minimally invasive nature [2,3].

Patients and methods

From September 2003 to June 2005 we studied 226 patients with urinary calculi, 157 males and 69 females, their age between 17 and 75 years (mean age 38 years 8 months). We treated them by extracorporeal shock -wave lithotripsy using the Siemens Modularis lithotripter in our institution at Al-Sheikh Zayed Hospital. The evaluation of stones was based on history, physical examination, laboratory testing, and radiographic imaging. The longest diameter of the stones ranged from (0.5 to 2.5 cm) with an average of (1.2 cm). All patients were treated as an outpatient procedure with conscious sedation only.

Children and high risk patients with cardiopulmonary problems were excluded from the study.

Patients with urinary tract infection received broad-spectrum antibiotics according to recent urine culture beginning 5 days before the procedure and continued during and thereafter the procedure.

The complete procedure, including positioning the patient and

correcting the adjustment and shock wave exposure of the stone lasts 30 to 45 minutes.

There were 358 procedures performed on these patients for an average of 1.5 sessions per patient. Each treatment session consisted of 2000 to 3000 shock waves. The interval between treatment sessions ranged from 2 to 4 weeks to allow for evacuation of disintegrated fragments.

Patients were routinely followed 2 weeks and 3 months after lithotripsy with an abdominal ultrasound and KUB. Those with an equivocal results underwent excretory urography or non-contrast spiral computerized tomography as necessary to confirm stone-free status and exclude obstruction.

Before the initial ESWL session, double j stents were introduced into the ureters under general anesthesia in 21 patients to minimize the risk of obstructive complications. Of these patients 9 had bilateral stones, 1 with multiple stones in the same kidney and 11 had stones larger than 2 cm in diameter.

Results

During 358 lithotripsy sessions we treated 198 renal and 28 ureteral calculi in 226 patients 17 to 75 years old, including 157 (69%) males and 69 (31%) females. Of these patients 9% had undergone an open procedure for stones in the same kidney previously.

Table 1 presents the locations of treated stones:

Site of stone	No		
	Rt	Lt	Bilateral
Renal pelvis	51 (54.2)	53 (55.7)	9 (4.5)
Superior calices	20 (21.2)	13 (13.6)	
Middle calices	4 (4.2)	7 (7.3)	
Inferior calices	19 (20.2)	22 (23.1)	
Upper ureter	16 (80)	4 (20)	
Lower ureter	3 (37.5)	5 (62.5)	
Total	113 (50)	104 (46)	9 (4.5)

- More stones on the Rt side were treated. Stones ≤ 1 cm constitute (78.3%) of cases, while (21.7%) of cases were > 1 cm.

Urine culture was positive in 66 (29.2%) and negative in 160 (70.8%)

patients with E-coli being the most common microorganism detected.

Patient demographics and treatment data are listed in table 2:

Table 2

	No.
Av. age (range)	38.8 (17-75 y.)
Sex M	157 (69%)
F	69 (31%)
Previous surgery (treated side)	20 (9%)
Stone size ≤ 1 cm	177 (78.3%)
> 1 cm	49 (21.7%)
Lithotripsy session	358
Urine culture +ve	66 (29.2%)
-ve	160 (70.8%)

The stone free rate after initial shock-wave lithotripsy for ureteral stones was 68% but it decreased to

46% after 1 and to 31% after 2 re-treatments.

The success rate of initial treatment for stones 10 or less versus 11 to 20 mm was 86% versus 43%. Re-treat 1 and 2 stone free rates were higher for stones 0 to 10 than 11 to 20 mm (49% versus 37% and 44% versus 33%).

Ureteral stenting during treatment had no influence on the stone free rate in our patients.

Table 3 Post ESWL complications:

Complications	No. (%)
Renal colic	20 (8.8)
Perirenal hematoma	4 (1.7)
Fever > 39C	3 (1.3)
Urine retention	1 (0.4)

Discussion

Indications for ESWL for urinary calculi have expanded from primarily renal stones to include those located any where in the urinary tract [4,5]. However, the success rate of ESWL for fragmenting ureteral stones is lower than that for renal stones.

In our study the overall success rate of initial treatment was 86% this is similar to the results obtained by studies reported by Torrecilla 1998 [6], Tligui 1999 [7], Gnanapragasam 1999 [8] and Lamotte 2000 [9].

Ureteral stones that fail to clear after initial ESWL are less likely to clear after subsequent re-treatments. An explanation for the decreased stone- free rate for re-treatment is that initial shock-wave lithotripsy is successful for softer stones and, thus, it selects out a group of harder calculi that are less amenable to shock-wave lithotripsy fragmentation when re-treated.

We identified another factor that appeared to affect the stone free rate in our patients who underwent ESWL. Large stone size caused a decreased stone free rate in patients

Complications after ESWL were infrequent and consisted of renal colic in (20) patients, perirenal hematoma due to pre-existing hypertension in (4), fever > 39C due to sepsis in (3) and urine retention in (1). No complication required an open operation. These complications are shown in table 3.

treated 1 to 3 times which is comparable with other studies [8,10,11]. This factor is likely most important when considering repeat shock-wave lithotripsy.

Ureteral stenting during treatment had no influence on the stone-free rate in our patients. Most authors have reported no difference in the shock-wave lithotripsy success rate based on ureteral stenting during treatment [12-15].

It can be concluded that ESWL is a safe and highly effective method of treating urinary calculi particularly those less than 1 cm in size.

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