The outcome of Extracorporeal Shockwave Lithotripsy for Renal Pelvic Stone with and without JJ Stent — a comparative study

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Abstract

Objective: To compare the outcome of Extra corporeal shockwave lithotripsy for a renal pelvic stone with and without JJ stent.

Methods: A comparative cross sectional study was carried out at Sindh Institute of Urology and Transplantation from January 2007 to January 2008. Eighty patients with renal pelvic stone measuring 2cm ± 2mm were selected for treatment with Extra Corporeal Shockwave Lithotripsy (ESWL). All of these patients were adults with normal renal function and had unilateral renal stones with negative urine cultures. Patients with renal failure and children were excluded. They were divided into two groups of 40 each. Group A patients underwent ESWL without a JJ stent and in Group B a JJ stent was placed before ESWL . SLX F2 electromagnetic ESWL machine was used to impart shock waves. 3000 shockwaves were given in a session. Both the groups were compared for renal colic, steinstrasse, fever, lower urinary tract symptoms (LUTS) emergency room visits and hospital admissions , stone clearance, number of ESWL sessions, auxilliary procedures, (percutaneous nephrostomy or ureterorenoscopy) and cost.

Results: Ureteric colic occurred in 13 (32.5%) patients in group A and in 3 (7.5%) patient in group B . Steinstrasse developed in 4 (10%) patients with out JJ stent and in 3 (7.5%) patients with JJ stent. Fever was encountered in 1 (2.5%) patient in group A and in 3 (7.5%) patient in group B. Mean emergency room visits were 2.1 per patient in group A and 0.7 per patient in group B. Stone clearance occurred in 33 (82.5%) patients in group A and 31 (77.5%) in group B. In group B lower urinary tract symptoms were found in 50% versus 20% in group A .Auxillary procedure was performed in one (2.5 %) patient each in both groups.

Conclusion: Pre ESWL JJ stenting for a 2 cm ± 2 mm renal stone was not beneficial in terms of steinstrasse, fever, stone clearance and number of ESWL sessions. However ureteric colic was significantly less in the stented group. Lower urinary tract symptoms (LUTS) was also significantly high in the patients having a JJ stent The cost of the treatment doubled in the stented group which is an important factor in our country. JJ stenting does not prove to be a cost effective procedure when compared to the reduction in complications (JPMA 59:143; 2009).

Introduction

Renal stone is a common problem in our country because of our geographical location (Pakistan lies within the stone belt region extending from Indonesia to Egypt), economic and dietary factors, dehydration, exposure to heat and possible genetic factors.[1] The advent of Extra Corporeal Shock Wave Lithotripsy (ESWL) in 1980s, propelled the treatment of renal stone disease from mainly open surgery into a new era of non invasive procedures.

The use of ESWL in the treatment of renal stone disease is gradually increasing in Pakistan. This is associated with the progressively increasing availability of Extracorporeal shock wave lithotripters.[2] Since its first introduction in 1989 in Pakistan, the number of lithotriptors has reached a figure of 37, which are catering for a population of 160 million. With the increasing use of ESWL, urologists are being frequently confronted with its limitations and complications.

Size of the stone is one of the most important factor determining the appropriate treatment modality for a patient with renal stone.[3] Currently the recommendations are that ESWL is the treatment of choice for stones up to 2 cm, whereas for stones larger than 2 cm percutaneous neprolithotomy is the best treatment option.[4] At the moment, world wide about 80 to 85 % of patients harbouring simple renal calculi are treated with shock wave lithotripsy.[5]

JJ stent is an important tool in the urologist armamentarium. It has its benefits and complications.[6] Insertion of JJ stent for shockwave lithotripsy of renal calculi may be done as a part of therapy (for obstructive pyelonephritis, renal failure, refractory colic, high grade obstruction) or as a prophylactic stenting before ESWL of renal calculi which is at best controversial.[7]

Currently European urologist guide lines and the American urologist Association guidelines recommend putting a JJ stent before ESWL for renal pelvic stones of 2 cm and above.[7,8] Initial ESWL practices involved the routine placement of ureteral stents prior to ESWL in the majority of patients to aid in fragment passage and thought to decrease obstructive and infective complications. The observation of intraluminal and extraluminal drainage and ureteral dilatation as a result of stenting provided the rationale for their use.

The purpose of the study was to determine the benefits or disadvantages of placing a JJ stent before ESWL in the 2cm ± 2mm size renal pelvic stone for which ESWL is the treatment of choice in our stone patients. The data created will guide us to a more intelligent use of prophylactic JJ placement in patients with renal stones undergoing ESWL leading ultimately to better patient care.

Patients and Methods

This study was carried out at Sindh Institute of Urology and Transplantation (SIUT) between January 2007 to January 2008. It was a comparative cross sectional study. The patients were registered from the out patients department of SIUT. Patients with radio opaque renal pelvic stone in which the greatest diameter was 2 cm were evaluated for the study. The following inclusion criteria was used for selecting patients. Adult patients with normal renal functions between the ages of 16 and 70 years , patients having normal ureter on IVU e.g no PUJO or ureteric orifice obstruction, negative urine culture and unilateral stone disease with a stone measuring 2 cm ± 2mm. Patients with history of previous renal surgery or extra corporeal shock wave lithotripsy or with co morbids like diabetes mellitus, hypertension or renal failure, were excluded.

A detailed history and a clinical examination was performed followed by baseline investigations including complete blood film, Serum urea and creatinine and urine culture. An Intravenous pyelogram and an ultrasound was done in all patients. Guidelines of the ethics committee were followed. All patients were informed about the study and a consent form was signed by them. A previously designed proforma was filled to collect data. Eighty patients selected were divided into two equal groups of 40 each. They were offered two folded pieces of paper bearing letter A and B and were requested to take one of these. Those who picked A were selected for ESWL without JJ stent and those who picked B were given ESWL with JJ stent.

In the patients selected for JJ placement a prophylactic injection gentamycin 80 mg i/m was given and a 4.8 fr JJ percuflex plus (made of propriety Olefenic block co polymer developed by Boston Scientific Corporation) was placed under local or general anaesthesia before ESWL under fluoroscopic control .

Then patients of both the groups were subjected to shockwaves via SLX F2 electromagnetic ESWL machine. Stone was localized with fluoroscopy. 3000 shockwaves were given and the energy was kept between 4 and 6 and the shockwave rate was 70 per minute.

Each patient was followed in stone clinic after 1 week with X ray KUB and ultrasound KUB. Later patients were checked at one, two and three months in which the above mentioned investigations were repeated. If the patient came in emergency, a complete blood film along with Serum urea and creatinine and urine culture was done followed by ultrasound and an X ray KUB.

For each group renal colic, steinstrasse, fever, LUTS, Emergency room visits and hospital admissions, stone clearance, number of ESWL sessions, and auxillary

procedures and cost were recorded. JJ stent was removed when the stone disappeared or at three months.

The cost estimated in two groups included the cost per session of ESWL, cost of JJ stent and related disposable items used, cost of investigations and drugs used for anesthesia , antibiotics and cost of auxillary procedures.

The data analysis was conducted with statistical packages SPSS version 10.0. Chi square test was applied to compare proportion difference for various variables. P value <0.05 was considered level of significance.

Results

The mean patient age was 32.13 ± 11.5 years in group A and 34.3 ± 11.35 years in group B(P = 0.392). There were 31 (77.5%) males and 9 (22.5%) females in group A and 32 (80%) males and 8 (20%) females in group B. The mean stone size was 19.3mm ± 0.126 in group A and 19.5mm ± 0.138 in group B.

Eighty cases were studied and the outcome of 40 cases in Group A was compared with that of 40 cases in group B. The complications are enumerated in Table 1. The

Table 1: showing complication in both groups.

S. No		Group A n= 40	Group B n= 40	P Value
1	Ureteric Colic	13 (32.5%)	3 (7.5%)	0.005
2	Steinstrasse	4 (10%)	3 (7.5%)	0.69
3	Fever	1 (2.5%)	3 (7.5%)	0.305
4	Auxillary procedures	1 (2.5%)	1 (2.5%)	1.000
5	Hospital visits	2.1 per person	0.7 per person	0.305
	and admissions:-	3 (7.5%)	1 (2.5%)	

Table 2: Showing LUTS in two groups.

	LUTS in Group A	LUTS in Group B	P value
Urinary frequency	3 (7.5%)	18 (45%)	0.0001
Nocturia	1 (2.5%)	5 (12.5%)	0.090
Urgency	4 (10%)	19 (47.5%)	0.0001
Dysuria	6 (15%)	23 (57.5%)	0.0001
Hematuria	27 (67.5%)	37 (92.5%)	0.005

lower urinary tract symptoms are shown in Table 2. In this study overall the patients in group B had a higher frequency of LUTS (50%) as compared to the patients in group A (20.5%).

The number of ESWL sessions per person was 1.55 in group A and 1.63 in group B (p =0.701). Stones were cleared in 33 (82.5%) patients in group A and in 31 (77.5%) patients in group B (p = 0.576). Residual stones remained in 7 (17.5%) patients in group A and in 9 (22.5%) patients in group B. The auxillary procedure performed in both the groups was percutaneous nephrostomy.

Cost of the procedure was calculated to be Rs 11 500 in group A and 22 600 in group B.

Discussion

The use of ESWL in the treatment of renal stones has brought a revolution in the field of urology. It has not only reduced hospitalization time and morbidity, but is also cost effective. Like any other urological procedure, ESWL is also associated with complications mainly obstructive and infactive.

In this study renal colic occurred in 32.5% of patients in group A and 7.5% of patients in group B. (p value : 0.005) In a study by Chandhoke[9] pain scores were high in the group with out JJ stent as compared to those who had a 4.7 fr JJ placed before ESWL whereas Musa et al[10] reported no statistical difference in pain in both the stented or unstented groups. In a study by Taku Abi et al[11] who evaluated outcome of ESWL for upper urinary tract stones pain occurred as a minor complication in 35.3% of patients, showing that pain is a subjective symptom, different in different populations.

In this study steinstrasse developed in 10% patients in group A and in 7.5% patients in group B.(P value of 0.69). A study by Al awadi et al[12] showed that the incidence of steinstrasse increased with the size of stone irrespective of the fact that JJ stent is present or not. Similarly Kumar et al[13] in a study on shockwave lithotripsy in solitary functioning kidneys concluded that ureteral obstruction requiring intervention can occur even with JJ stent in situ, and suggested that prophylactic stenting can be avoided before ESWL in carefully selected patients but the patient must be informed about the possiblity of obstructive complications and the need to report to the hospital immediately.

The number of patients presenting with high grade fever and sepsis was one (2.5%) in group A and three (7.5%) in group B (p = 0.305). In a study by Musa et al[10] there was slightly higher incidence of fever in stented patients. This could be explained by the fact that patients with JJ stent had two additional procedures performed and a foreign body was placed in a normally sterile system.

The lower urinary tract symptoms e.g urinary frequency, nocturia, urgency ,dysuria and haematuria were quite high in the group B (45%, 12.5%, 47.5%, 57.5%, 92.5.%) as compared to group A (7.5%, 2.5%, 10%, 15%, 67.5%) respectively. In group B overall lower urinary tract symptoms were found in 51% versus 20.5% in group A (p = 0.005). This is similar to the findings of the other studies e.g Perminger et al[14] found a higher incidence of LUTS in patients with JJ stents than in the control group (43% vs

25%). Similarly in the study by Paramjit S[9] the incidence of frequency, urgency, dysuria was higher in the stented group. The same finding were reported by Musa[10] who found a much higher frequency of lower urinary tract symptoms (85%) in the stented group as compared to the non stented group. It was suggested that the stent related LUTS were due to the presence of foreign body in the urinary bladder irritating the trigone and the bladder neck.

The mean emergency room visits in group A was 2.1 ± 0.84 per person as compared to 0.7 ± 0.67 per person in group B. Whereas hospital admissions were 7.5% in group A vs. 2.5% in group B this finding was similar to the results of Chandhoke et al[9] who encountered 22% hospitalization rate in the unstented group vs 7.5 % in the stented group . Libby et al[15] also concluded that the hospital stay was shortened by an average of 25% when stents were used concomitantly in patients.

In our study the number of patients in which the stone were cleared (defined as no calculi visible on X ray KUB and less than 4 mm fragments on ultrasound KUB) was 33 (87.5%) patients in group A and 31 (77.5%) patients in group B (p = 0.57) the mean stone size was 19.3 ± 0.126 mm. In the study by Musa et al[10] stone free rate was 91% in the unstented group vs 88% in the in the stented group (average stone size of 16 [range 10-20 mm]) similarly in the study by Chandhoke et al[9] the stone free rate was 84% in the group without JJ stent an 80% in the group with a 4.8 Fr JJ stent (mean stone size was 13.2 ± 0.8mm) this shows that stone clearance is not significantly affected by the presence of JJ stent but is related to the size of stone and other factors.

In the present study the number of patients who underwent auxillary procedures in group A was 1 (2.5%) and in group B was 1 (2.5%) as well In both the cases it was a percutaneous nephrostomy. This is similar to the study by Chandhoke et al[9] where there was no difference in the auxillary procedure rate in the group without JJ stent and in the group with a 4.7 fr JJ spent. Similarly in the classic study by Libby et al[15] the number of auxillary procedures in the stented and the unstented group for a 2 cm size renal stone were not statistically different.

Although SIUT is a free hospital and it does not charge from patients, so the cost of treatment was estimated from expenses to the institute. The expenses estimated in group A (without stent) was Rs 11500 and in group B (with stent) was Rs 22600. Hence it is a safe assumption to say that pre ESWL JJ stenting increases the cost to almost double.

Conclusion

The study concluded , that in view of the minimal benefits of JJ stenting there is no need to place a JJ stent just for a 2 cm size stone if the patient can be frequently observed and has access to good urological care JJ stenting can be safely recommended for patients coming from far flung areas with no immediate access to good urological care in case of an emergency.

This comparative study supports the fact that the use of J J stent does not alter the out come of treatment of patients with 2 cm ± 2 mm stone with ESWL with and without J J stent By using this criteria for the insertion of JJ stent with stones of 2 cm ± 2mm the work load of hospital as well as expenditure can be reduced.

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