

## Original Article

### **Management of Stone Disease: 17 years experience of a stone clinic in a developing country**

Manzoor Hussain, Syed Adibul Hasan Rizvi, Hasan Askari, Gauhar Sultan, Murli Lal, Bux Ali, Syed Ali Anwar Naqvi  
Department of Urology, Sindh Institute of Urology and Transplantation (SIUT), Civil Hospital, Karachi, Pakistan.

#### **Abstract**

**Objective:** To review 17 years experience of the stone clinic with incorporating the changes in practice over the years and to report the benefits of stone clinic in a developing country.

**Methods:** The SIUT Stone clinic was established in 1990 with installation of HM4 Lithotripter. This clinic is run jointly by a Urologist, Dietitian, Nephrologist, Biochemist and Radiologist. From 1990 - 2007, about 38,749 stone patients received treatment with ESWL (55%), PCNL (6.0%), URS (15.5%), litholopaxy 4.0% and open surgery 19.7%. These patients after treatment were followed in the stone clinic with stone analysis and 24 hours urine metabolic studies where indicated. Dietary and oral hydration programme combined with medical therapy was also instituted. Recurrence rate was noted in those patients who were advised diet modification, oral hydration and medical treatment. Complications of stone disease were documented during the follow-up period.

**Results:** In ESWL group 8,226 patients were followed in the stone clinic for 5 years. In this group, 185 (2.2%) had recurrence of renal calculi. In PCNL group 1306 patients were followed, and 16 (1.1%) had recurrence. In the open surgery group of 1294 patients, 17 (1.3%) had recurrence of renal calculi. The complications of stone disease noted were renal failure and infections in 162 (1.5%) patients, during the follow-up period.

**Conclusion:** This study shows the beneficial effect of a stone clinic in a developing country and positive effect on the reduction of recurrence and complications of stone disease. Our experience promotes the need to open more specialized stone clinics in areas where stone disease is highly prevalent (JPMA 59:843; 2009).

## Introduction

Urolithiasis is the commonest urologic disorder in Pakistan and constitutes 50% of all urologic workload in adults<sup>1</sup> and 60% in children in SIUT.<sup>2</sup> The estimated prevalence in the country is 10-15% in the population<sup>3</sup> but only 1-2% symptomatic patients come to the hospitals for treatment (personal communication). In a developing country like Pakistan many patients present with complications of stone disease like acute or chronic renal failure, pyelonephritis, pyonephrosis and perinephric abscess or unilateral non-functioning kidneys, which can present with life threatening situations and even death.<sup>4</sup> Moreover, stone disease is recurrent in nature with a rate of 50% at 5 years follow-up.<sup>5</sup> Similarly, the number of newly diagnosed cases and patients coming to the public sector hospitals for treatment has increased by thousand folds. This was observed after the introduction of extra corporeal shock wave lithotripsy (ESWL), Percutaneous nephrolithotomy (PNL), ureterorenoscopy (URS) and a parallel increase in diagnostic facilities as ultrasound and CT scan. With the introduction of these facilities, a comprehensive stone disease centre was established at Sindh Institute of Urology and Transplant (S.I.U.T.) in 1990. All services as ESWL, PNL, and URS are offered free. These patients were followed in a separate section of the "stone clinic", jointly managed by urologists, nephrologists, radiologists, biochemists, dietitian, medical social officers, pharmacists and para medical staff.

This study was undertaken to review the changing practice in the management of stone disease and to observe the benefits of the 'stone clinic' on the recurrence of stone disease, and its related complications.

## Patients and Methods

This retrospective descriptive study was conducted on stone patients registered during the period of 1990-2007. A total of 38,749 patients were treated and followed-up in the stone clinic of Sindh Institute of Urology and Transplantation (SIUT). Children less than 14 years age were excluded. Age, sex, diagnostic workup, stone complications and change in management trends every 6 years were noted from the case records. After the patients became stone free, as judged by ultrasound and x-ray KUB, their stone analysis and 24 hour metabolic workup was done and accordingly, hydration, diet and pharmacologic advice was given according to the following protocol designed locally at this institute:

- Fluid intake was encouraged to 3 liters/day so that the output could be maintained to more than 2 litres in 24 hours.
- Advice was given to increase citrus fruits and juices like lemon juice and orange juice in diet which would increase the urinary citrate level. Tea and coffee was restricted to one

cup/day or completely omitted. Salt intake was minimized, oxalates stopped and at least one cup of milk daily was encouraged. The pharmacological products prescribed were, potassium citrate or polycitra to patients with low urinary citrate levels or along with citrus fruits, Pyridoxine 200-300 mg daily was given to all hyperoxaluric patients. Allopurinol 300 mg daily was prescribed for all hyperuricaemic patients with stones. Implementing these measures the patients were followed in the stone clinic for at least 5 years. Any recurrence of stone disease on ultrasound or any complication as acute or chronic renal failure, pyonephrosis, sepsis or non-functioning kidney was documented.

The data was entered in SPSS version for statistical analysis.

## Results

The study included 38,749 stone patients coming from all over Pakistan. There were 26,969 (69%) males and 11,780 (34.4%) females. (M:F ratio of 2.3:1). The age of the patients ranged from 15-80 years with a peak age of 31-40 years with mean age of  $35.6 \pm 11.2$  years.

The complications noted at the time of admission were, renal failure (8.2%), calculous anuria 0.8%, recurrent stones 2.5%, unilateral Non functioning kidney 2.1%, infective complications 1.4%, Hypertension 17.6%, Urinary Tract Infections 39% and mortality 1% / year (Table-1). The

**Table-1: Age, sex, complications of stone disease at the time of admission (N=38749).**

Male	26,969 (69.6%)
Female	11,780 (34.4%)
M:F ratio	2.3:1
Age range	14-80 years
<b>Complications of stone disease</b>	
Calculus renal failure	3177 (8.2%)
Calculus anuria	310 (0.8%)
Unilateral N.F. kidney	813 (2.1%)
Infectious complications*	542 (1.4%)
Hypertension	6819 (17.6%)
Recurrent renal calculi	968 (2.5%)
U.T.I.	15112 (39%)
Mortality	387 (1%)

\*(Pyonephrosis + Perinephric abscess, Xanthogranulomatus Pyelonephritis, Emphysematus pyelonephritis)

management trends in stone patients showed that ESWL was done in 21,214 (55%), PCNL in 2,788 (6%), URS in 6,037 (15.5%), litholopaxy 1,535 (4.0%), open surgery in 7,667 (19.7%) (Table-2). About 35,264 sessions of ESWL were done on 21,214 patients with an average of 1.6 sessions / patient.

A rising trend of ESWL was observed from 1990 and 2007. The number of sessions were 4055 from 1990 to 1995, 11,830 from 1996 to 2001 and 19,379 sessions between 2002 to 2007.

**Table-2: Trends in the management Stone disease.**

Period	ESWL Session	PCNL	URS	Litholopaxy	Open Surgery
1990-95 (n=5897)	4055 (68.7%)	-	603 (10.2%)	382 (6.4%)	857 (14.4%)
1996-2001 (n=16406)	11,830 (69.9%)	620 (3.6%)	1636 (9.6%)	424 (2.5%)	1896 (11.2%)
2002-2007 (n=30,378)	19,379 (63.7%)	1558 (5.1%)	3798 (12.5%)	729 (2.3%)	4914 (16.1%)

Note: 53,181 procedures on n 38749 stone patents.

**Table-3: Stone Clinic effect on Recurrence and Complications of Renal Calculi: 5 years follow-up (n=10,826)**

Group	Recurrence	%
ESWL (n=8226)	185	2.2
PCNL (n=1306)	16	1.2
Open Surgery (n=1294)	17	1.3
	<b>Complications</b>	
Renal failure, Pyonephrosis N.F. Kidney (n=10,826)	162	1.5

A similar increase was seen in the number of PCNL, URS and open surgery (Table-2). After successful treatment, 10,825 stone-free patients were followed-up in the stone clinic for 5 years with advice on hydration, diet and pharmacologic intervention. Recurrence of stone in ESWL group of 8226, was found in 185 (2.2%) patients, 16 (1.1%) of 1306, in PCNL group, and of the 1294 patients followed up after open surgery, only 17 (1.3%) had recurrence of the stone. (Table-3).

The complications noted in stone free patients are shown in Table-3.

## Discussion

Urolithiasis is a major public health problem and is the commonest urologic disease in Pakistan. It not only causes recurrent pain and physical suffering, haematuria and infection, but can also lead to the loss of one or both kidneys. It is one of the frequent causes of end stage renal disease<sup>6</sup> and life threatening infective complications like pyonephrosis, perinephric abscess, xanthogranulomatous pyelonephritis and emphysematous pyelonephritis.<sup>4</sup> To prevent these complications the stone clinic was established as a comprehensive stone centre in 1990 at SIUT. Initially there was only one ESWL (HM-4) machine with 20 patients attending the clinic per week. With the increasing load of stone patients, EDAP LT02, Dolis, DLS2, SLXF2 machines were installed over the period of 17 years. Presently, 500-600 stone patients from allover Pakistan, are being treated weekly in the clinic.

In this part of the world the fear of open surgery and folk lore stone dissolving medicines are the main reasons for delay in seeking treatment, resulting in complications of stone disease.<sup>7</sup> This fear has been alleviated by ESWL and other minimally invasive procedures. Our observations over the passage of time show more patients with smaller stones coming for early treatment which has reduced the obstructive and infective complications to (1.5%) in patients treated at our stone centre as compared to pre-stone clinic era.<sup>4</sup> It is anticipated that ESWL, PCNL and URS will further reduce the complications of stone disease in the future. Similarly, the post-ESWL complications have also decreased from 16.2% to 3.5% by prophylactic use of antibiotics and careful selection of patients during the period of 1990-2000 and 2001-2007 respectively.<sup>8</sup> Reports to this effect have been published by Skolrikos et al<sup>9</sup> where complications of ESWL have been reduced over the period of 25 years experience. Although prophylactic use of antibiotics before ESWL is controversial but few studies have shown the benefits of giving prophylactic antibiotics similar to this study.<sup>10,11</sup> With the introduction of PCNL at SIUT in 1997, the more complex stones like size more than 2cms, lower pole stones bigger than 1.5 cm, stones with renal dysfunction and staghorn calculi are now being treated by PNL. The change in trends at our centre show that ESWL for pelvic stones more than 2 cms and lower pole stones more than 1.5 cm has reduced considerably as compared to the initial period of 1990-2000.<sup>8</sup> Similar trends have been reported from centres in the developed countries.<sup>12</sup>

By gaining experience in percutaneous techniques, the post-operative complication rate has declined to 9.9% (155 out of 1,588) in the period 2002-2007. Between 1996-2001 16.2% patients (101 out of 620) developed complications. In the treatment of ureteric calculi (n=6,036), the majority 3,984 (66%) were treated by URS and lithoclast or laser therapy. ESWL was done in only 1,325 (22%) of ureteic calculi. This data shows a shift towards ureteroscopy from ESWL at our institute because of better results with the former<sup>11</sup> although patients prefer ESWL in this part of the world.<sup>1,3</sup>

Although, open stone surgery has decreased in the last decades because of improvement in endourologic techniques and ESWL, but in SIUT 7,667 (19.7%) patients were subjected to open surgery in the last 17 years. This does not show a significant change because majority of these patients presented late with very large staghorn stones or complex stones that infrequently lead to failure of endoscopic procedures as well. Another reason is lack of urologic facilities in the rural areas of the country for the early diagnosis and treatment of stone disease resulting in serious septic and renal failure complications which makes the open surgery an option because it can make the patient stone free in one sitting. Other, tertiary care centres have reported open

surgery rates in the range of 1 to 5.4% on cases with different indications than ours.<sup>14</sup>

After the patients became stone free, stone analysis and 24 hour urine metabolic workup was done at the stone clinic if indicated (i.e., recurrent calculi, multiple stones, positive family history). Accordingly hydration programme was started at our centre to educate the patients on increasing water intake to 3 litres/day with extra water intake in hot seasons and at the time of exposure to heat. This along with diet advice and pharmacological intervention where required, 8,226 stone free patients after ESWL were followed in the clinic for at least for 5 years. A significant reduction in recurrence rates was observed than reported by other studies.<sup>16</sup> Similar results have also been reported in paediatric patients from our institute.<sup>2</sup>

This study shows the beneficial effects of availability of facilities under one roof and close follow-up in stone clinic jointly by urologists, nephrologists, radiologists, dietitian and supported by metabolic laboratory services. Similar collaborative efforts have also been implemented by other colleagues resulting in better management and reduction in the recurrence rates.<sup>17</sup>

### Conclusion

This study showed the beneficial effect of a comprehensive stone centre and positive stone clinic effect on the reduction of stone complications and recurrence of renal calculi.

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