www.jmscr.igmpublication.org
Index Copernicus Value: 79.54
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v7i4.97

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Original Research Article

Study of Efficacy of the Conservative and Surgical Management of Small Ureteral Stones

Authors
Dr Aamir Afroz MBBS MS, Dr Mushtaq Ali MBBS MS, Dr.(Prof) SK Bhat MBBS MS, Dr Maham Ahmad MBBS MS, Dr Mohd Aamir MBBS MS, Dr Rahul Agrawal MBBS MS

Abstract

Background: *Ureteric colic is one of the most painful conditions that may occur and it is often caused by stone in ureter more often in distal one third of ureter. A watchful waiting approach may be expected to produce spontaneous stone expulsion in upto 50% cases, especially if stone size is <7 mm but some complications such as urinary infection, hydronephrosis and repeat colic events may occur. endoscopic treatment with ureteroscopy (URS) and extracorporeal shock wave lithotripsy (ESWL), majority of ureteric stones can be removed without open surgery. However, these procedures are not complication free and these procedures require experience and imply high cost. On the contrary, the role of medical expulsive therapy (MET) in the treatment of this condition still unclear .The most effective treatment regimen for spontaneous stone expulsion and the control of painful symptoms has not been yet determined despite the wide spread need in clinical practice. With the availability of minimally invasive procedures like endoscopic treatment with ureteroscopy (URS) and extracorporeal shock wave lithotripsy (ESWL), majority of ureteric stones can be removed without open surgery*[1].

Methods: *The present study was carried out as a prospective observational Study.*

Introduction

The life time prevalence of ureteral stones disease is estimated at 1% to 15%[2], with the probability of having a stone varying according to age, gender, race and geographical location. Upper urinary tract stones occur more commonly in men than women by a ratio of 2 to 3:1.Whites have highest incidence of upper tract stones compared with Asians, Hispanics and African Americans. Prevalence of stone disease show geographical variability with the highest prevalence of stone disease in South East.

Ureteric colic is one of the most painful conditions that may occur and it is often caused by stone in ureter more often in distal one third of ureter. A watchful waiting approach may be expected to produce spontaneous stone expulsion in upto 50% cases, especially if stone size is <7 mm but some complications such as urinary infection, hydronephrosis and repeat colic events may occur. Therefore, successful treatment of stone disease not only involves management of acute colic and hydronephrosis but also long term medical management to prevent future stone formation[3]

With the availability of minimally invasive procedures like endoscopic treatment with ureteroscopy (URS) and extracorporeal shock

wave lithotripsy (ESWL), majority of ureteric stones can be removed without open surgery[4]. However, these procedures are not complication free and these procedures require experience and imply high cost. On the contrary, the role of medical expulsive therapy (MET) in the treatment of this condition still unclear .The most effective treatment regimen for spontaneous stone expulsion and the control of painful symptoms has not been yet determined despite the wide spread need in clinical practice. With the availability of minimally invasive procedures like endoscopic treatment with ureteroscopy (URS) and extracorporeal shock wave lithotripsy (ESWL), majority of ureteric stones can be removed without open surgery[5].

It has been reported that patients with ureteral calculi ≤ 10mm in diameter, have a high likelihood of spontaneous stone expulsion, and the current joint EAU/AUA guidelines offer the option of an initial conservative approach with the use of MET and close follow-up[6].

However, in the recent years, some doubts regarding the adverse irreversible impact of conservative management of small stones on kidney functions has been raised[7,8,9] , moreover the overall cost-effectiveness of surgical over conservative management has not been studied, especially in context with small size stones. Hence, the present study was planned with an aim to study and compare the course of ureteral stones disease managed Conservatively with respect to Early surgery.

Aim

To study and compare the course of ureteral stones disease managed Conservatively with respect to Early surgery.

Objectives

1) To study and identify sites of occurrence of ureteric stones.
2) To analyse efficacy and success rate of the MET (Medical Expulstion therapy) as well as surgical intervention.
3) To compare morbidity and complications in both the modalities.
4) To study cost-efficacy of both the modalities.
5) To study time taken to achieve stone free disease in both the modalitiy

Material and Methods

Study Design: The present study was carried out as a prospective Observational study

Settings: The study was carried out at Department of Surgery, Era's Lucknow Medical College, Era University, Lucknow.

Duration of Study: Eighteen months starting from January 2017 to June 2018

Sampling Frame: Patients coming to Emergency and OPD with ureteral stone of 5-10 mm in size confirmed on radiological evaluation. The sampling frame of the study was bound by the following inclusion and exclusion criteria:

Inclusion Criteria

- Age 18-80 years
- Single (Unilateral) ureteral calculus
- Duration of symptoms <1 month.

Exclusion Criteria

- Patients with multiple comorbidities or on multiple medication: patients with reduced mobility.
- Age <18 years and >80 years of age
- Pregnant females
- Patients with multiple (>1) ureteral stone and patients admitted with urosepsis.
- Patients with deranged renal profile and function on IVP (Intravenous pyelography)
- Patients who changed management due to non medical reasons (social/professional/ personal etc.)
- Patients with NSAID allergy/intolerence; patients who did not conform with given treatment.
- Familial/Hereditary syndromes, solitary functioning kidney.
- Endocrine disorders (hyper-parathyroidism)

Methodology

All the patients falling in sampling frame were invited to participate in the study.

All the patients were explained about both conservative as well as surgical management modality and were allowed to choose the management. All the patients were also allowed to switch over to surgical modality from conservative management if they wished to do so in between the treatment at one month, two months or three months after the treatment.

Conservative management comprised of increase oral intake of fluids, analgesics, Anti-spasmodic, Alpha blockers and steroids (as indicated).

Surgical management comprised of URSL (Ureteroscopic Lithotripsy) followed by DJ stenting with post-operative catheterization for 3 days.

Patient was followed for 2 months with history and clinical examination, repeat radiological investigations to confirm complete clearance.

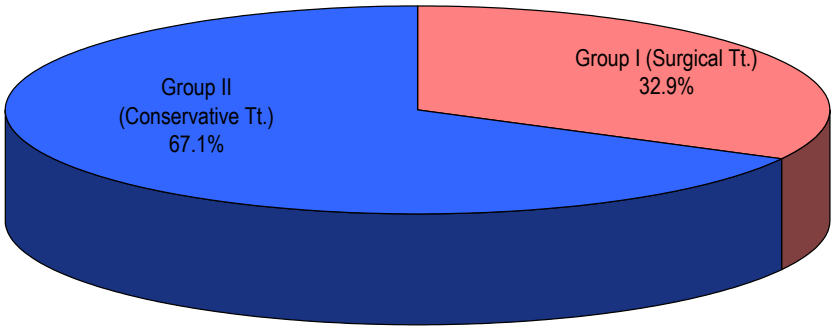
An assessment of complications, duration for complete removal of stone, cost of management were also assessed.

Results

The present study was conducted in the Department of Surgery, Era's Lucknow Medical College & Hospital, Era University, Lucknow to compare the course of ureteral stones disease managed Conservatively with respect to Early surgery. A total of 70 patients of ureteral stones fulfilling the inclusion criteria were enrolled in the study after obtaining an informed consent. Patients presenting with acute ureteric colic were managed on standard protocol. Distribution of patients based on their management type is given in Table 1.

Table 1: Group wise Distribution of Study Population according to Management

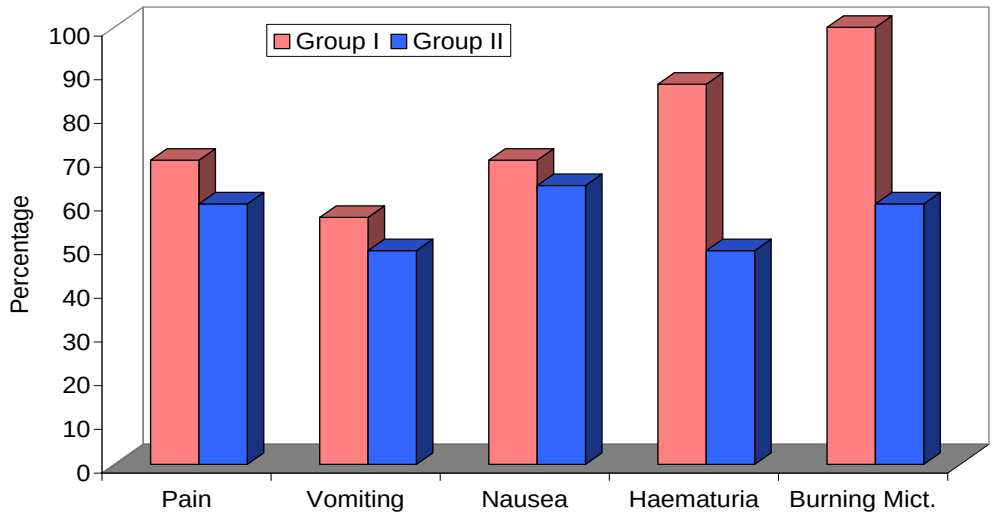
Group	Description (Type of Management)	No. of patients	Percentage
Group I	Surgical management	23	32.9
Group II	Conservative management only	47	67.1
	Total	70	100.0



OUT of 70 patients enrolled in the study, surgical intervention was done in around one-third (n=23, 32.9%) patients these patients were classified as Group I, rest of the 47 (67.1%) patients were managed conservatively only and were classified as Group II.

Table 6: Between Group Comparison of Presenting Symptoms

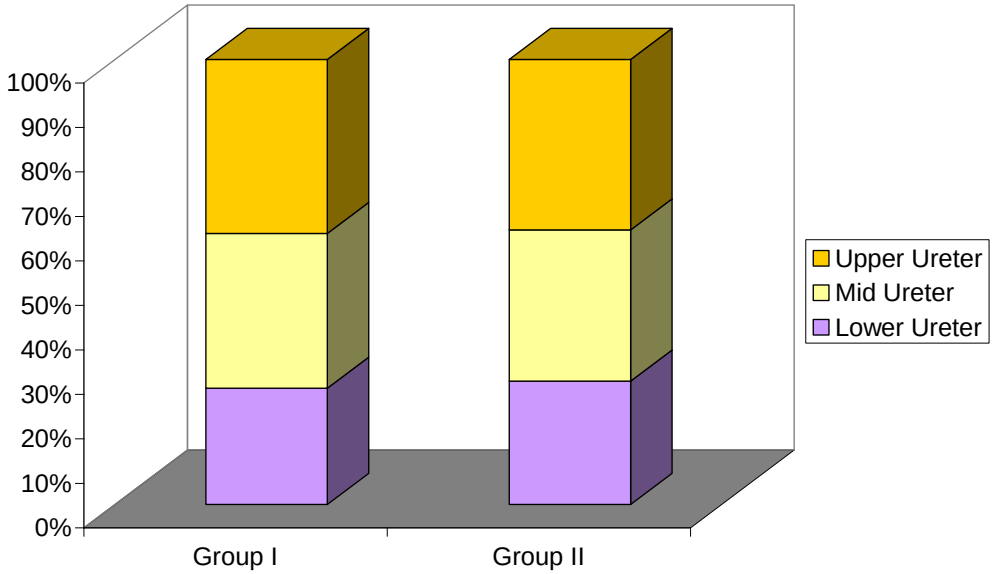
SN	Presenting Symptoms	Total (N=70)	Group I (n=23)		Group II (n=47)		Significance of differences	
			No.	%	No.	%	χ^2	p
1-	Pain	44	16	69.6	28	59.6	0.660	0.416
2-	Vomiting	36	13	56.5	23	48.9	0.356	0.551
3-	Nausea	46	16	69.6	30	63.8	0.225	0.635
4-	Haematuria	43	20	87.0	23	48.9	9.422	0.002
5-	Burning Mict.	51	23	100.0	28	59.6	12.762	<0.001



Though proportion of patients of Group I was higher as compared to Group II presenting with all the above symptoms but differences were found to be statistically significant only for patients presenting with haematuria (87.0% vs. 48.9%) and Burning micturition (100.0% vs. 59.6%).

Table 7: Between Group comparison of Site of stone among Study population

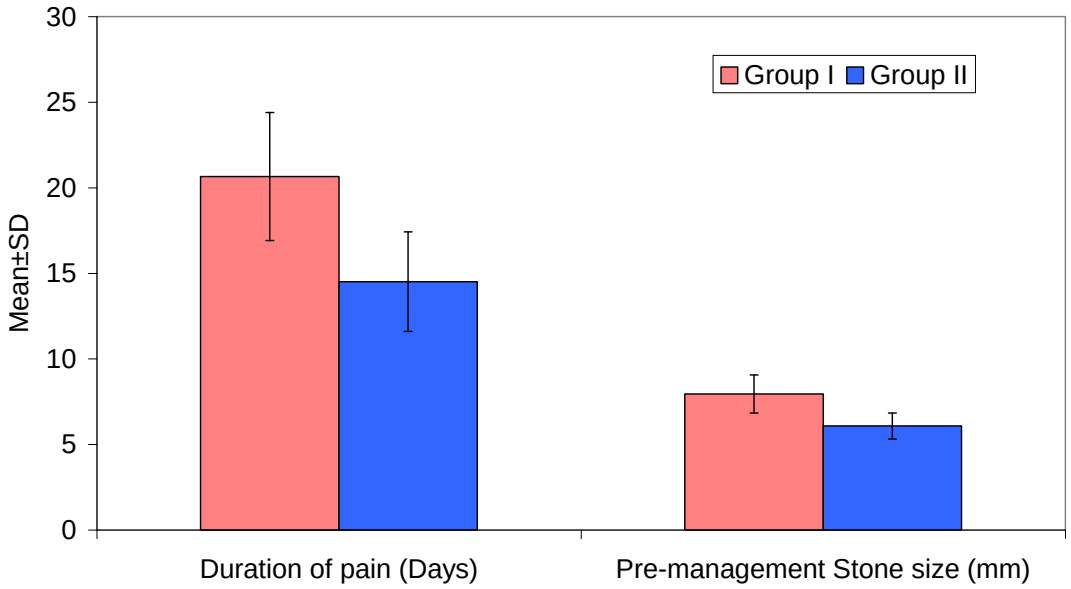
SN	Site of stone	Group I (n=23)		Group II (n=47)		Total (N=70)	
		No	%	No.	%	No.	%
1-	Lower Ureter	6	26.1	13	27.7	19	27.1
2-	Mid Ureter	8	34.8	16	34.0	24	34.3
3-	Upper Ureter	9	39.1	18	38.3	27	38.6
		χ^2=0.019(df=2); p=0.990					



Among patients of both the groups most common site of stone was Upper ureter (39.1% & 38.3%) followed by Mild Ureter (34.8% & 34.0%) and least common site was lower Ureter (26.1% & 27.7%). Difference in site of stone among patients of above two groups was not found to be statistically significant.

Table 8: Between Group comparison of Duration of Pain and Stone size of Study population

SN	Parameters	Group I (n=23)		Group II (n=47)		Student 't' test	
		Mean	SD	Mean	SD	't'	'p'
1-	Duration of pain (Days)	20.65	3.74	14.51	2.91	7.539	<0.001
2-	Pre-management Stone size (mm)	7.95	1.11	6.08	0.76	8.261	<0.001
	<7 mm	7 (33.3%)		45 (91.8%)		χ^2=26.34; p<0.001	
	>7 mm	14 (66.7%)		4 (8.2%)			

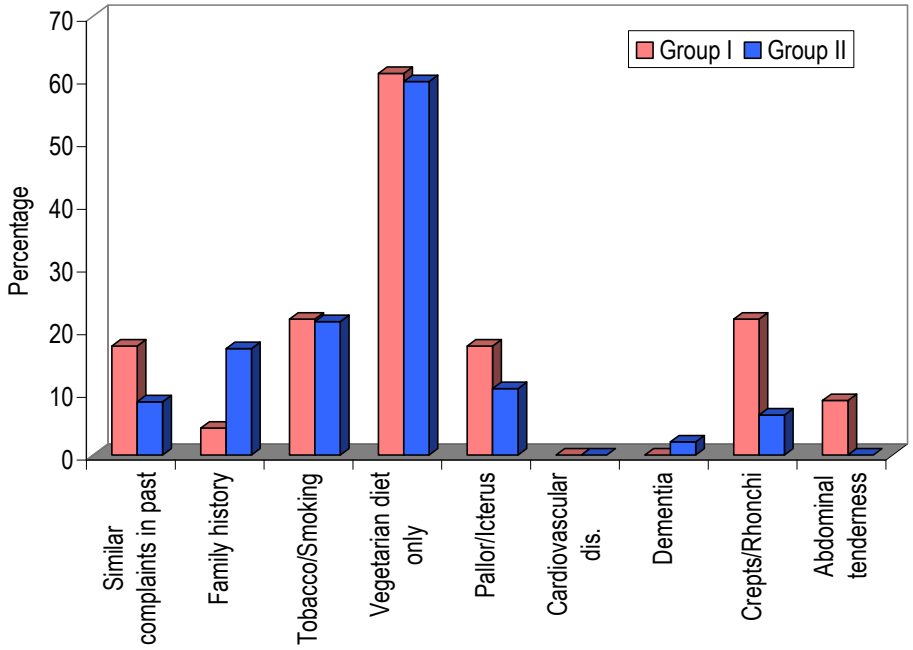


Range of duration of pain among patients of Group I and Group II was 16-27 days and 8-21 days respectively. Mean duration of pain among patients of Group I (20.65±3.74 days) was found to be significantly higher as compared to those of Group II (14.51±2.91 days).

At enrolment in the study range of size of stone of patients of Group I and Group II was 6.5-9.8 mm and 5.0-8.2 mm respectively. Mean size of stone of patients of Group I (7.95±1.11 mm) was found to be significantly higher as compared to Group II (6.08±0.76 mm). In Group I, 7 (33.3%) had stone size <7 mm while remaining 14 (66.7%) had stone size >7 mm whereas in Group II, 45 (91.8%) had stone size <7 mm and remaining 4 (8.2%) had stone size >7mm.

Table 9: Between Group Comparison of Patient Profile

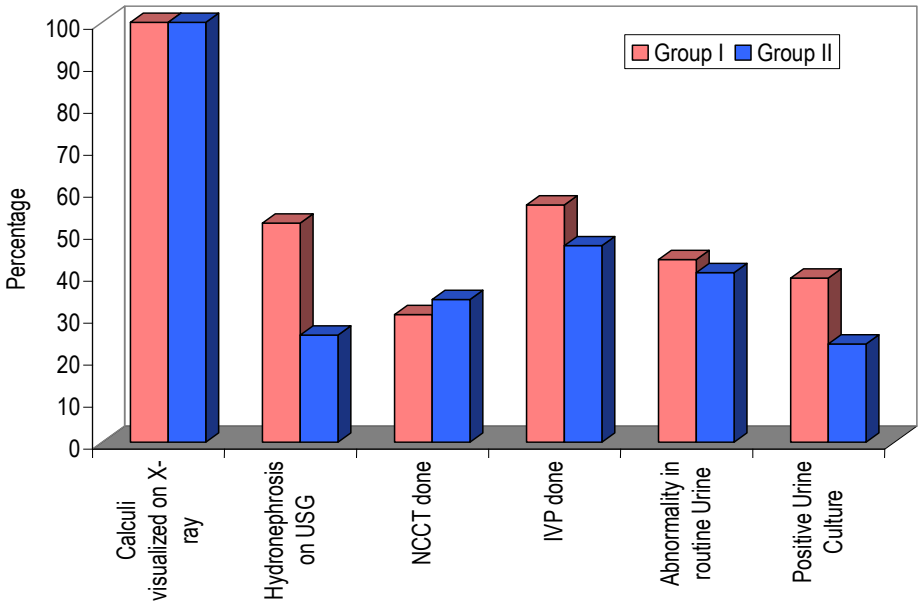
SN	Patient Profile	Total (N=70)	Group I (n=23)		Group II (n=47)		Significance of differences	
			No.	%	No.	%	χ^2	p
1-	Similar complaints in past	8	4	17.4	4	8.5	1.203	0.273
2-	Family history	9	1	4.3	8	17.0	2.214	0.137
3-	Tobacco/Smoking	15	5	21.7	10	21.3	0.002	0.965
4-	Vegetarian diet only	42	14	60.9	28	59.6	0.011	0.917
5-	Pallor/Icterus	9	4	17.4	5	10.6	0.629	0.428
6-	Cardiovascular dis.	0	0	0.0	0	0.0	–	–
7-	Dementia	1	0	0.0	1	2.1	0.496	0.481
8-	Crepts/Rhonchi	8	5	21.7	3	6.4	3.598	0.058
9-	Abdominal tenderness	2	2	8.7	0	0.0	4.207	0.040



None of the patients enrolled in the study was found to be suffering from cardiovascular disease. All the above risk factors except Family history and dementia were found in higher proportion of patients of Group I as compared to Group II but this difference was found to be statistically significant only for patients presenting with abdominal tenderness (8.7% vs. 0.0%; p=0.040).

Table 10: Between Group Comparison of Radiological Investigations

SN	Radiological findings	Total (N=70)	Group I (n=23)		Group II (n=47)		Significance of differences	
			No.	%	No.	%	χ^2	p
1-	Calculi visualized on X-ray	70	23	100.0	47	100.0	–	–
2-	Hydronephrosis on USG	24	12	52.2	12	25.5	4.865	0.027
3-	NCCT done	23	7	30.4	16	34.0	0.091	0.763
4-	IVP done	35	13	56.5	22	46.8	0.583	0.445
5-	Abnormality in routine Urine	39	10	43.5	19	40.4	0.059	0.808
6-	Positive Urine Culture	20	9	39.1	11	23.4	1.871	0.171



Calculi was visualized on X-ray of all the patients. NCCT was done in higher proportion of Group II as compared to Group I patients (34.0% vs. 30.4%) while IVP was done in higher proportion of Group I as compared to Group II patients (56.5% vs. 46.8%).

USG findings suggestive of ureteric calculus were present in all the patients, Hydronephrosis was also visible in 24 patients. Proportion of patients with hydronephrosis was significantly higher in Group I as compared to Group II (52.2% vs. 25.5%).

Routine Urine examination was found to be abnormal (Pus cells & RBC) in higher proportion of Group I as compared to Group II patients but this difference was not found to be statistically significant.

Pathogens (E. coli, Enterococcus, Proteus, Staphylococcus) were found in Urine (culture) among higher proportion of Group I as compared to Group II patients (39.1% vs. 23.4%) but this difference was not found to be statistically significant.

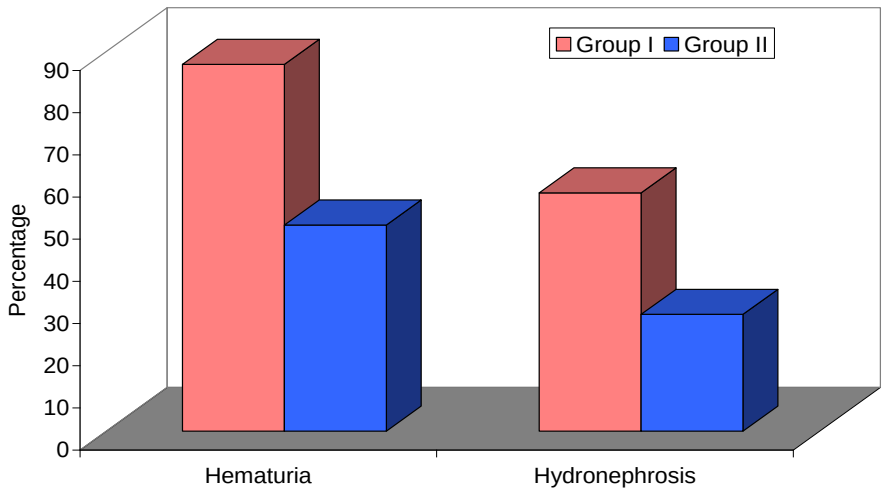
Table 11: Between Group comparison of Hematological/Biochemical parameters of Study population

SN	Parameters	Group I (n=23)		Group II (n=47)		Student 't' test	
		Mean	SD	Mean	SD	't'	'p'
1-	Hb	11.17	2.12	11.39	2.09	-0.411	0.682
2-	TLC	6400.00	2895.92	7182.98	2847.68	-1.075	0.286
3-	P	77.48	8.00	77.70	6.90	-0.121	0.904
4-	L	11.83	3.28	12.13	4.21	-0.301	0.764
5-	M	6.52	4.03	6.06	2.85	0.549	0.585
6-	E	4.17	2.31	4.19	2.78	-0.026	0.979
7-	S. creat	1.01	0.29	1.00	0.32	0.193	0.848
8-	S. Urea	27.48	7.52	27.32	6.91	0.088	0.930

Above Hematological/Biochemical of patients of both the groups were comparable.

Table 12: Between Group Comparison of Complications during Treatment

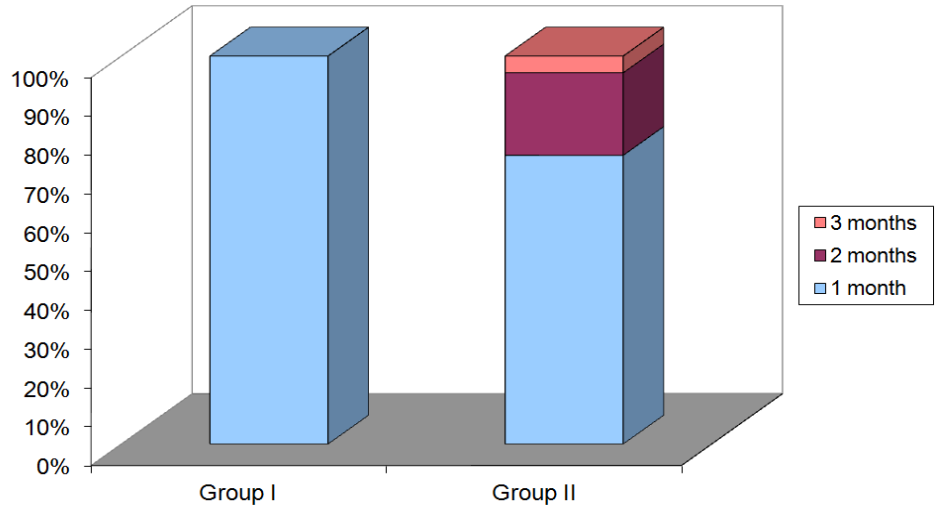
SN	Complications	Total (N=70)	Group I (n=23)		Group II (n=47)		Significance of differences	
			No.	%	No.	%	χ^2	p
1-	Hematuria	43	20	87.0	23	48.9	9.422	0.002
2-	Hydronephrosis	26	13	56.5	13	27.7	5.510	0.019



Significantly higher proportion of patients of Group I as compared to Group II were found to have complications of hematuria (87.0% vs. 48.9%) and hydronephrosis (56.5% vs. 27.7%) during the study period

Table 13: Between Group comparison of Duration of Complete removal/ Time taken to shift from conservative to surgical management among Study population

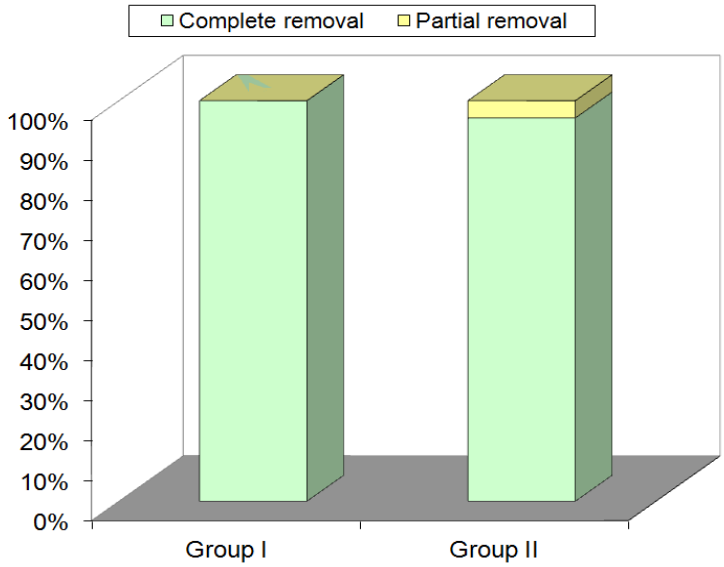
SN	Duration	Group I (n=23) (Time taken for change of modality)		Group II (n=47) (Time taken for complete expulsion)		Total (N=70)	
		No	%	No.	%	No.	%
1-	≤1 month	23	100	35	74.5	37	52.9
2-	2 months	0	0	10	21.3	22	31.4
3-	3 months	0	0	2	4.3	11	15.7



In Group I, all the 23 (100%) cases opted to surgical modality within 1 month. On the other hand, in Group II complete expulsion was achieved within 1 month in 35 (74.5%) of cases, in 2 months in 10 (21.3%) cases and in 3 months in 2 (4.3%) cases.

Table 14: Between Group comparison of Outcome at completion of treatment among Study population

SN	Outcome	Group I (n=23)		Group II (n=47)		Total (N=70)	
		No	%	No.	%	No.	%
1-	Complete removal	23	100	45	95.7	68	97.1
2-	Partial removal	0	0	2	4.3	2	2.9
		χ^2=1.01 (df=1); p=0.316					

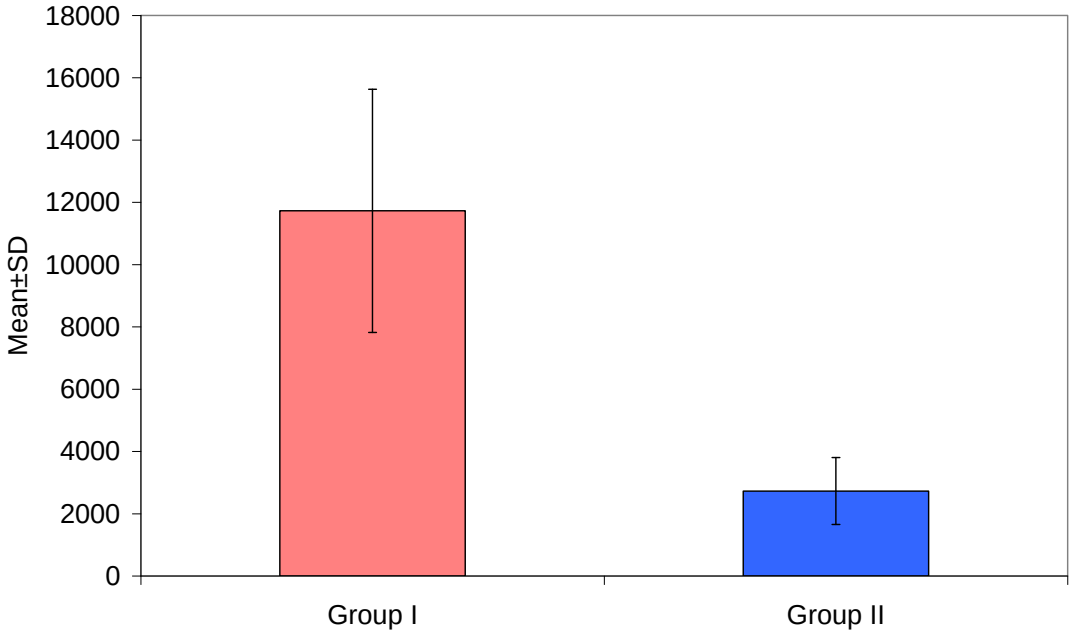


Complete removal of stone was observed During the six months' follow-up, there was no mortality and no case of metastasis was noted. However, recurrence was seen in a total of 12 (15%) cases. Thus recurrence rate was 15% in present study in all the patients in Group I as compared to 45 (95.7%) of those in Group II. However, this difference was not significant statistically (p=0.316)

Table 15: Between Group Comparison of Cost of Treatment

Group	No. of patients	Min.	Max.	Mean	S.D.
Group I	23	10400	14600	11726	3903
Group II	47	1800	6100	2726	1075
Total	70	1800	14600	5683	4874

't'=14.800; p<0.001



Cost of Conservative treatment (Group II) ranged from Rs 1800-6100, mean cost was Rs 2726±1075 while that of Surgical treatment (Group I) ranged from Rs 10400-14600 and mean cost was Rs11726±3903. Difference in cost of treatment of patients of Group I and Group II was found to be statistically highly significant.

Conclusion

The present study was conducted to compare the course of ureteral stones disease managed conservatively with respect to Early surgery. Study population comprised of 70 patients of ureteral stones undergoing conservative management at the hospital, of these 23 (32.9%) underwent surgical management while rest 47 (67.1%) underwent conservative treatment only. Age of patients enrolled in the study ranged from 18 to 70 years. Majority of the patients were males (58.6%) and from Urban areas (51.4%). Following findings of the study lead to conclusions:

1) Demographic profile (age, gender, habitat, occupation) of patients managed surgically and conservatively was found to be comparable.
2) Proportion of patients managed surgically was higher as compared to those managed conservatively presenting with symptoms of Pain (69.6% vs 59.6%), Vomiting (56.5% vs 48.9%), Nausea (69.6% vs 63.8%), Hematuria (87.0% vs 48.9%,) and burning micturition (100.0% vs 59.6%). Significant differences were found for only two presenting symptoms: hematuria and burning micturition.

3) Difference in site of stone for patients managed surgically or conservatively was not found to be statistically significant. Most common site of stone for both the groups was Upper ureter (39.1% &38.3%) followed by Mild ureter (34.8% & 34.0%) and least common site was lower ureter (26.1% & 27.7%).
4) Duration of pain was found to be significantly higher among patients managed surgically (20.65±3.74 days) as compared to those managed conservatively (14.51±2.91 days).
5) Stone size of patients who had to undergo surgical treatment (7.95±1.11 mm) was found to be significantly higher as compared to those who were treated conservatively (6.08±0.76 mm).
6) Significantly higher proportion of patients managed surgically as compared to those managed conservatively had hematuria (87.0% vs. 48.9%) and hydronephrosis (56.5% vs. 27.7%).
7) Among 23 cases managed surgically, decision for surgical management was made within one month itself.
8) In conservatively managed patients complete expulsion was achieved within 1 month in 35 (74.5%) of cases, in 2 months in 10 (21.3%) cases and in 3 months in 2 (4.3%) cases.
9) In conservatively managed group, complete expulsion could not be ensured in 2 (4.3%) cases.
10) Cost of management of patients managed surgically (Rs 11726±3904) was significantly higher as compared to those managed conservatively (Rs 2726±1075).

References

1. Lotan Y, Gettman MT, Roehrborn CG, Caddeu JA and Pearle MS.: Management of ureteral calculi: a cost comparison and decision making analysis. J Urol, 167: 1621, 2002
2. Campbell-Walsh Urology. 9th edition Chapter 42 epidemiology of renal calculi
3. Dellabella M, Milanese G, Muzzonigro G. Randomized trial of the efficacy of tamsulosin, nifedipine and phloroglucinol in medical expulsive therapy for distal ureteral calculi. Journal of Urology 2005; 174: 167-172.
4. Lotan Y, Gettman MT, Roehrborn CG, Caddeu JA and Pearle MS.: Management of ureteral calculi: a cost comparison and decision making analysis. J Urol, 167: 1621, 2002
5. Lotan Y, Gettman MT, Roehrborn CG, Caddeu JA and Pearle MS.: Management of ureteral calculi: a cost comparison and decision making analysis. J Urol, 167: 1621, 2002
6. Preminger GM, Tiselius HG, Assimos DG, Alken P, Buck AC, Gallucci M, Knoll T, Lingeman JE, Nakada SY, Pearle MS, Sarica K, Türk C, Wolf JS Jr: 2007 Guideline for the management of ureteral calculi. EurUrol2007;52:1610–1631.
7. Yang M, Gao F, Liu H, Pang H, Zuo YP, Yong T: Prospectively estimating the recoverability of renal function after relief of unilateral urinary obstruction by measurement of renal parenchymal volume. AcadRadiol 2013;20: 401–406.
8. Chaabane W, Praddaude F, Buleon M, Jaafar A, Vallet M, Rischmann P, Galarreta CI, Chevalier RL, Tack I: Renal functional decline and glomerulotubular injury are arrested but not restored by release of unilateral ureteral obstruction (UUO). Am J Physiol Renal Physiol 2013;304:F432–439.
9. Ito K, Chen J, El Chaar M, Stern JM, Seshan SV, Khodadadian JJ, Richardson I, Hyman MJ, Vaughan ED Jr, Poppas DP, Felsen D: Renal damage progresses despite improvement of renal function after relief of unilateral ureteral obstruction in adult rats. Am J Physiol Renal Physiol 2004;287:F1283–1293.