ORIGINAL RESEARCH

A study of medical expulsion therapy in comparison with intravenous hydrotherapy in treatment of ureteric calculus at tertiary care centre

[1]Jha Rupeshkumar Jainandan, [2]Satish G. Gireboinwad,[3]N N Chate, [4]Swapnil Suresh Ugale

[1]PG 3rd year, [2]Associate Professor, [3]Professor& Head,[4]Senior Resident, Department of General Surgey, S.R.T.R. GMC AmbajogaiIndia

Corresponding Author
Jha Rupeshkumar Jainandan
PG 3rd year, Department of General Surgey, S.R.T.R. GMC Ambajogai India
Email:rupeshjha256@gmail.com

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ABSTRACT
Background: Urolithiasis incidence is rising globally despite significant advancements in the discovery of alternative therapies for the management of urinary stones. It's still unclear how ureteric stones form in many ways.However, the development of minimally invasive surgeries has made ureteric calculi management much easier than in the past, with a significant decrease in morbidity.**Objective:**to compare the outcome of treatment of ureteric calculus by medical expulsion therapy and intravenous hydrotherapy**Methods**: The present study is a Comparative Analytical Study. The study was conducted in the Department of General Surgery at the Government Tertiary Care Hospital over a period of 2 years from January 2021 to December 2022. **Results:** The average calculus size in medical expulsive therapy was 6.51 ± 1.10mm, whereas it was 6.79 ± 1.34mm in intravenous hydrotherapy. CT urography was performed in total 66 patients and we have seen that 4 (12.12%) cases passed calculi after the medical expulsive therapy, whereas intravenous hydrotherapy shows that 21 (63.64%) cases passed calculi. After receiving medical expulsive therapy, 29 (87.87%) patients experience loin pain, compared to 9 (27.27%) patients who received intravenous hydrotherapy. There were 18 (54.55%) cases that needed to be readmitted to the hospital followed by medical expulsive therapy, whereas 12 case was readmitted after intravenous hydrotherapy.**Conclusions:** It can be concluded that intravenous hydrotherapy is a relatively safe and efficient treatment method in cases of ureteric calculus.

Keywords: Medical expulsion therapy, Intravenous hydrotherapy, Ureteric calculus

INTRODUCTION

The term "ureteric calculi" or "stones" refers to any ureteric obstruction due to stones between the ureteropelvic junction (UPJ) and the vesicoureteral junction (VU).[1] Ureteral stones are a common issue with serious consequences that affect healthcare systems worldwide. The incidence of ureteral stones is estimated to be 1% to 15% of the population and is on the rise.[2,3] 20% of all urolithiasiscases are due toureteral stones, and 70% of these stones are found in the lower portion of the ureter.[4] Urolithiasis is one of the most common kidney diseases.A recurrence will occur in nearly 50% of affected people within 5 years, making it a chronic condition.[5,6]

The National Health and Nutrition Examination reports that according to a survey from 2012, the prevalence of renal calculi was 10.6% for males and 7.1% for women. Both numbers are rising. The most prevalent type of urolithiasis is symptomatic. The age range of 20 to 40 years has a higher frequency of urolithiasis.[7,8] The intramural "detrusor tunnel" in the terminal region of the ureter is typically the biggest barrier to the passage of calculi. Most calculi that are 5 mm or less pass on their own without much discomfort, becauseureteric calculus is frequently associated with renal obstruction. It is critical to take precautions to avoid irreversible kidney damage by selecting an effective therapy strategy.[9]

The two basic types of variables that affect calculi expulsion are as follows:

1. Pathogenic elements such as an infection, edema, and urinary tract contraction

2. Calculi characteristics include calculi size, form, and location.The most crucial of these are calculi's position and size.

The location and size of the stone are important factors in the spontaneous removal of calculus. According to American Urological Association guidelines, approximately 98% of calculi 5 mm in size pass spontaneously, while only 68% of those 5-10 mm in size pass spontaneously without treatment.When removal of calculus becomes difficult due to its large size. The treatment options can be broadly divided into observation and medical expulsive therapy, shock wave lithotripsy, ureteroscopy, open surgery, laparoscopic calculi removal, or percutaneous antegrade ureteroscopy.[10] According to the location of the stone, stones in the proximal ureter have a 48% chance of spontaneous removal, mid-ureteral stones have a 60% chance, distal stones have a 75% chance, and stones at the ureter-vesical junction have a 79% chance.[11]

Patients with calculi less than 10 mm in size and located in the ureter can receive medical treatment in the form of:[12]

1. Medical Expulsion therapy
2. Intravenous hydrotherapy

This study reviews the role of medical expulsive therapy in facilitating the ureteric calculus and its use as an adjunct to other treatment modalities such as intravenous hydrotherapy. This study compared the outcomes and results of medical expulsion therapy and intravenous hydrotherapy. This is also applied to conservative approaches to treating ureteric calculi, which will help to reduce hospital visits and admissions in the given patients.

MATERIALS AND METHODS

The present study is a Comparative Analytical Study. The study was conducted in the Department of General Surgery at the Government Tertiary Care Hospital over a period of 2 years from January 2021 to December 2022. Patients from the Department of General Surgery and Tertiary Care Center are selected for the study as per the inclusion and exclusion criteria.

INCLUSION CRITERIA

1. Patients with ureteric calculi with age between 18-60 years
2. Patients with calculi of size between 4mm to 10mm located in ureter
3. Patients who have given written and informed consent for the procedure and complications associated with it.

EXCLUSION CRITERIA

1. Unwillingness of the patients, uncooperative subjects.
2. Patients age below 18 years.
3. Patients age above 60 years.
4. Patients with deranged kidney function.
5. Patients with known cardiac disease.
6. Patients with uncontrolled hypertension.
7. Patients with ureteric calculus less than 4 mm in size.
8. Patients with ureteric calculus more than 10 mm in size.
9. Patients with renal calculi.
10. Patients with urinary bladder calculi.
11. Patients those are terminally ill.

SAMPLING TECHNIQUE

After getting permission from the ethical committee, the study is carried out.Patients fulfilling inclusion and exclusion criteria are taken into the study Patients were explained about the procedure, and then written informed consent was taken.Patients were divided into two groups randomly. Group A willreceive medical expulsion therapy, and Group B will receive intravenous hydrotherapy.The results of both are compared and analysed.

SAMPLE SIZE

All the patients during the study period were included. Patients having ureteric calculi were diagnosed clinically and selected according to inclusion criteria.

CONDUCT OF STUDY

1) **Medical Expulsion therapy:** oral fluids (4-5 litres/day) +T. Spironolactone 25 mg OD+T. Tamsulosin 0.4mg HS for 5 days
2) **Intravenous hydrotherapy:** Inj.depot Progesterone 250 mg im stat followed by IVF NS 1.5 L Followed by inj.LASIX 40 mg iv then then IVE NS 1L. For 3 days. (Progesterone should be given only once on day 1)

STATISTICAL ANALYSIS

Descriptive statistics were done for all data. Based on normality, parametric and nonparametric tests were done and declared statistically significant at a p value of 0.05.Results on continuous measurements were presented as a mean +/-SD and results on categorical measurements were presented in terms of percentage (%). Significance was assessed at a level of 5% significance.At the end of the study, appropriate tests were applied.

RESULT

Majority of patients were male i.e., 37 (56.06%) and females were 29 (43.94%) in the given study. 31 cases (46.97%) of ureteric calculi were found at the vesicoureteral junction, followed by 19 cases (28.79%) at the distal ureter, 13 cases (19.70%), and 3 cases (4.55%) at the ureteropelvic junction.

Table1: Location of Calculi in patients.

Location of Calculi	No. of cases	Percentage
Distal ureter	19	28.79%
Proximal ureter	13	19.70%
Ureteric pelvic junction	3	4.55%
Vesicoureteric junction	31	46.97%
Total	66	100.00%

Hypertension were seen in seven cases (10.61%), followed by six cases (9.09%) of obesity, three cases of diabetes mellitus, two cases each of dyslipidaemiaand high intake of animal protein. The majority of patients had no previous history of these issues.

The average calculus size in medical expulsive therapy was 6.51 ± 1.10 mm, whereas it was 6.79 ± 1.34 mm in intravenous hydrotherapy. According to a comparison of calculus size (mm) with therapies, there was no statistically significant difference between the two therapies (p = 0.35).

Table-2: Comparison of size of calculus (mm) between therapies.

Therapy type	Size of calculus (mm) mean ±SD	p value
Medical expulsive therapy	6.51 ± 1.10	0.35
Intravenous hydrotherapy	6.79 ± 1.34	

S.D. = Standard Deviation

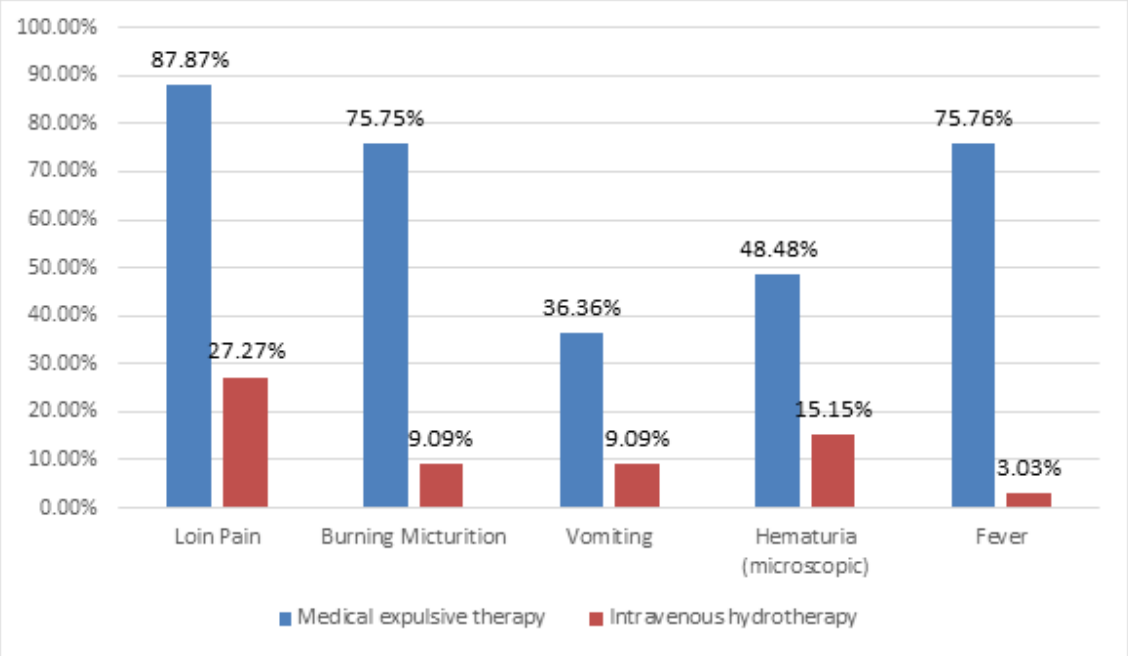
After the CT urography, we have seen that 4 (12.12%) cases passed calculi after the Medical expulsive therapy, whereas intravenous hydrotherapy shows that 21 (63.64%) cases passed calculi. Twelve cases (36.36%) of calculi descent were noted in medical expulsive therapy which accounted for about 0736.36% in intravenous hydrotherpy, and the cases that was affected by the location of calculi after the Medical expulsive therapy. With p = 0.001, a statistically significant difference was discovered.

Table3: CT urography status after therapy

CT urography	Medical expulsive therapy	Intravenous hydrotherapy	p value
Descent of calculi	12 (36.36%)	7(21.21%)	<0.001*
No effect on location of calculi	17 (51.52%)	5 (15.15%)	
Passed calculi	4 (12.12%)	21 (63.64%)	
Total	33	33	

*=Significant

Figure 1: Symptoms after therapy in patients



After receiving Medical expulsive therapy, 29 (87.87%) patients experience loin pain, compared to 9 (27.27%) patients who received intravenous hydrotherapy. These patients were then followed by 25 (75.75%) patients who experienced burning urination and fever, and only 3 (9.09%) patients received

intravenous hydrotherapy. No cases of vomiting and haematuria were reported after intravenous hydrotherapy; however, 12 and 16 cases were reported after Medical expulsive therapy.

Following a urine microscopic examination, we have seen that 31 (93.94%) of the cases in intravenous hydrotherapy had less than 6 cells/HPF, compared to no cases with 6 cells/HPF, only 2 cases with 6–10 cells/HPF in intravenous hydrotherapy, and 24 (72.73%) in medical expulsive therapy. No case was reported with a loaded catheter in intravenous hydrotherapy, whereas nine (27.27%) cases in medical expulsive therapy.There was significant association found between groups (p=<0.0001)

Table4: Association of urine microscopic examination with therapies.

No. of pus cells/HPF	Medical expulsive therapy	Intravenous hydrotherapy	p value
<6	0 (0%)	31 (93.94%)	<0.0001*
6-10	24 (72.73%)	2 (6.06%)	
Loaded	9 (27.27%)	0 (0%)	
Total	33	33	

*=Significant

There were 18 (54.55%) cases who need to be readmitted to the hospital followed by medical expulsive therapy, whereas 12 cases were readmitted after intravenous hydrotherapy. Also, statistically significance difference was found (p=<0.001).

Table 5: Need of Re-Hospitalization after therapy

Need of Re-Hospitalization	Medical expulsive therapy	Intravenous hydrotherapy	p value
No	15 (45.45%)	21 (63.63%)	<0.0001*
Yes	18 (54.55%)	12 (36.36%)	

*=Significant

DISCUSSION

The study was carried out in the Department of General Surgery,at Government Tertiary Care Hospital. This study was aimed to compare the outcome of treatment of ureteric calculus by medical expulsion therapy and intravenous hydrotherapy. The study's primary goal was to study the result of medical expulsion therapy and Intravenous hydrotherapyon ureteric calculus located at various positions in the ureter.

The current study was carried out on patients who were hospitalized in the Department of General Surgery from January 2021 to December 2022 with ureteric calculi. During the study period, 66 patients who met the inclusion criteria were admitted and were a part of the study. Complete clinical history and examination were carried out in each case. The clinical diagnosis of ureteric calculi was made. Medical expulsion therapy and Intravenous Hydrotherapy was performed on a subset of patients.

The management of urinary stones depends on the size, location, and composition of the stone.Thebenefits are observed along the distal ureters, and the AUA recommendations also advise medical expulsive therapy for ureteral stones smaller than 10 mm.According to studies, stones that do not pass after six weeks are more likely to need treatment.[13]

From were study, the following results were obtained

- According to a comparison of calculus size (mm) with therapies, there was no statistically significant difference between the two therapies.
- Gender distribution-
- Out of the total 66 patients, the majority of patients, i.e., 56.06 percent (37 cases), were males, and the remaining 29 cases were female.
- It is generally acknowledged that the stone's position has a significant role in predicting stone passage.[14]When predicting stone passage, our findings suggest a classification of stone location at the Vesicoureteric junction. (31 cases)
- Urinary calculi patients frequently experience abdominal pain, infection, or haematuria.[15]In our study, the majority of patients had a history of hypertension.
- The size of calculus (mm)in medical expulsive therapy was 6.51 ± 1.10 mm which was similar to the results obtained by **D Bos et.al**[16] and**A Ramesh et al**. [17]
- The size of calculus (mm) in **D Bos et.al**[16]and**A Ramesh et al.**[17]was 6.4mm - 6.9mm and 5-7mm respectively.
- The CT urography results suggested that the 4 (12.12%) cases passed calculi after the medical expulsive therapy. And in intravenous hydrotherapy, 21 63.64%) cases passed calculi.The AUA guideline on stones recommendedCT-urography imaging is required to diagnose complex urinary tract anatomy such as an ectopic kidney.
- ureteral strictures, ureterocoeles.[13]
- In the present study, hypertension was seen in 10.61% of patients. According to study by **K. Jagannath, et. Al**[18], obesity was seen in 6.66% of patients. They further conclude that obesity increases the risk of ureteric calculi formation.

There is currently a dearth of important scientific information about the positive results of MET in clinical procedures. But there are limited studies about intravenous hydrotherapy with encouraging results.

CONCLUSION

Urolithiasis incidence is rising globally despite significant advancements in the discovery of alternative therapies for the management of urinary stones. It's still unclear how ureteric stones form in many ways. However, the development of minimally invasive surgeries has made ureteric calculi management much easier than in the past, with a significant decrease in morbidity.

In the right circumstances, MET can effectively improve the expulsion rate of calculi while lowering their length, complications, expenses, and hospitalization rates. But in our study, it was proven that intravenous hydrotherapy was efficient and should be considered for uncomplicated distal ureteral calculi removal. We also discovered that intravenous hydrotherapy reduced re-hospitalization rates and symptoms in patients after therapy.

After conducting a thorough assessment of the results established in the present literature, it can be concluded that intravenous hydrotherapy is a relatively safe and efficient treatment method in cases of ureteric calculus.

When ureteric calculi are found within 1-2 days of colic in uncomplicated, unilateral, and are less than 8mm in size, a conservative approach should be considered as a possible treatment option.A more detailed and in depth understanding of the composition of urolithiasis, rates of clearance will help to assess,treat and prevent more effectively.

REFERENCES

1. Tiselius HG. Epidemiology and medical management of stone disease. BJU Int 2003:91:758-67
2. Pak CY. Kidney stones. Lancet. 1998;351:1797- 801.
3. Ramello A, Vitale C, Marangella M. Epidemiology of nephrolithiasis. J Nephrol. 2000;13(3):S45-50
4. Ahmed AF, Al-Sayed AY. Tamsulosin versus alfuzosin in the treatment of patients with distal ureteral stones: prospective, randomized, comparative study. Korean J Urol. 2010;51:193-7.
5. Moe OW. Kidney stones: pathophysiology and medical management. Lancet 2006;367(9507):333- 44.
6. Trinchieri A, Coppi F, Montanari E, Del Nero A, Zanetti G, Pisani E. Increase in the Prevalence of Symptomatic Upper Urinary Tract Stones during the Last Ten Years. Eur Urol. 2000;37:23-5.
7. Romero V, Akpinar H, Assimos DG. Kidney calculi: a global picture of prevalence, incidence, and associated risk factors. Reviews Urol. 2010;12(2-3):e86-96.
8. Lingeman JE, Lifshitz DA, Ewan AP. Surgical management of urinary lithiasis in Campbells Urology 8th Edition, vol. 4, Published by WB Saunders Company, Philadelphia; 2002;3361-1451.
9. Stoller ML. Urinary calculi disease, Smith General Urology, 17th edition; 2011:262
10. Preminger GM, Hans-Göran Tiselius CC, Dean Assimos CCG, Chair Peter Alken V, Colin Buck A, Gallucci M, et al. The management of ureteral calculi: diagnosis. Am Urol Assoc Adv Urol. 2007:1-64.
11. Hollingsworth JM, Rogers MA, Kaufman SR, Bradford TJ, Saint S, Wei JT, et al. Medical therapy to facilitate urinary stone passage: a meta-analysis. Lancet. 2006;368:1171-9.
12. Segura JW, Preminger GM, Assimos DG, Dretler SP, Kahn RI, Lingeman JE, et al. Ureteral stones clinical guidelines panel summary report on the management of ureteral calculi. J Urol 1997; 158: 1915-1921.
13. Assimos D, Krambeck A, Miller NL, et al. Surgical management of stones: american urological association/endourological society guideline, PART I. J Urol. 2016;196(4):1153–1160
14. Sfoungaristos S, Kavouras A, Perimenis P (2012) Predictors for spontaneous stone passage in patients with renal colic secondary to ureteral calculi. Int Urol Nephrol 44:71–79
15. López M, Hoppe B. History, epidemiology and regional diversities of urolithiasis. Pediatr Nephrol. 2010 Jan;25(1):49-59.
16. Bos, Derek, and Anil Kapoor. “Update on medical expulsive therapy for distal ureteral stones: Beyond alpha-blockers.” Canadian Urological Association journal = Journal de l'Association des urologues du Canada vol. 8,11-12 (2014): 442-5.
17. Ramesh A, Karthick P, Shiva Kumar R. Medical expulsion therapy for ureteric calculus – possible. Int Surg J 2016; 3:113-8
18. Jagannath K, Gupta AK, Srinivasan N. A study on ureteric calculi in a rural tertiary care centre. Int Surg J 2019;6:1312-7