



Observing the Outcome of Ureter Stones Expelled with Medical Expulsive Therapy: A Prospective Longitudinal Study

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ABSTRACT

Introduction: There are a lot of risks involved with the surgery which include postoperative complications such as ureteric damage and sepsis. With the rise in the need for an efficient cure for expelling ureter stones research is being done to study the effect of medical expulsive therapy on the expulsion of stones.

Aim: The purpose of this study was to observe the outcome of ureter stones expelled with medical expulsive therapy

Methodology: The study population consisted of a sample of 220 patients that had been diagnosed with Ureterolithiasis. This diagnosis was radiologically confirmed. Once the diagnosis was confirmed, the patients were prescribed medication for the medical expulsive therapy. The medication prescribed was tamsulosin which was to be taken daily over a period of six weeks. Follow-up checkups were used to gauge the pain severity and determine whether the drugs needed to be continued. Surgical intervention was required for patients who had a stone size greater than 10 millimeters. Prospective longitudinal study. This study was conducted at Benazir Bhutto Hospital Rawalpindi Pakistan, period of six months from December 2020 to May 2021.

Results: In a total of 220 patients, 173 (78.6 %) of the patients were male while the rest of the 47 patients (21.4%) were female. The mean age of the patients was 41 ± 4.3 years. The results showed that a total of 220 stones were found in the patients where 43 stones (19.5 %) were found in the upper ureter, 55 stones (25%) in the mid ureter and 122 stones (55.5%) in the lower ureter. A total of 40% of the patients passed their stones within the 12-weeks. A total of 14% patients did not expel the stones through Medical expulsive therapy rather they required surgery to remove the stones. The results from the study showed that in cases of uncomplicated Ureterolithiasis, stones which had a size of up to 10 millimeters could be expelled easily through medical expulsive therapy.

Conclusion: The study showed that only a small percentage of the patients with ureter stones required surgical intervention and vertical expulsive therapy proved to be an efficient way of expelling the stones up to ten millimeters. The trial could be continued from 6 to 12 weeks dependent on the movement of the stones through the ureter passage.

Key Words: Renal calculi, Ureter, Medical expulsive therapy, Patients, Surgical intervention, Techniques

INTRODUCTION

About 11% adults develop ureter stones.¹ There has been a wave of technological advancement in eliminating these stones with the use of different techniques such as shock wave lithotripsy (SWL) and ureteroscopic lasertripsy.² However, in resource poor clinics and countries the use of these interventions is not feasible and in South Asian countries native remedies are often used to treat these stones since taking the surgical route to eliminate these stones can often be

costly and rather risky.³ There are a lot of risks involved with the surgery which include postoperative complications such as ureteric damage and sepsis.⁴ With the rise in the need for an efficient cure for expelling ureter stones research is being done to study the effect of medical expulsive therapy on the expulsion of stones. Recent studies have noted that medical expulsive therapy is much more beneficial in larger stones.⁵ Recent studies also have evaluated the effect of two medications in medical expulsive therapy, these medications are

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Tamsulosin and nifedipine.⁶ The distal ureter holds the highest concentration of α adrenergic receptors, these receptors are found along the entire length of the ureter and the medications used for medical expulsive therapy contain these receptors in order to help expel the stone.⁷ This strategy will be focusing on the effects of Tamsulosin in helping expel stones comes from the ureter.⁸ Tamsulosin is also an adrenergic receptor however it is categorized as α 1A. It works in such a way that it reduces the spasm occurring within the ureter, this allows pressure to build on top of the stone from the accumulated urine and this increase in pressure helps in expelling the stone.⁹ Another medication used is Nifedipine which also works on the same principle as Tamsulosin and reduces the spasm within the ureter.¹⁰ It blocks the calcium channels which helps the stone to be expelled painlessly.¹¹ This study will establish the maximum size of the stone that can be expelled using medical expulsion therapy as well as the optimal time it takes to expel the stone. Different researchers and experts have recommended the possibility of there being a disparity within the rates of the stone expulsion due to different Demographics and ethnicities.¹² Current study was planned to observe the outcome of ureter stones expelled with medical expulsive therapy

METHODOLOGY

The study design was a prospective longitudinal that was conducted at our hospital. Permission was taken from the ethical review committee of the institute. The study population consisted of a sample of 220 patients that had been diagnosed with Ureterolithiasis. This diagnosis was radiologically confirmed and the study was held for a period of six months from December 2020 to May 2021. Demographic data was taken from the patients at the time of their admittance into the study along with their informed consent. The size of the stone, its location and its clinical outcomes were recorded periodically. Each patient brought in with the suspicion of having ureteric stone underwent x rays of the kidneys, ureters and the bladder. An ultrasound was also taken of the kidneys, ureters and the bladder. If the existence of the stone could not be confirmed with these scans and the physician still suspected the existence of stone than a non-contrast computerized tomography (NCCT) was also taken.¹³ Once the diagnosis was confirmed, the patients were prescribed medication for the medical expulsive therapy. The medication prescribed was tamsulosin which was to be taken daily over a period of six weeks. Additional medication such as diclofenac sodium and celecoxib were prescribed along with tamsulosin 0.4 mg. the Non-steroidal anti-inflammatory drugs were prescribed in order to manage the pain for a duration of two weeks. Follow-up checkups were used to gauge the pain severity and determine whether the drugs needed to be continued. Surgical intervention was required for patients

who had a stone size greater than 10 millimeters. Two surgical options were available for the patients based on the size of the stone, ureteroscopic lasertripsy was taken as an option if the stone size was between 11 millimeter and 15 millimeter and for stones that were greater than 15-millimeter open ureterolithotomy was taken as a course of action.¹⁴ The exclusion criteria for the study included patients that were pregnant, had a singular functioning kidney or had renal impairment. The exclusion criteria also included patients that had fever and a high CRP level since that was indicative of urosepsis. For the statistical analysis of the study the stone sizes were divided into 4 groups and the clinical outcomes for the medical expulsive therapy but evaluated at a period of six and twelve weeks respectively. In order to confirm the absence of a ureter stone a CT scan of the kidneys, ureters and the bladder was repeated. Patients who did not expel the stone in a 12-week period had to undergo surgery. In order to statistically analyze the data obtained from the study Chi squared test and correlation coefficient were used.¹⁵ A P value was considered significant if it was less than 0.05.

RESULTS

A study population of 220 patients was taken, all of whom were diagnosed with Ureterolithiasis which was radiologically confirmed. The patients were treated for Ureterolithiasis using medical expulsive therapy, the therapy entailed of administering tamsulosin for six months. The patients were treated in an outpatient setting and follow up information was taken. In a total of 220 patients, 173 (78.6 %) of the patients were male while the rest of the 47 patients (21.4%) were female. The mean age of the patients was 41 ± 4.3 years. A total of 70 patients (31.8%) were shown with a history of Ureterolithiasis. The results showed that A total of 220 stones were found in the patients where 43 stones (19.5 %) were found in the upper ureter, 55 stones (25%) in the mid ureter and 122 stones (55.5%) in the lower ureter. A total of 83% of the stones had a size < 10 Millimeter. 4.09% of the stones had a size greater than 15 millimeters. A total of 46% of the patients, which were 101 patients expelled their stones within a period of six weeks of the medical expulsive therapy. Total 40% of the patients passed their stones within the 12-week mark. 14% of the patients did not expel the stones through Medical expulsive therapy rather they required surgery to remove the stones. The results from the study showed that in cases of uncomplicated Ureterolithiasis, stones which had a size of up to 10 millimeters could be expelled easily through medical expulsive therapy. The study showed that 70 (32%) stones were less than 5 millimeter in size whereas 49.5% (109) were measured to be between 6 to 10 millimeters. A total of 212 patients (96.36%) were diagnosed with ureter stones based on their X ray and ultrasound of the kidneys, ureter and bladder. the remaining 8 patients required a

non-contrast computerized tomography (NCCT) of the kidneys, ureter and bladder In order to confirm the stones.

The 220 patients within the study group started medical expulsive therapy regardless of the stone size. The patient whose stone size measured between 11 to 15 millimeters were also scheduled for surgery. Each patient who had a stone size less than 5 millimeters managed to expel their stone with medical expulsive therapy. Three of the patients with stone size is greater than fifteen millimeters, underwent ureteric meatotomy since the stone passed into the lower ureteric orifice with medical expulsive therapy. Patient with stone size greater than 15 millimeters noted the migration of the stone in a downward trajectory with the use of medical expulsive therapy. There was statistical success significance noted in the medical expulsive therapy when the stone had to travel less distance within the ureter.

A total of 48% of the stones found in the upper ureter were expelled with the use of medical expulsive therapy, similarly the statistics show that the same expulsion happened for 84% of the stones found in the mid ureter and 95% of the stones in the lower ureter expelled through medical expulsive therapy. One of the most important parameters analyzed in this paper what is the distance and time it took for each Ureter stone to be expelled from the body. The time was measured based on the size of the stone itself and location of the stone according to the ultrasound and X rays of the kidneys, bladder, and ureter. The study showed that the stones in the upper ureter took more time to expel from the body. After the administration of the medical expulsive therapy for the first six weeks, 26% of the stones found in the upper ureter were expelled. The remaining 74% stones found were expelled after another six weeks off MET. When taking a look at the expulsion of the stones from the lower ureter, 57% of the stones were expelled from the body during the first six weeks. The remaining 43% stones we expelled from the body after another six weeks. The data showed that successful expulsion of the stone through medical expulsive therapy did not depend on any demographic parameters such as age or gender or the history of urolithiasis. The medical expulsive therapy would consist of using the medication tamsulosin which resulted in a success rate of 93% over a period of 12 weeks. The results from this study and the use of tamsulosin would greatly benefit clinics and patients since it would decrease the need for interventional procedures.

Table 1: Characteristics of the ureter stones

Characteristic	n (220)	%
Location		
Upper ureter	43	19.5
Mid ureter	55	25
Lower ureter	122	55.5

Table 1: (Continued)

Characteristic	n (220)	%
Stone size (mm)		
< 5	70	32
5-10	109	49.5
11-15	32	14.5
> 15	9	4.09
Outcome		%
Expulsion within first 6 weeks	101	46
Expulsion within 6 - 12 weeks	88	40
Surgical Intervention	31	14
Total	220	100

Table 2: Success of expulsion of ureter stones after 12 weeks of MET

Characteristic	MET	%	Surgery	%
Location				
Upper ureter	20	46.5	23	53.4
Mid ureter	45	83.6	10	18.18
Lower ureter	119	42.6	3	2.45
Stone size (mm)				
< 5	70	100	0	0
5-10	102	87.9	14	12
11-15	4	80	13	20
> 15	0	0	9	4.09

DISCUSSION

According to established evidence, 94 percent of ureteric stones up to four millimeters would pass on their own within forty days without the need for medicinal or surgical intervention.¹⁶ In our research, stones smaller than five millimeters had a similar rate of ejection. Furthermore, our findings demonstrate that after six weeks of Medical Expulsive Therapy, 49.6% of ureteric stones up to ten millimeters passed, and 93 percent pass after 12 weeks. In addition, our research discovered a statistically significant link between the size of the stone, its location, and the success rate of medical expulsion therapy. Only stones smaller than ten millimeters in diameter showed a linear link between the location of the stone and the effectiveness rate of Medical Expulsive Therapy.

As a result, it's appropriate to recommend that uncomplicated ureteric stones smaller than ten millimeters be treated with Medical Expulsive Therapy first. If the pain is effectively controlled and there is clinical and radiographic evidence of stone migration downward, the MET trial duration can be extended up to twelve weeks. However, such patients

must be closely monitored so that the small percentage of patients who do not experience relief from symptoms or stone ejection can be offered surgical surgery. In the industrialized world, about 26% of patients with ureteric calculi have urological procedures, compared to 18% in our study sample.¹⁷ Most of the patients had mild to severe hydronephrosis, but this was reversed once the stones were passed, and none of the patients' renal functions deteriorated biochemically.¹⁸ The fact that this observational study was conducted in a normal care context is its greatest strength.¹⁹ This allows researchers to apply their results directly to clinical practice and make the required improvements. This form of pragmatic observational research would enable for better clinical trial preparation and increase health-care equity for people from all socioeconomic backgrounds.²⁰ Even developed countries can benefit from these findings because they help to promote reverse innovation.

CONCLUSION

The study showed that only a small percentage of the patients with ureter stones required surgical intervention and vertical expulsive therapy proved to be an efficient way of expelling the stones up to ten millimeters. The trial could be continued from 6 to 12 weeks dependent on the movement of the stones through the ureter passage.

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Conflict of interest

None

Permission

Permission was taken from the ethical review committee of the institute

REFERENCES

- Islam DMDS. Comparative Study between Tamsulosin and Silodosin as a Medical Expulsive Therapy for Lower Ureteral Stones. *J. Med. Sci. Clin. Res.* 2020 Sep 7; 08(09).
- Jayant K, Agrawal R, Agrawal S. Tamsulosin versus tamsulosin plus tadalafil as medical expulsive therapy for lower ureteric stones: A randomized controlled trial. *Int. J. Urol.* 2014; 21(10):1012–5.
- Ronellenfisch U. What are the effects of alpha-blockers as medical expulsive therapy for people with ureteral stones? *Cochrane Clinical Answers.* 2018 Aug 3;
- Itoh Y, Okada A, Yasui T, Hamamoto S, Hirose M, Kojima Y, et al. Efficacy of selective α 1A adrenoceptor antagonist silodosin in the medical expulsive therapy for ureteral stones. *Int. J. Urol.* 2011 Jun 26.
- MCNAMARA D. Medical Expulsive Therapy Does the Job for Small Stones. *Internal Medicine News.* 2008 Sep; 41(17):21.
- Dahm P, Hollingsworth JM. Medical Expulsive Therapy for Ureteral Stones—Stone Age Medicine. *JAMA Internal Med.* 2018; 178(8):1058.
- Arda E, Cakiroglu B, Yuksel I, Akdeniz E, Cetin G. Medical Expulsive Therapy for Distal Ureteral Stones: Tamsulosin Versus Silodosin in the Turkish Population. *Cureus.* 2017 Nov 15;
- Bos D, Kapoor A. Update on medical expulsive therapy for distal ureteral stones: Beyond alpha-blockers. *Can. Urol. Assoc. J.* 2014; 8(11-12):442–5.
- Ozer C. Letter to the editor: on “Medical expulsive therapy for ureteral stones.” *Turk. J. Urol.* 2010; 36(4):441–1.
- Patterson JM, Wiseman OJ. The Role of Medical Expulsive Therapy for Ureteral Stones: Against MET. *European Urology Focus.* 2017 Feb; 3(1):5–6.
- Parikh C, Gurjar V, Shah S. Tamsulosin versus tadalafil as medical expulsive therapy of distal ureteric stones: a comparative study. *Int Surg J.* 2019; 6(3):982.
- Poulakis V. Editorial Comment on: Cost-Effectiveness of Medical Expulsive Therapy Using Alpha-Blockers for the Treatment of Distal Ureteral Stones. *European Urology.* 2008 Feb; 53(2):418–9.
- Tzortzis V, Mamoulakis C, Rioja J, Gravas S, Michel MC, de la Rosette JJMCH. Medical Expulsive Therapy for Distal Ureteral Stones. *Drugs.* 2009; 69(6):677–92.
- Molina WR, Catarinichia SP. Medical Expulsive Therapy for Ureteral Stones: is it Still Worthwhile? *Annals of Emergency Medicine.* 2019 Mar; 73(3):313–4.
- Dell'Atti L. Silodosin versus Tamsulosin as Medical Expulsive Therapy for Distal Ureteral Stones: A Prospective Randomized Study. *J Urol.* 2014; 82(1):54–7.
- Campschroer T, Zhu X, Vernooij RW, Lock MT. Alpha-blockers as medical expulsive therapy for ureteral stones. *The Cochrane Database of Systematic Reviews [Internet].* 2018 Apr 5; 4:CD008509. Available from: <https://pubmed.ncbi.nlm.nih.gov/29620795/>
- Dahm P, Sukumar S, Hollingsworth JM. Medical Expulsive Therapy for Distal Ureteral Stones: The Verdict is In. *European Urology.* 2018 Mar; 73(3):392–3.
- Giannarini G, Autorino R. Recommending Medical Expulsive Therapy for Distal Ureteric Calculi: A Step Back? *European Urology.* 2009 Sep; 56(3):413–5.
- Shah Y, Thekdi P, Patel K. Medical expulsive therapy for the management of ureteric calculi. *Int J Res Med Sci.* 2013; 1(3):267.
- Williams K, Dhanasekaran A. Medical expulsive therapy for ureteric calculi – yes or no? *J Clin Urol.* 2017; 11(5):345–9.