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Silodosin versus tamsulosin for medical expulsive therapy in distal ureteric calculi (<10 mm): A comparative study from a tertiary care centre

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Abstract
Background: Urolithiasis is a common urological disorder worldwide and contributes significantly to morbidity due to recurrent episodes of renal colic and ureteric obstruction. Distal ureteric calculi constitute a substantial proportion of ureteric stones because of physiological narrowing at the vesico ureteric junction. Stones measuring less than 10 mm often pass spontaneously, however, ureteric spasm, edema, and increased intraluminal pressure can hinder expulsion. Medical Expulsive Therapy (MET) using alpha-adrenergic blockers has been widely adopted to facilitate stone passage by reducing ureteric smooth muscle tone and improving peristalsis. Tamsulosin, a selective α1-adrenergic antagonist, has long been used in MET, while Silodosin, a newer highly selective α1A-adrenergic blocker, may offer improved efficacy due to its greater receptor selectivity in the distal ureter.
Objective: To compare the efficacy of Silodosin and Tamsulosin in the medical expulsive therapy of distal ureteric calculi less than 10 mm with respect to stone expulsion and analgesic requirement.
Methods: A observational Cross sectional study was conducted in the Department of General Surgery, K. H. Patil Institute of Medical Sciences, Gadag. Two hundred patients with distal ureteric calculi measuring less than 10 mm were enrolled and managed conservatively using either Silodosin or Tamsulosin. Patient demographics, stone characteristics, analgesic usage, and treatment outcomes were analyzed.
Results: Both medications demonstrated satisfactory stone expulsion rates. However, patients receiving Silodosin exhibited higher stone expulsion rates and required fewer days of analgesic therapy compared with those receiving Tamsulosin.
Conclusion: Silodosin demonstrated superior clinical efficacy over Tamsulosin in facilitating distal ureteric stone passage and reducing analgesic requirement.

Keywords: Urolithiasis, distal ureteric calculus, medical expulsive therapy, silodosin, tamsulosin, alpha-blockers

Introduction

Urolithiasis is one of the most common urological disorders worldwide, with a lifetime prevalence of 5–15%. Its incidence continues to rise because of changing dietary habits, sedentary lifestyles, and increasing life expectancy. Ureteric calculi account for a substantial proportion of urinary stone disease, with distal ureteric stones being the most frequent due to anatomical narrowing at the vesicoureteric junction. Patients typically present with renal colic, hematuria, dysuria, and lower urinary tract symptoms. Stone size and location are the primary determinants of spontaneous passage, with distal ureteric calculi measuring <10 mm having a favorable likelihood of spontaneous expulsion.

Medical expulsive therapy (MET) has become an established conservative treatment for selected patients with distal ureteric stones. Alpha-adrenergic blockers are the most widely used agents because alpha-1 receptors, particularly the α1A and α1D subtypes, are highly expressed in the distal ureter. Blockade of these receptors reduces ureteric smooth muscle tone and spasm, decreases intraluminal pressure, and facilitates stone passage.

Tamsulosin, a selective α1A/α1D receptor antagonist, has demonstrated improved stone expulsion rates, shorter expulsion times, reduced analgesic requirements, and lower need for surgical intervention. However, its use may be associated with adverse effects such as dizziness, postural hypotension, and ejaculatory dysfunction [5]. Silodosin, a newer highly selective α1A receptor antagonist, has been proposed to provide superior ureteric relaxation and improved stone clearance. Several studies have reported higher stone expulsion rates and faster passage with silodosin, although retrograde ejaculation remains its most notable adverse effect.

Despite growing evidence supporting the use of alpha-blockers, the relative efficacy and safety of silodosin compared with tamsulosin remain subjects of ongoing investigation, particularly in different patient populations and healthcare settings. Comparative data from tertiary care centres are important for guiding evidence-based clinical practice.

Therefore, the present study was undertaken to compare silodosin and tamsulosin as medical expulsive therapy for distal ureteric calculi <10 mm, with respect to stone expulsion rate, time to stone passage, analgesic requirement, adverse effects, and the need for surgical intervention.

Aim

- Comparison of Stone expulsion rate by Silodosin and Tamsulosin

Objective

- To compare the expulsion rate of distal ureteric calculus using Silodosin and Tamsulosin among patients with distal ureteric calculus.

- To compare efficacy of Silodosin and Tamsulosin for reduction in analgesic usage among the patients with distal ureteric calculus..

Method:

- **Type of Study:** The study is Observational Cross sectional study
- **Place of Study:** Patient visiting OPD in Department of General Surgery in Gadag Institute of Medical Sciences, Gadag
- **Duration of Study:** The study was conducted for a period of 2 years from March 2024 to February 2026
- **Inclusion Criteria:**
  - Patients of age 15 years and above.
  - Patients having ureteral calculi in lower ureter on computerized tomography of kidney, ureter and bladder.
  - Patients whose calculi measures 10 mm and less.
  - Patients who give informed written consent.

- **Exclusion Criteria**
  - Pregnant women or nursing mothers.
  - Patients with febrile UTI or severe hydronephrosis or hypotension.
  - Patients on α-blockers or α/β blockers or CCB or steroid.
  - Patients whose urinary tracts are anatomically deformed or stenosed.
  - Patients who underwent previous urological procedure
  - Patients whose blood creatinine levels are 1.4 mg/dL and over.
  - Patients with solitary kidney
  - Patients with NSAID drug intolerance or adverse effects of Tamsulosin/Silodosin during study.

Sample Collection

The Study participants were selected using the simple random sampling method. All patients who fulfilled the inclusion criteria and attended the general surgery department of GIMS, Gadag during the study period were considered eligible for study.

Methodology

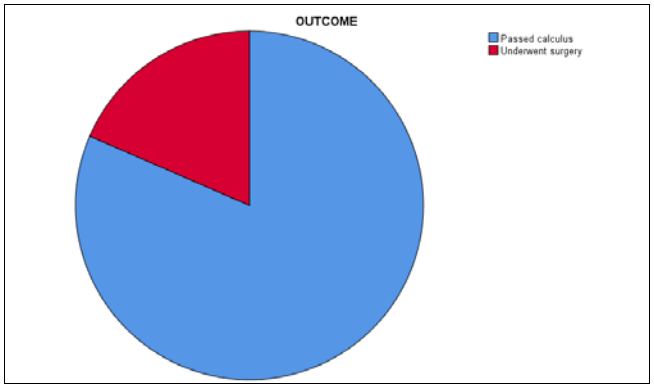
- Patients diagnosed by plain abdominal radiograph of KUB, ultrasonography, and non-enhanced spiral CT were explained about the study procedure, nature of the study, duration, possible adverse effects, and the need for intervention if required.
- Patients were divided into two equal groups and received the respective medications as per group allocation.
- Both groups were instructed to consume a minimum of 2 liters of water daily and were advised symptomatic treatment with tablet Diclofenac 50 mg SOS when required.
- Patients were advised to filter or strain urine to detect stone passage and to stop the medication after stone expulsion and report for confirmation.
- Patients were followed up with X-ray KUB and ultrasonography on day 14 and day 28.
- Failure of stone expulsion at the end of 28 days was considered as failure of drug therapy and further invasive intervention was advised if required.

Results

- **Treatment Outcome (n = 200)**

The treatment outcome analysis showed that 163 patients (81.5%) successfully passed the distal ureteric calculus with medical expulsive therapy, while 37 patients (18.5%) required surgical intervention due to failure of conservative management or complications. This indicates that a substantial majority of patients achieved stone expulsion without the need for operative treatment.

Outcome	Frequency	Percent
Passed calculus	163	81.5
Underwent surgery	37	18.5
Total	200	100.0



- **Descriptive Statistics of Size of Distal Ureteric Calculus (n = 200)**

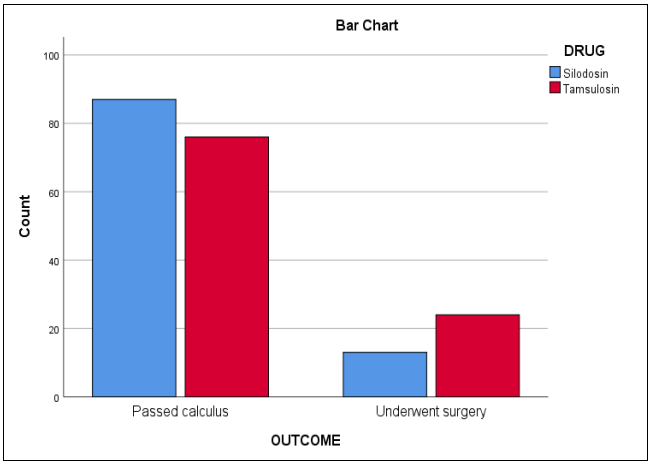
The size of distal ureteric calculi among the study participants ranged from 5.0 mm to 10.0 mm. The mean calculus size was 7.746 mm with a standard deviation of 1.1658, indicating moderate variability in stone size within the study population and confirming that all included calculi were less than 10 mm in diameter.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
SIZE OF CALCULUS	200	5.0	10.0	7.746	1.1658

- **Association between Treatment Outcome and Drug Used (n = 200)**

Stone expulsion was achieved in 87 patients (Silodosin) and 76 patients (tamsulosin), while surgical intervention was required in 13 and 24 patients, respectively. The association between treatment outcome and drug used was statistically significant (p = 0.045), indicating a difference in outcomes between the two drugs.

Outcome	Silodosin (n)	Tamsulosin (n)	Total	p-value
Passed calculus	87	76	163	
Underwent surgery	13	24	37	
Total	100	100	200	0.045



- **Association between Size of Calculus and Treatment Outcome (n = 200)**

Patients who passed the calculus had a mean stone size of 7.0656 ± 1.3584 mm, whereas those who underwent surgery had a larger mean size of 9.3054 ± 0.5916 mm. This difference was highly statistically significant ($p < 0.001$), indicating an association between larger stone size and surgical intervention.

	Outcome	N	Mean	Std. Deviation	P value
Size of calculus	Passed calculus	163	7.0656	1.35835	<0.001
	Underwent surgery	37	9.3054	0.59158	

- **Comparison of Mean Size of Passed Calculus between Drug Groups**

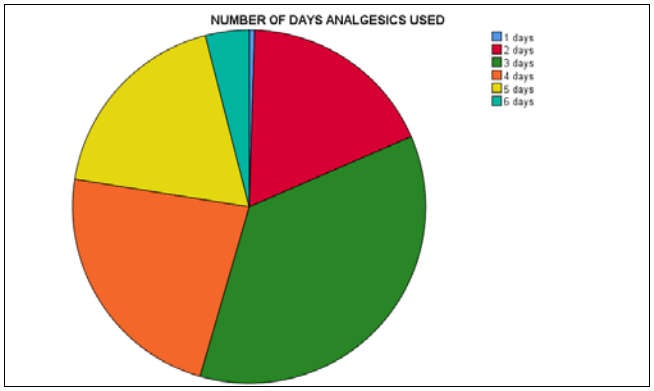
Among patients who passed the calculus, the mean stone size was 7.14 ± 1.36 mm in the Silodosin group (n = 87) and 6.98 ± 1.36 mm in the tamsulosin group (n = 76). The comparison showed no statistically significant difference (p = 0.434) between the two drugs.

Drug	N	Mean size of calculus (mm)	Standard Deviation	p-value
Silodosin	87	7.14	1.36	
Tamsulosin	76	6.98	1.36	
Total / Comparison				0.434

- **Number of Days of Analgesic Usage (n = 200)**

Most participants required analgesics for a short duration. The highest proportion used analgesics for 3 days (36.0%), followed by 4 days (23.0%). Analgesic use for 2 days (18.0%) and 5 days (18.5%) was also common. Prolonged use for 6 days was noted in 4.0%, while 0.5% required analgesics for only 1 day.

Days of Analgesic Use	Frequency	Percent
1 day	1	0.5
2 days	36	18.0
3 days	72	36.0
4 days	46	23.0
5 days	37	18.5
6 days	8	4.0
Total	200	100.0



A total of 200 patients with distal ureteric calculi measuring less than 10 mm were included. Both treatment groups were comparable with respect to baseline demographic and stone characteristics. The majority of patients belonged to the 31–50 years age group with male predominance. Silodosin demonstrated a higher stone expulsion rate and reduced analgesic requirement compared with Tamsulosin. Stone size significantly influenced spontaneous stone passage.

Outcome	Silodosin	Tamsulosin
Patients	100	100
Stone expulsion	Higher	Lower
Analgesic use	Lower	Higher
Overall outcome	Better	Good

Discussion

Medical expulsive therapy is an established conservative treatment for uncomplicated distal ureteric stones. The findings of this study suggest that Silodosin provides superior clinical efficacy compared with Tamsulosin, likely due to its greater α1A-adrenoceptor selectivity in the distal ureter. Improved ureteric relaxation may enhance stone passage while reducing painful colic episodes and analgesic requirement. These findings are broadly consistent with previously published comparative studies. The study is limited by its single-centre design and limited follow-up.

Conclusion

The present study evaluated the effectiveness of medical expulsive therapy (MET) for distal ureteric calculi less than 10 mm in a tertiary care centre using alpha-adrenergic blockers. A total of 200 patients were included and equally allocated into Silodosin and tamsulosin groups for comparative analysis. Distal ureteric calculi were most commonly seen in young and middle-aged adults, particularly in the 21–40 year age group (61.5%), with a marked male predominance (78%) and a male-to-female ratio of approximately 3.5:1. The overall stone expulsion rate with MET was 81.5%, while 18.5% of patients required surgical intervention.

Stone expulsion was significantly higher in the Silodosin group (87%) compared to the tamsulosin group (76%), indicating superior efficacy of Silodosin in facilitating stone passage.

Analgesic requirement was generally short, with most patients requiring pain medication for only 3–4 days, and the duration of analgesic use differed significantly between the two treatment groups. Stone size was found to be a strong predictor of treatment outcome, with patients who passed stones having significantly smaller calculi than those requiring surgery ($p < 0.001$). Among patients who

successfully passed stones, the mean stone size was comparable between both drug groups. Overall, MET proved to be an effective treatment strategy for distal ureteric stones less than 10 mm, significantly reducing the need for surgical intervention.

Silodosin demonstrated a higher stone expulsion rate compared with tamsulosin, suggesting it may be a more effective option for conservative management in appropriately selected patients.

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