

Efficacy of Tamsulosin with or Without Deflazacort as a Medical Expulsive Therapy in Middle and Lower Ureteric CalculusShikha Singh¹, Nitin Gupta², Mridul Shahi³, Piyush Singh^{2*}¹Junior Resident, Department of General Surgery, People's Medical College and Research Center, Bhopal, Madhya Pradesh, India²Assistant Professor, Department of General Surgery, People's Medical College and Research Center, Bhopal, Madhya Pradesh, India³Associate Professor, Department of General Surgery, People's Medical College and Research Center, Bhopal, Madhya Pradesh, India

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Abstract:**Background:** Urolithiasis, the formation of stones in the urinary system, affects over 12% of the global population and presents significant recurrence rates. Ureteric calculi, a subset of urolithiasis, are the primary cause of renal colic, causing distinct abdominal pain and other symptoms based on their location.**Aim and Objective:** To evaluate the effectiveness of tamsulosin, with or without deflazacort, as a medical expulsive therapy (MET) in patients with middle and lower ureteric calculus.**Materials and Methods:** A prospective observational analytical study was conducted with 170 patients diagnosed with middle or lower ureteric calculus at the Department of General Surgery, People's Hospital & Research Center, Bhopal. Patients were randomly assigned to two treatment groups: Group A received tamsulosin (0.4 mg once daily at bedtime) and deflazacort (6 mg twice daily for 2 weeks and then tapered to 6mg once a day for additional 2 weeks), while Group B received only tamsulosin (0.4 mg once daily at bedtime). Follow-ups and evaluations were conducted during the 2nd, 3rd, and 4th weeks of MET via ultrasonography or X-ray KUB.**Results:** The mean age and gender distribution were comparable between groups. The expulsion rate after 3 weeks was significantly higher in Group A (23.5%) compared to Group B (7.1%). By the end of 4 weeks, Group A showed an 88.2% expulsion rate compared to 52.9% in Group B. Group A also required significantly fewer analgesic doses (4.59 vs. 6.38, $p < 0.01$). Adverse reactions were comparable between groups, with no significant differences.**Conclusion:** The combination therapy of tamsulosin and deflazacort significantly enhances stone expulsion rates and reduces the need for analgesics compared to tamsulosin monotherapy, making it an optimal therapeutic approach for managing middle and lower ureteric calculi.**Keywords:** Urolithiasis, Medical Expulsive Therapy, Tamsulosin, Deflazacort, Ureteric Calculi.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Urolithiasis, the formation of stones in the urinary system, specifically affects the kidneys, ureters, urinary bladder, and urethra. [1] This condition is a significant and painful urological issue, impacting over 12% of the global population. Men experience a recurrence rate between 70-81%, while women face a 47-60% recurrence rate. At least 10% of the population encounters urinary stone formation in industrialised regions. [1]

Ureteric calculi, stones found in the ureter, ranging from the ureteropelvic junction (UPJ) to the ureterovesical junction (UVJ), are the primary cause of renal colic, a distinct type of abdominal pain. [2] These stones are a subset of the broader urolithiasis problem. Symptoms of ureteric calculi include peristaltic discomfort (renal colic), hematuria, nausea,

and vomiting. The type and location of pain depend on the calculi's position in the ureter. [3] Calculi at the ureteropelvic junction can cause severe side pain due to the expansion of the renal capsule without extending to the groin. Conversely, stones in the upper ureter result in pain that radiates to the side and lower back. Middle ureter calculi cause pain that radiates to the lower abdomen. [4]

Medical expulsive therapy (MET) aims to facilitate the passage of stones through the ureter, reducing the need for surgical intervention. [5] Tamsulosin, an alpha-blocker, is commonly used in MET due to its ability to relax the smooth muscles of the ureter, promoting stone passage. [6] Recent studies have explored the efficacy of combining tamsulosin with deflazacort, a corticosteroid, to enhance the

expulsion rates of ureteric stones. This combination therapy leverages the anti-inflammatory effects of deflazacort to reduce ureteral swelling, potentially improving the efficacy of tamsulosin. [2, 7]

The current study aims to evaluate the effectiveness of tamsulosin with or without deflazacort as a medical expulsive therapy in patients with middle and lower ureteric calculi. By comparing the expulsion rates, time to stone passage and associated symptoms, this research seeks to determine the optimal therapeutic approach for managing ureteric calculi.

Materials and Methods

This prospective observational analytical study was conducted in the Department of General Surgery at People's Hospital Bhopal, associated with People's College of Medical Sciences & Research Centre. The study population included patients diagnosed with middle or lower ureteric calculi who met the inclusion criteria and consented to participate. The study spanned from November 2022 to March 2024.

Eligibility criteria for inclusion were: patients over 18 years of age, both male and female, with unilateral ureteric stones sized 4-8 mm, no active urinary tract infection (UTI), no previous surgeries for ureteric calculi, and normal renal function tests. Exclusion criteria included morbid obesity (BMI above 40), diabetes, multiple stones, pregnancy, paediatric patients, solitary functioning kidney, deranged renal function tests, previous stone disease surgeries (ESWL/PCNL), and obstructive uropathy.

Following approval from the Institutional Ethical Committee, 170 patients meeting the eligibility criteria were enrolled after informed consent. Per standard hospital protocol, a detailed history, examination, and investigations were conducted.

Patients were randomly assigned to one of two treatment groups using computer-generated random numbers. Group A received Tamsulosin 0.4 mg once daily at bedtime and Deflazacort 6 mg twice daily for 2 weeks, then tapered to 6 mg once daily for an additional 2 weeks. Group B received mono-therapy of Tab Tamsulosin 0.4 mg once daily.

Both groups were provided antibiotic coverage and Diclofenac 50 mg for pain relief as needed and were

advised to consume 3 to 4 litres of oral fluids daily. Follow-up evaluations, including ultrasonography of the abdomen and digital radiographs (X-ray) of the kidney, ureter, and bladder (KUB) region, were conducted during the 2nd, 3rd, and 4th weeks of medical expulsive therapy (MET).

Statistical Analysis

The data was recorded in a predetermined research proforma. The qualitative data was shown using frequency and percentage. The association between qualitative factors was evaluated using the Chi-Square test. The quantitative data was expressed using the mean value plus or minus the standard deviation. The quantitative data analysis between the two groups was conducted using an unpaired t-test if the data passed the 'Normality test' and by the Mann-Whitney Test if the data failed the 'Normality test'. A significance level of p-value < 0.05 was used. Results were visually shown where judged appropriate. The statistical analysis was conducted using SPSS Version 26.0, while Microsoft Excel 2021 was utilised for creating graphical representations.

Results

This study included 170 patients diagnosed with middle or lower ureteric calculi. They were randomly assigned into two equal groups: Group A (Deflazacort + Tamsulosin) and Group B (Tamsulosin alone), with 85 patients in each Group.

Demographic Characteristics

The age distribution of the patients in both groups was comparable. The mean age of patients in Group A was 39.02 years (SD = 15.00), while in Group B, it was 39.77 years (SD = 14.97). The difference in age between the groups was not statistically significant (p = 0.74) (Table 2).

The gender distribution in the study population included 56 females (32.9%) and 114 males (67.1%). In Group A, there were 30 females (35.3%) and 55 males (64.7%). Group B comprised 26 females (30.6%) and 59 males (69.4%). The gender distribution was not statistically different between the groups (p = 0.625) (Table 3).

Table 1: Age Distribution by Study Groups

Variables	Group	N	Mean	SD	p-value
Age (yrs.)	A	85	39.02	15.00	0.74
Age (yrs.)	B	85	39.77	14.97	0.74

Table 1 indicates that the mean age and standard deviation are similar between the two groups, with no significant difference (p = 0.74).

Table 2: Gender Distribution by Study Groups

Gender	Group A	Group B	Total	% Group A	% Group B	% Total	p-value
Female	30	26	56	35.3	30.6	32.9	0.625
Male	55	59	114	64.7	69.4	67.1	0.625
Total	85	85	170	100.0	100.0	100.0	0.625

Table 2 shows the gender distribution across both groups. There was a higher number of male participants, but there was no significant difference between them ($p = 0.625$).

Presenting Complaints and Clinical Findings

The most common presenting complaint among the patients was pain in the lower abdomen, reported by 99.4% of participants. This was followed by burning micturition (68.2%), nausea/vomiting (57.1%), fever (12.9%), and hematuria (5.9%). The mean duration of symptoms was 11.43 days, with no significant difference between the study groups ($p = 0.95$). Renal angle tenderness was present in 48.2% of cases, with no significant difference between the groups ($p = 0.44$).

Stone Characteristics

Right-sided calculi were observed in 55.3% of cases, while left-sided calculi were seen in 44.7%, with no significant difference between the study groups ($p = 0.165$). The mean size of the stones was 5.91 mm in Group A and 6.01 mm in Group B, with no

significant difference between the groups ($p = 0.63$). Mild to moderate hydronephrosis was present in 44.7% and 47.1% of cases in Group A, compared to 48.2% and 42.4% in Group B, respectively, with no significant difference between the groups ($p = 0.82$).

Analgesic Requirements

Almost all patients in both groups required analgesics ($p = 1.0$). However, the mean requirement of analgesics was significantly higher in Group B (Tamsulosin monotherapy) at 6.38 doses compared to Group A (combined therapy) at 4.59 doses ($p < 0.01$).

Stone Expulsion and Supplementary Interventions

Supplementary interventions for stone expulsion were required in 8.2% of cases in Group A and 7.1% in Group B ($p = 1.0$). Stone expulsion after 3 weeks was observed in 23.5% of cases in Group A compared to 7.1% in Group B ($p < 0.01$). By the end of 4 weeks, the stone expulsion rate was 88.2% in Group A compared to 52.9% in Group B ($p < 0.01$).

Table 3: Expulsion Rate by Study Groups

Expulsion	Group A	Group B	Total
Successful	71	51	122
Unsuccessful	14	34	48

Table 3 demonstrates that Group A had a significantly higher successful stone expulsion rate than Group B.

Adverse Reactions

Both groups were comparable in adverse reactions ($p > 0.05$). The incidence of flushing was 3.5% in

Group A and 0% in Group B, frequent urination was 3.5% in Group A and 4.7% in Group B, headache was 5.9% in Group A and 8.2% in Group B, and lightheadedness was 4.7% in Group A and 2.4% in Group B.

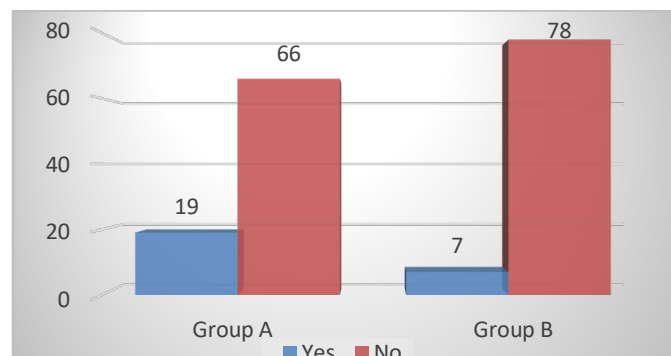


Figure 1: Pain-Free Status by Study Groups; P=0.006.

Figure 1 highlights the significant difference ($p=0.006$) in pain-free status between the two groups, with Group A showing better pain relief.

Weekly Stone Expulsion Rates

Group A's weekly stone expulsion rates were 2.4%, 22.9%, and 66.3% for weeks 2, 3, and 4, respectively. For Group B, the rates were 1.2%, 7.3%, and 48.8% for the same periods. The differences in

weekly expulsion rates between the two groups were statistically significant ($p < 0.01$).

Discussion

The progress in minimally invasive methods has reduced the negative health effects associated with the treatment of ureteric calculi. Notable advancements in this field include shock wave lithotripsy and ureteroscopic lithotripsy. While these treatments are

less intrusive than conventional open surgical methods, they come with high costs and associated hazards. Therefore, it is recommended to closely monitor tiny ureteral stones, as they are likely to pass on their own. Adjuvant medical expulsive treatment (MET) can be used in conjunction with the expectant method to treat distal ureteric stones. MET helps alleviate symptoms and promotes the ejection of the stone. [8]

Several parameters, including the size, form, and position of the stone and ureteric oedema and ureteric convolutions, influence the ejection of calculi. The most crucial parameters among them are the placement and magnitude of the calculus.

The care of patients with ureteral calculi has undergone significant changes. The primary emphasis is now on a conservative approach, which offers the main advantage of minimising patient morbidity. Typically, conservative non-surgical methods are used to treat distal ureteral stones 5-10 mm in size, as they are unlikely to pass independently [84,85].

Previous research indicates that the rate of naturally passing a distal ureteric stone through observation is 25-54%, with an average period of over 10 days for the stone to be expelled. This method is also linked to a significant need for pain relief, even for stones smaller than 5 mm. To enhance the pace of evacuation and decrease the need for pain medication, medical treatment is recommended for distal ureteral stones. [9, 10]

The current study examined the effectiveness of two medications routinely utilised in MET, both as standalone treatments and in combination therapy.

The research consisted of 170 participants who were diagnosed with middle or lower ureteric calculi. The participants were allocated into two treatment groups using computer-generated random numbers, and the investigator did not have the authority to select the technique.

The predominant symptoms reported by patients were lower abdominal pain, painful urination, nausea/vomiting, fever, and hematuria. Renal angle tenderness was noted in some individuals, with no significant difference between the groups. Again, Calculi were found on both the right and left sides, with no significant difference between groups. Mild to moderate hydronephrosis was observed in both groups, with no significant difference in its occurrence. Multiple investigations have demonstrated that experiencing severe pain in the side of the body and the lower abdomen on the same side, which spreads to the testicles or the vulvar area, is a distinct symptom of a ureteric calculus. The primary symptom in the majority of patients is lower abdominal discomfort. [2, 11, 12]

Stone Size

As per the Urolithiasis guidelines from the European Association of Urology (2015), stones up to around 5 mm are highly likely to pass naturally. Consequently, medical expulsive therapy (MET) is unlikely to significantly improve the rate of stone-free patients for these smaller stones. Optimal outcomes with MET are observed when stone dimensions range between 5-10 mm. In the current study, most patients had calculi ranging in size from 5-10 mm, with an average size of 5.96 mm. The comparison of stone sizes observed in other studies is as follows:

Author	Mean size (mm)
Sinha AR et al. [13]	5.80
Puvvada S et al. [11]	7.11
Girish TD et al. [14]	6.20
Ranjan et al. [15]	5.16
Present study	5.96

Analgesic Requirement

Analgesics were necessary in nearly all cases in both groups ($p=1.0$). The average need for pain relievers was substantially higher in group B, treated with only tamsulosin, compared to group A, treated with a combination of tamsulosin and deflazacort (6.38 vs 4.59; $p<0.01$).

In their study, Porpiglia et al. [16] reported that the average rate of diclofenac intake for pain relief per patient in the control group was seven times higher than in the Group receiving combination treatment ($p<0.01$). In another trial, Porpiglia et al. [17] found that the average amount of analgesic used was 42.5 ± 0.4 mg in the monotherapy group and 27.3 ± 0.5 mg in the combination group ($p<0.001$). Additional

authors have also noted a decrease in the amount of pain medication needed with combination therapy compared to monotherapy ($p<0.01$)

Stone Expulsion Rate & Success

Stone ejection occurred in 23.5% of patients in group A after 3 weeks, compared to 7.1% in group B ($p<0.01$). At the end of 4 weeks, the stone expulsion rate was 88.2% in group A, compared to 52.9% in group B ($p<0.01$). The combination treatment of tamsulosin with deflazacort resulted in a significantly higher success rate (90.4%) for stone removal compared to tamsulosin monotherapy (43.9%) ($p<0.01$). Weekly stone expulsion rates were 2.4%, 22.9%, and 66.3% for the combination treatment, compared to 1.2%, 7.3%, and 48.8% for the

monotherapy group, with a statistically significant difference ($p < 0.01$). Porpiglia et al. [16] observed that the expulsion rate was 79% in the combination group and 35% in the monotherapy group, which was statistically significant ($p < 0.01$). The duration of expulsion varied between 2 and 10 days in the combination group and between 10 and 28 days in the monotherapy group ($p < 0.01$). In another study, Porpiglia et al. [17] reported expulsion rates ranging from 60% to 84.8% across four groups. Dellabella et al. [18] found that adding deflazacort significantly reduced stone expulsion time, with a median duration of 3 days in the combination group compared to

5 days in the tamsulosin group ($p = 0.036$). Sinha et al. [13] assessed the effectiveness of combining tamsulosin and deflazacort (Group I) versus tamsulosin alone (Group II) for lower ureteric stones. In Group I, 76% of patients expelled the stones compared to 52% in Group II, a statistically significant result ($p = 0.038$). The median time for stone ejection was 3 days in Group I and 11 days in Group II ($p = 0.032$).

The expulsion rates observed in other similar studies are tabulated below.

Author	Monotherapy	Combined therapy
Porpiglia F et al. [16]	35%	79%
Porpiglia F et al. [19]	60%	84.8%
Hwang et al. [20]	62.1%	82.9%
Bhange S et al. [21]	60%	80%
Sinha AR et al. [13]	52%	76%
Present study	43.9%	90.4%

Adverse drug reactions

The two groups exhibited similar adverse effects, with no significant differences ($p > 0.05$). Flushing occurred in 3.5% of patients in the combination therapy group compared to 0% in the monotherapy group. Frequent urination was reported by 3.5% in the combination group and 4.7% in the monotherapy group. Headaches were experienced by 5.9% in the combination group versus 8.2% in the monotherapy group. Lightheadedness was reported by 4.7% in the combination group and 2.4% in the monotherapy group.

In a similar trial, Sinha et al. [13] reported adverse drug reactions (ADRs) in patients receiving combination therapy (Group I) and monotherapy (Group II). In Group I, retrograde ejaculation was observed in 6% of patients, nausea in 12%, dizziness in 8%, headaches in 14%, vomiting in 10%, constipation in 12%, nasal congestion in 4%, and diarrhoea in 2%. In Group II, retrograde ejaculation occurred in 4%, nausea in 8%, dizziness in 10%, headaches in 8%, vomiting in 6%, nasal congestion in 6%, and diarrhoea in 2%, with no constipation reported. Jain et al. [22] found that in Group I, 2.2% of patients experienced Stein Strasse, 2.2% developed fever, 4.4% had hematuria, and 2.2% reported severe discomfort. In Group II, 2.1% of patients experienced stein strasse, fever, and hematuria, while 6.2% reported severe pain.

Conclusion

The use of medical expulsive therapy (MET) as an adjunct to conservative treatment has become increasingly common in recent years for managing intermediate and distal ureteric stones. In our study, we examined the efficacy of tamsulosin, with or without deflazacort, as a medical expulsive

treatment for clearing stones in middle and lower ureteric calculi. Our findings demonstrated that combination therapy significantly increases the incidence of ureteric stone ejection compared to monotherapy. Additionally, combination therapy facilitates faster stone removal, reduces the frequency of colic episodes, and decreases the need for analgesic medication. Both tamsulosin and deflazacort are safe, effective, and well-tolerated, with only a few isolated adverse effects.

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