

## Triamcinolone Injection Following Internal Urethrotomy for Treatment of Urethral Stricture

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**Purpose:** To investigate the success rate of internal urethrotomy when combined with corticosteroid injection in urethral scar tissue for treatment of urethral stricture.

**Materials and Methods:** We performed a double-blind, randomized, placebo-controlled study on 70 patients with urethral stricture, who underwent internal urethrotomy from June 2003 to July 2008. Patients were randomized into 2 groups; the experimental group (34 patients) who received triamcinolone acetonide injection and the control group (36 patients) that received an injection of sterile water after internal urethrotomy. Postoperative results were compared between two groups.

**Results:** In the experimental group, 1 (2.94%), 3 (8.82%), and 2 (5.8%) patients developed infection, bleeding, and extravasation, respectively, and recurrence was noted in 12 patients. In the control group, infection, bleeding, and extravasation occurred in 2 (5.55%), 3 (8.33%), and 2 (5.55%) patients, respectively, and stricture recurred in 15 patients. There were no significant differences in stricture location as well as its etiology between the two groups ( $P = .672$  and  $P = .936$ , respectively). Complication and recurrence rates in experimental group were lower than the control group, but the difference was not statistically significant ( $P = .847$  and  $P = .584$ , respectively). However, time to recurrence decreased significantly in experimental group ( $8.08 \pm 5.55$  versus  $3.6 \pm 1.59$  months) ( $P < .05$ ). In our study, we did not find any complications that could be attributed to the triamcinolone acetonide injections.

**Conclusion:** It seems that steroid injection after internal urethrotomy is a safe method, which may delay the recurrence of urethral stricture.

Keywords: urethra, urethral stricture, triamcinolone acetonide, recurrence, retreatment

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### INTRODUCTION

Urethral strictures can occur due to trauma, infection, ischemia, inflammation, or unknown causes. As a result, scar tissue forms in the epithelium, which leads to decrease in caliber of the urethral lumen. Stricture can develop in any part of the urethra from the prostatic urethra to the meatus.<sup>(1)</sup>

Different techniques have been described for treatment of urethral strictures, depending on the stricture length, location, and depth of scar. Internal urethrotomy is a worthwhile method for treating urethral strictures which are less than 1.5 cm in length. However, high recurrence rates have been reported with this technique.<sup>(2)</sup>

Several adjuvant interventions have been proposed to minimize the recurrence rate of urethral strictures after internal urethrotomy.<sup>(1)</sup> Local corticosteroid injection (triamcinolone) after urethrotomy was proposed by Hebert for the first time.<sup>(3)</sup> Corticosteroids decrease the scar formation by reducing collagen and glycosaminoglycans synthesis and expression of inflammatory mediators.<sup>(4)</sup> Hebert's study was followed by Sachse<sup>(5)</sup> and Gaches and colleagues,<sup>(6)</sup> who reported favorable results with corticosteroid injection. Abourachid and associates recommended intralesional steroid injection as a means to reduce the recurrence rate of urethral stricture.<sup>(7)</sup>

In this study, we investigated the results of triamcinolone acetonide injection on the recurrence rate of the stricture following internal urethrotomy. In addition, we longitudinally looked at the interval between urethrotomy and the recurrence of urethral stricture.

## MATERIALS AND METHODS

We performed a double-blind, randomized, placebo-controlled study on patients with urethral stricture who presented to our clinic from June 2003 to July 2008. One hundred and seven patients with the mean age of  $42.18 \pm 17.7$  years were studied for eligibility.

Patients with previous urethroplasty, urethral manipulation (urethrotomy or urethral dilatation), urethral strictures longer than 1.5 cm, neurogenic bladder, urinary tract infection, history of systemic or immune disease, and use of corticosteroids were excluded from the study. Of recruited patients, 70 met our inclusion criteria and were randomized into 2 groups: The experimental group (34 patients), who received triamcinolone acetonide injection and the control group (36 patients), who received an injection of sterile water after internal urethrotomy (Figure 1).

The operating surgical team was blinded to the

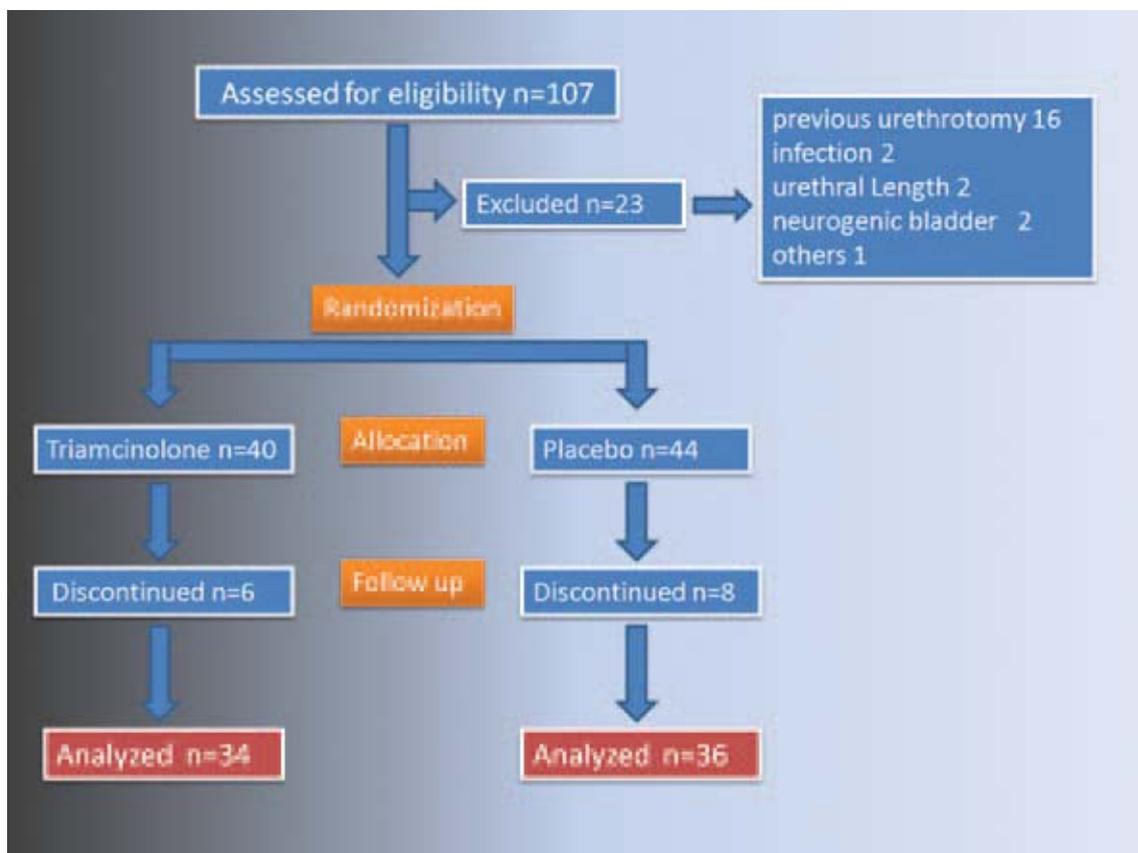


Figure 1. Patients selection

intervention. The length of the urethral stricture was 0.5 to 15 mm. The stricture length was measured by both pre-operative urethrogram and endoscopic evaluation. The location of stricture was bulbar in 43 (61.42%), penile in 20 (28.57%), and both sites in 7 (10%) patients. The mean follow-up was  $8.68 \pm 5.36$  months (range, 6 to 24 months). Failure was defined as a need for repeat of surgical intervention during the follow-up period. Recorded complications were wound infections, bleeding, and extravasation.

### Surgical Technique

Pre-operative evaluation consisted of physical examination, history taking, retrograde urethrography, and cystoscopy. Furthermore, patients received a single dose of a first-generation cephalosporin half an hour before the surgery. First, by using a cold knife, multiple incisions were made through stricture sites at various positions endoscopically. In this manner, only fibrous tissue was cut and normal healthy urethra was remained intact. The incisions were continued until a 20 F urethral catheter could pass through the stricture site into the bladder. Subsequently, 5 cc of the study solution was injected into the fibrotic tissue of the stricture site in four quadrants (Figure 2). Thereafter, an 18 F Foley catheter was inserted and left in place for 3 to 5 days. After removal of the catheter, patients were followed up for 6 to 24 months for development of any complications. Follow-up visits included history taking, questions about urinary symptoms as well as retrograde urethrography and cystoscopy if indicated.

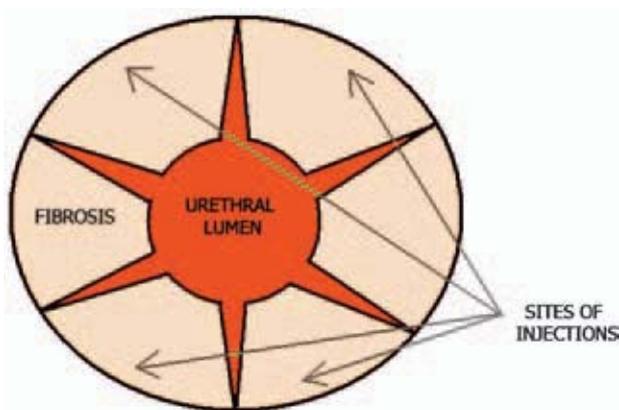


Figure 2. Sites of transurethral injections

Follow-ups were scheduled every 3 months and when patients had any complaints.

### Statistical Analysis

Data were analyzed using SPSS software (the Statistical Package for the Social Sciences, Version 14.0, SPSS Inc., Chicago, Illinois, USA). Chi-square and student *t* test were used to compare two groups. Non-normal distributed data were analyzed using Mann-Whitney *U* test.

### RESULTS

Complications occurred in 13 patients: infections in 3 (4.28%), bleeding in 6 (8.57%), and extravasation in 4 patients (5.71%). Twenty-seven patients had recurrent stricture formation, and the mean time to recurrence was  $6.37 \pm 4.86$  months. In the group who received triamcinolone acetonide injection, we observed infection in 1 (2.94%), bleeding in 3 (8.82%), and extravasation in 2 (5.8%) patients, and recurrence in 12 patients. In the control group, we observed infection in 2 (5.55%), bleeding in 3 (8.33%), and extravasation in 2 (5.55%) patients, and recurrence in 15 patients.

There were no significant differences regarding stricture location and etiology of strictures between the two groups ( $P = .672$  and  $P = .936$ , respectively). Complication rate in experimental group was lower than the control group, but the difference was not statistically significant ( $P = .847$ ). Recurrence rate was lower in the experimental group, but the difference did not reach statistical significance (35.3% versus 41.7%) ( $P = .584$ ). However, time to recurrence decreased significantly in experimental group compared to placebo group ( $8.08 \pm 5.55$  versus  $3.6 \pm 1.59$  months) ( $P < .05$ ) (Table). There was not any complication which could be attributed to the triamcinolone acetonide injections.

### DISCUSSION

Internal urethrotomy has been suggested as a procedure of choice for correction of the urethral strictures shorter than 1.5 cm; however, recurrence of strictures has been remained as its major drawback.<sup>(2)</sup> Holm-Nielsen and colleagues reported recurrence rates ranging from 50% to

## Comparison of experimental and placebo groups

Summary of results				
Characteristics		Experimental group (n = 34)	Control group (n = 36)	P
Stricture location	Bulbar	64.70	58.33	.672*
	Penile	23.52	33.33	
	Both	11.76	8.33	
Stricture causes		38.23	38.23	.936*
	Trauma	17.64	17.64	
	Catheter	11.76	20.58	
	Infection	5.88	5.88	
	Unknown	26.47	23.52	
Complications	Infection	2.94	5.55	.847*
	Bleeding	8.82	8.33	
	Extravasation	5.8	5.55	
	None	82.44	80.57	
Recurrence rate		12	15	.584*
Time to recurrence (month)		8.08	3.6	< .05#
Mean age (y)		42.38	42.00	.929†
Mean follow-up (month)		9.55	7.86	.097#
Stricture length (cm)		0.80.7 ± 1.40	0.83.97 ± 1.38	> .05

\*Chi-square test

† t test

# Mann-Whitney U test

75% during a 2-year follow-up period.<sup>(8)</sup> In our study, the overall recurrence rate was 38.6%, and the recurrence rate in the control group was 41.7%, which is consistent with the findings of Holm-Nielsen and colleagues. The reason for lower recurrence rates may be due to shorter duration of follow-up in our study.

Several adjuvant therapies, including brachytherapy,<sup>(9)</sup> injection of captopril,<sup>(10)</sup> mitomycin C, and steroids<sup>(11)</sup> have been proposed to minimize the recurrence rate of urethral strictures after internal urethrotomy. Intraurethral brachytherapy with iridium-192 has been used after internal urethrotomy with early success. Initial dose of 1000 to 1500 centigray was followed with daily irradiation for 3 days. Of 17 patients, 6 developed complications during 20-month follow-up.<sup>(9)</sup> This study was followed by Shin and colleagues who used rhenium-188-mercaptoacetyl triglycine (188Re-MAG3)-filled balloon dilation in five patients. Only one of their subjects did not develop stricture during follow-up period.<sup>(12)</sup> However, further studies are needed to confirm advantage of brachytherapy for the treatment of stricture.

Shirazi and associates used captopril gel after

internal urethrotomy with good results, but the heterogeneity of patients makes interpretation of their results difficult.<sup>(10)</sup> Because of its anticollagen property, mitomycin C has been used to decrease the recurrence rates after internal urethrotomy.<sup>(11)</sup> Results showed that only 10% of patients had recurrence at 6 months. However, long-term results are not available.

Korhonen and colleagues reported transurethral injection of steroid for treatment of urethral strictures. Of 38 patients, 21 underwent internal urethrotomy while 17 received triamcinolone injection after internal urethrotomy. Urethrotomy was done at 12 o'clock position and catheter was removed one day after the surgery. In their study, some patients had strictures longer than 2 cm. Recurrence rate was 61% in patients who underwent internal urethrotomy and 71% in those who received triamcinolone. It should be noted that strictures in the first group were tighter than the latter one.<sup>(13)</sup> Hardec and coworkers reported that steroid injection decreased recurrence rate from 19.4% to 4.3%.<sup>(14)</sup>

In a recent randomized, placebo-controlled trial, Hosseini and colleagues administered triamcinolone in 70 patients on the clean

intermittent catheterization after internal urethrotomy. They put their patients on a urethral catheterization program and triamcinolone was used for lubrication. Thirty patients used triamcinolone injections (experimental group) and 34 patients used water-based jelly injections (control group). Recurrence rate in experimental and control groups were 30% and 44%, respectively.<sup>(15)</sup> Our results were similar to this study; however, in our study, the difference between recurrence rates was not statistically significant. Considering that we did not use clean intermittent catheterization, the similarity of the results in these two studies suggests that triamcinolone injection during internal urethrotomy combined with a urethral catheterization program may decrease the recurrence rate significantly. In our study, we measured both the recurrence rate and the time to recurrence. Our results showed that triamcinolone injection significantly delays the time to recurrence of urethral strictures after internal urethrotomy.

## CONCLUSION

Steroid injection into the urethral fibrous tissue is a safe and effective adjuvant therapy after internal urethrotomy. Although we could not demonstrate a decrease in recurrence rate of stricture formation, we were able to postpone the recurrence of urethral stricture after internal urethrotomy.

## CONFLICT OF INTEREST

None declared.

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