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Comparison of Internal Optical Urethrotomy with and without Intra-Lesional Injection of Triamcinolone for Management of Urethral Stricture in Term of Recurrence Rate

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ABSTRACT

Background: Urethral stricture is an abnormal narrowing of the urethral lumen, due to a scarring process in the corpus spongiosum surrounding urothelium. The urethral stricture is a recurrent disease and presents a significant workload to urologists. The various available treatment modalities are Dilatations, Internal optical Urethrotomy and Open Urethroplasties (Anastomotic and Substitutional Urethroplasties). Internal Optical Urethrotomy (IOU) is the most commonly performed procedure for short length (<1.5cm) urethral stricture but has recurrence as its major complication. To prevent recurrence of the disease various add on drugs like triamcinolone, which has anti-proliferative effect, is used after IOU.In this study we evaluated the efficacy of triamcinolone in the prevention of recurrence of urethral stricture after IOU. Material & Methods: A total of 70 patients fulfilling the inclusion criteria were included in the study and randomly divided into 2 groupsat Jinnah Hospital Lahore from November 2024 to April 2025. In Group 1 patients underwent Internal Optical Urethrotomy alone, while in Group 2 patients underwent Internal Optical Urethrotomyfollowed by intra-lesional sub mucosalinjection of Triamcinolone (40mg at 1, 5, 7 and 11 O' clock of urethra) were enrolled. All patients were followed with retrograde urethrogramafterone month and three months and stricture recurrence rate was compared with retrograde urethrogram. The data was collected and analyzed by using SPSS 23.0 version. Results: Mean age of the cases in group A (without triamcinolone) was 37.83 ± 4.84 and in group B (with triamcinolone) was 39.17± 5.79. The pre-operative evaluations of the strictureshowed that in group A (without triamcinolone) 22 (62.9%) patients has Grade 2 disease and 13 (37.1%) patients has Grade-3 disease and group-B (with triamcinolone) has 20 (57.1%) patients with grade-2 disease and 15 (42.9%) has Grade-3 disease. At 01 month follow up of procedure, comparison of recurrence of grade-2 disease was statistically significant with p-value 0.045 as only group-A has recurrence of 4 (18.2%) cases to grade-2 disease. Similarly, 5 (38.5%) patients of grade-3 in group-A and 1 (6.7%) in group-B has recurrence of grade-2 disease with significant p-value 0.041.The comparison of recurrence among grade-2 disease patients of both groups, after 3 month follow up, has significant p-value 0.023. There were 5 (22.7%) patients of Grade-2 disease in Group-A with recurrence of grade-2 while no recurrence of grade-2 disease in other group. There were 6 (46.2%) patients of grade-3 disease of (group-A) and 1 (6.7%) of (Group-B)has recurrence. of grade-2 disease after 3 months with significant p-value 0.016. Conclusion: Treating a urethral stricture with IOU in combination with intra-lesion triamcinolone injection has longer recurrence free period as compared to IOU alone. IOU with steroid injection is safe and successful therapy for management of urethral stricture with lower rate of recurrence of disease and grade of disease recurred is also decreased.

INTRODUCTION

A urethral stricture (US) is a narrowing of the urethral lumen (UL) that can happen anywhere in the urethra. It is caused by scarring of the urethral epithelium (UE) and the corpus spongiosum (CS) below it. US disease lowers the quality of life and causes significant urologic pathology, such as lower urinary tract symptoms, recurrent urinary tract infections (UTIs), and potentially more serious problems like detrusor dysfunction, renal failure, urethral cancer, and Fournier's gangrene (Zaid et al., 2016).

Mazdak et al. found no significant differences in baseline patient characteristics or the cause of the stricture between the two groups after internal urethrotomy (IU) and intraurethralsubmucosal injection of triamcinolone in patients with short bulbar urethral strictures (BUS). The average period of observation was 13.7 ± 5.5 months. In the triamcinolone group, US recurred 21.7% of the time, compared to 50% in the control group (P = 0.04). The researchers concluded that intravenous triamcinolone significantly reduced stricture recurrence following IU. It requires additional research to demonstrate its efficacy and safety. (Mazdak et al, 2010).

In clinical practice, IU is an uncomplicated procedure used as a first-line treatment for short US. An IU is any procedure that releases the stricture by incising or ablating it transurethrally. Stricture recurrence is the most frequent complication of an IU. IU has an approximately 20% curative success rate. Triamcinolone is a fibroblast and collagen inhibitor. This study will examine the efficacy of triamcinolone in preventing recurrence of anterior urethral stricture (AUS) following IU.

US has remained a challenging, painful, and recurring surgical condition for millennia, dating back to the ancient Greeks, Egyptians, and Hindus. Reports of US treatment can be found in Hindu texts reaching back to the sixth century before Christ. The use of a metallic dilator, reported in Ayurveda in the 16th century, was the first known attempt (Attwater, 1943). It was later replaced by a blind urethrotome by Civiale and Otis in the 18th century, but it was unpopular due to its complexities and poor outcome. In 1914, Hamilton Russell proposed surgical therapy for urethral stricture. After Hopkins introduced endoscopic optical devices in 1960, followed by Sachse in 1970, the recurrence rate and treatment success improved (Spirnak et al, 1993).

Anterior and posterior strictures are characterized not just by their location, but also by their pathophysiology. A retrospective assessment of all strictures rebuilt at a single institution revealed that the vast majority (92.2%) were anterior, with the BU (46.9%) being the most common, followed by the penile (30.5%), bulbar and penile (9.9%), and pan-urethral (4.9%).

PU injury is most usually caused by a PF, and it can occur in up to 10% of cases (Singh et al 2010). Approximately 80% of secondary instrumentation strictures arise during transurethral resection of the prostate (TURP) for benign prostatic hyperplasia. The remaining 80% usually occur near the penoscrotal junction. During TURP, the resectoscope can traverse 800 times back and forth over the urethra at the penoscrotal junction (Mundy et al, 2012). Treatment options for US include dilatation, urethrotomy under endoscopic vision, and surgical reconstruction. The most common operations for urethral stricture disease are internal optical urethrotomy and UD. Because it is minimally invasive, this method appeals to both urologists and patients (Dubey, 2011). Endoscopic therapy of US with dilatation and urethrotomy, according to some authors, exacerbates scar formation, increasing stricture length and severity and complicating eventual surgical repair (Barbagli et al 2012).

Spongiofibrosis develops in variable degrees and narrows the luminal diameter of the urethra. Antifibrotic drugs such as hyaluronidase, mitomycin C, bitoxin A, somatostatin analogues, captopril, and steroids have been proposed as potential treatments for fibrosis (Mehmet et al 2015). In various disciplines of medicine, steroid injections have been used to reduce the recurrence of scarring. Evidence from studies of wound healing in the oral mucosa suggests that these wounds recover from injury more quickly and with less scarring than dermal wounds due to differences in the expression of extracellular matrix components, immune mediators, profibrotic mediators, blood vessel structure, mesenchymal stem cell number, and fibroblast proliferation rate (Glim et al., 2013).

It is theorized that steroids mitigate scarring by slowing fibroblasts' collagen production while wounds heal. Stricture recurrence is decreased by intra-lesional injection of triamcinolone following internal optical urethrotomy. Intralesional injection during IOU has been shown to improve success rate and postpone stricture recurrence compared to IOU alone in previous studies (Rishi et al 2015).

MATERIAL AND METHODS

Study Design: Randomized Controlled Trial

Setting: Department of Urology, Jinnah Hospital, Lahore.

Study Duration: 6 months.

Sampling Technique: Non-probability, Purposive Sampling.

Sample Size: In this study 70 patients with Urethral Stricture were selected and randomly divided into two equal groups of 35 subjects each randomly.

METHODOLOGY

DATA COLLECTION PROCEDURE

This RCT is carried outin the Department of Urology, Jinnah Hospital, Lahore, from November 2024 to April 2025. A total of 70 patients with urethral stricture fulfilling the inclusion criteria (Age>25 years and <50 years with anterior urethral stricture upto 1.5 cm in length) were enrolled. And patients who have, bladder outlet obstruction like BPH, stone in bladder/prostate/urethra, patients with immune-compromised state, Neurogenic OR Decompensated urinary bladder, Untreated UTI/Prostatitis, blind or complete urethral strictures, multiple strictures, drug hypersensitivity to injection Triamcinolone, were excluded. Patients were grouped into Group A (undergoing IOU without Triamcinolone) and Group B (undergoing IOU with Triamcinolone). Detailed history was taken and Physical Examination was performed followed by Routine Investigations i.e. Urine routine examination, Urine culture if required, RFTs, Abdominal and pelvic Ultrasonography and Retrograde Urethrogram.

Preformed data record performa used for record. Proper counselling regarding procedure, outcomes, complications and follow up done and informed consent taken. Patients were informed regarding withdrawal from trial at any time and assured of adequate treatment in case complicationsoccurred.

After full filling all prerequisites, procedure was performed in spinal anaesthesia in lithotomy position. Preoperative prophylactic antibiotic (Inj ceftriaxone 1 Gm) given to every patient. WHO preoperative checklist marked. Under aseptic measures diagnostic urethroscopy was performed and guide wire (0.032 inch) passed through stricture up to urinary bladder .IOU was done with cold knife at 12 O'clock to let go 22fr sheath till urinary bladder. Intralesional sub mucosal Triamcinolone injected at 1, 5, 7 and 11 O'clock in urethra with Willium's endoscopic needle in Group B patients .16 fr 2-way silicon folley's catheter passed to both group patients .Catheter placed for 3 days post-operative. Broad spectrum antibiotic given for 3 days .Patients were followed up in urology OPD with history, physical examination and retrograde urethrogramat 1 and 3 months .Consolidated Standards of Reporting Trials (RCT) guidelines were followed for reporting of the trial. CONSORT Checklist was followed while reporting the findings of trial.

URETHROGRAM

A retrograde urethrogram required 30 cc of contrast to be withdrawn from a bladder wash syringe of

60 cc. The penis was positioned obliquely across the thigh or in an oblique position, and a nelaton tube of 12Fr was introduced slightly into the fossa navicularis. X-rays were taken at both the AP and oblique angles while a contrast substance was slowly introduced into the urethra for 30-60 seconds.

RESULTS

In this study the comparison of stricture recurrence showed that there were 4 (18.2%) patients in without triamcinolone group and 0 (0%) in with triamcinolone group found with grade 2 recurrence after 1 month and this difference was statistically significant with p-value 0.045. Similarly, there were 5 (38.5%) patients in without triamcinolone group and 1 (6.7%) in with triamcinolone group found with grade 3 recurrence after 1 month with significant p-value 0.041.The comparison of stricture recurrence showed that there were 5 (22.7%) patients in without triamcinolone group and 0 (0%) in with triamcinolone group found with grade 2 recurrence after 3 month with significant p-value 0.023. Similarly, there were 6 (46.2%) patients in without triamcinolone group and 1 (6.7%) in with triamcinolone group found with grade 2 recurrence after 3 month with significant p-value 0.016.The comparison of stricture appreciated on retrograde urethrogram after 1 month and 3 months showed significant p-values 0.039 and 0.046 respectively showing significant difference in both groups.

TABLE 1: COMPARISON OF STRICTURE AFTER 1 MONTH

SUBJECTIVE EVALUATION		Without Triamcinolone	With Triamcinolone	P-Value
Grade 2 patients after 1 month	Grade II Recurrence	4 (18.2%)	0 (0%)	0.045
	Grade III Recurrence	0 (0%)	0 (0%)	
	No Recurrence	18 (81.8%)	20 (100%)	
Grade 3 patients after 1 month	Grade II Recurrence	5 (38.5%)	1 (6.7%)	0.041
	Grade III Recurrence	0 (0%)	0 (0%)	
	No Recurrence	8 (61.5%)	14 (93.3%)	

TABLE2: COMPARISON OF STRICTURE AFTER 3 MONTHS

SUBJECTIVE EVALUATION		Without Triamcinolone	With Triamcinolone	P-Value
Grade 2 patients after 3 month	Grade II Recurrence	5 (22.7%)	0 (0%)	0.023
	Grade III Recurrence	0 (0%)	0 (0%)	
	No Recurrence	17 (77.3%)	20 (100%)	
Grade 3 patients after 3 month	Grade II Recurrence	6 (46.2%)	1 (6.7%)	0.016
	Grade III Recurrence	0 (0%)	0 (0%)	
	No Recurrence	7 (53.8%)	14 (93.3%)	

TABLE4: COMPARISON OF RECURRENCE OF STRICTURE AT FOLLOW UP IN BOTH GROUPS

Stricture appreciated on retrograde urethrogram		Without Triamcinolone	With Triamcinolone	P-Value
Stricture appreciated on retrograde urethrogram after 1 month	Yes	4 (11.4%)	0 (0%)	0.039
	No	31 (88.6%)	35 (100%)	
Stricture appreciated on retrograde urethrogram after 3 months	Yes	5 (14.3%)	0 (0%)	0.023
	No	30 (85.7%)	35 (100%)	

DISCUSSION

For strictures shorter than 1.5 cm, internal optical urethrotomy has been recommended as the technique of choice; yet, strictures have continued to reoccur as its principal downside. (Naudé, and Heyns, 2005) The aim of this study was to compare the outcome of Internal Optical Urethrotomy with and without intra-lesional steroid/triamcinolone injection in terms of recurrence of urethral stricture among patients presenting with urethral stricture.

In this studythere were 35 (50%) male in Group A and 35 (50%) in Group B.

In Group A there were 27 (58.7%) patients found with bulbar urethral stricture and 8 (33.3%) with bulbomemberanous urethral stricture, similarly in Group B there were 19 (41.3%) patients found with bulbar urethralstricture and 16 (66.7%) with bulbomemberanous urethralstricture in our study. In a previous study by Tabassi, Yarmohamadi, and Mohammadi (2011) there were 64.70% participants in triamcinolone group found with bulbar urethra and 58.33% in without triamcinolone group. (Tabassi, Yarmohamadi, and Mohammadi 2011)

In our data, the comparison of mode of urethral injury showed that there were 21 (75%) patients found with direct injury and 7 (25%) with indirect injury in Group A while 17 (60.7%) patients found with direct injury and 11 (39.3%) with indirect injury in Group B with insignificant p-value 0.252. Similarly, H/O uterthritis was found in 7 (20%) patients in both groups with insignificant p-value 1.00.

The results of our study showed that there were 4 (18.2%) patients in without triamcinolone group and 0 (0%) in with triamcinolone group found with grade 2 recurrence after 1 month and this difference was statistically significant with p-value 0.045. Similarly, there were 5 (38.5%) patients in without triamcinolone group and 1 (6.7%) in with triamcinolone group found with grade 2 recurrence after 1 month with significant p-value 0.041. The comparison of stricture recurrence showed that there were 5 (22.7%) patients in without triamcinolone group and 0 (0%) in with triamcinolone group found with grade 2 recurrence after 3 month with significant p-value 0.023. In this study 6 (46.2%) patients in without triamcinolone group and 1 (6.7%) in with triamcinolone group found with grade 2 recurrence after 3 month with significant p-value 0.016. Similarly, Tabassi, Yarmohamadi, and Mohammadi(2011) found in their study the recurrence rate in Triamcinolone group 12 (35.29%) and in control group 15 (41.67%) with insignificant p-value 0.584. (Tabassi, Yarmohamadi, and Mohammadi 2011) In another study Amin et al (2022) found whole recurrence rate 18 (30%) in control group and 6

(10%) in triamcinolone group with significant p-value 0.006. (Amin et al, 2022)

Kumar and coworkers gave triamcinolone to 70 participants in a recent randomized, placebo-controlled experiment. Thirty patients in the experimental group were given triamcinolone injections, whereas 34 patients in the control group were given water-based jelly injections. The rate of recurrence was 30% in the study group and 44% in the control group. (Kumar et al, 2012) Likewise, Amin et al, (2022) found recurrence rate at 3 months follow up 8 (13.3%) in control group while 0 (0%) in triamcinolone group p-value 0.006. (Amin et al, 2022)

The current findings of this study showing comparison of stricture appreciated on retrograde urethrogram after 1 month and 3 monthsshowed significant p-values 0.039and 0.046 respectively showing significant difference in both groups.

CONCLUSION

Treating a urethral stricture with Internal Optical Urethrotomy in combination with intra-lesional triamcinolone injection has longer recurrence free period as compared toInternal Optical Urethrotomyalone. Internal Optical Urethrotomy with steroid injection is safe and successful therapy for management of urethral stricture with lower rate of recurrence of disease and grade of disease recurred is also decreased.

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