

# Predictors for failed Initial Urethral Catheterization in Patients with Acute Urinary Retention

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## ABSTRACT

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**Objectives:** The aim of this study was to find the predictors for failed initial per urethral catheterization in patients with acute urinary retention.

**Methods:** Patients with acute urinary retention with failed per urethral catheterization were evaluated and followed prospectively. A detailed history, physical examination and investigations were done. An attempt was made to catheterization by a senior urologist. Failed cases underwent suprapubic diversion. Urethro-cystoscopy was done within 48 hours to determine the cause of failed catheterization.

**Observations and results:** A total of 47 patients were studied. Of the 47 patients who were referred for failed catheterization, 24 were readily catheterized by urology senior resident. In 16 patients supra pubic urinary diversion was done while the remaining 7 were catheterized under Cystoscopy guidance. In our study improper technique was the most significant predictor for failed catheterization. 51.06% of patients who were referred for failed catheterization were readily catheterized while practicing proper technique. Other causes were analysed.

**Conclusion:** Technique of urethral catheterization is the most important predictor for failed attempts at catheterization. Improper multiple attempts at catheterization leads to significant urethral injuries which cause significant pain and distress to the patients. Moreover such iatrogenic injuries are the leading cause for urethral stricture development later on. As such it is imperative for all emergency health care professionals to have proper training in the technique for urethral catheterization.

**Keywords:** Predictors, Failed catheterization, Improper technique

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## INTRODUCTION

Urological emergencies though rare, cause significant morbidity to the patient. Acute urinary retention is the most frequent cause for urology consultation in an emergency setting (24-30%) followed by renal colic (17-20%), urinary infection, torsion testis and genitourinary trauma. The incidence of acute urinary retention adjusted for age is 2.96-3/1000 men. The immediate management of acute urinary retention involve decompression of the bladder, mostly by placing a per-urethral catheter. Supra pubic catheterization is done when per urethral catheterization fails or is contraindicated. Difficult or failed urethral catheterization is a common problem, usual causes being improper technique, benign prostate enlargement, urethral strictures and bladder neck contracture. Catheterization if

not attempted properly not only cause significant pain and distress to the patients; it may also lead to significant urethral injuries. Such iatrogenic urethral injuries are the most common causes for urethral strictures.

The aim of this study was to find the predictors for failed initial per urethral catheterization in patients with acute urinary retention. Emphasis was giving on catheterization technique in an attempt to prevent urethral trauma leading to stricture formation.

### Patient Selection Criteria

Patients presenting to the casualty with acute urinary retention with previous history of lower urinary tract symptoms, with failed attempt at catheterization were included in the study. Paediatric patients, patients with suspected/ confirmed urethral injury, patients with

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coagulation disorders and/or unstable vitals were excluded.

## MATERIAL AND METHODS

Patients with acute urinary retention with failed per urethral catheterization referred to urology unit III of GMC Trivandrum, a tertiary referral centre, from January 2014 till December 2014 were evaluated and followed prospectively. Evaluation comprised of detailed history and physical examination. Blood investigations included complete haemogram, renal functions and serum PSA levels. Ultrasound abdomen and pelvis was done for all the patients. Initial single gentle attempt at catheterization was tried by senior resident in urology. Supra pubic bladder diversion was done for those patients who failed catheterization. Urethro-cystoscopy was done in all patients within 48 hours of presentation to evaluate the cause of retention.

Data was compiled and entered on an Excel® database. Statistical analysis was performed using Stat Cal® software. Chi square and Fisher's exact test were used to analyse the significance of the results. A p-value < 0.05 was accepted as statistically significant.

## RESULTS

Of the 47 patients who were referred for failed catheterization, 24 were readily catheterized by urology senior resident. In 16 patients supra pubic urinary diversion was done while the remaining 7 were catheterized under Cystoscopy guidance.

## DISCUSSION

It is imperative for all emergency healthcare professionals treating acute urinary retention to know the correct technique of urinary catheterization. Multiple unsuccessful attempts at catheterization cause significant urethral injuries with subsequent stricture formation.<sup>1,2,3</sup> Such iatrogenic strictures are the most common and preventable cause for urethral stricture disease.<sup>2</sup> In our study 51.06% of patients who were referred for failed catheterization were readily catheterized while practicing proper technique. During data analysis in two different institutions, Villanueva and Hemstreet III reported similar results where 41% and 54% patients respectively were readily catheterized using 18 Fr catheters.<sup>4</sup>

In review of literature improper technique was found to be the most common cause for failed catheteriza-

**Table 1. Successful Catheterization- Urology vs. Casualty**

Parameters Studied	Urology	Casualty	p value
Amount of Jelly used (<5/ 5-10/ >10 cc)	0/0/24	21/2/1	0.00001
Technique of applying jelly( catheter tip/ into urethra)	0/24	18/6	0.00001
Time b/w jelly application and catheterization (immediate/ after 5 mins.)	0/24	20/4	0.00001
Size of Catheter use(14/16/18Fr)	0/3/21	13/11/0	0.00001

tion followed by benign prostatic enlargement.<sup>4</sup> Proper technique of blind catheterization<sup>5</sup> includes application of 10-15cc of water based anaesthetic solution/ jelly into the urethral meatus. After jelly application a penile clamp is placed so that the anaesthetic agent is retained in the urethra for it to act. Pain while attempting catheterization will lead to distress and voluntary contraction of the external sphincter by the patient making the procedure difficult. Several studies in the literature comparing the use of anaesthetic agent vs. plain aqueous lubricant solution for catheterization have found that use of anaesthetic agent significantly reduces procedure related pain and morbidity.<sup>6,7</sup> Patient is asked to breathe slowly; the penis is stretched in upright position at an angle of ~60°, in line with normal anatomic curve of urethra and the catheter is gently passed in. Care should be taken not to force the catheter into the urethra in case resistance is encountered. Size of the normal adult male urethra is 30 Fr.<sup>8,9</sup> A 16 or 18 Fr Foley catheter is ideal for male catheterization. Smaller sized catheter should be used in case of suspected stricture. If the obstruction is due to enlarged prostate, catheterization should be attempted using bigger sized catheters.<sup>8</sup>

In our study improper technique was the most significant predictor for failed catheterization. In 87% cases (21/24) inadequate amount of anaesthetic jelly was used. The jelly was applied to the tip of the catheter rather than into the urethra in 18/24 patients (75%). In 20/24 patients (84%) the catheterization was attempted immediately after jelly application, before the onset of action of the anaesthetic agent. In more than half of the patients (54.16%), catheterization was attempted by 14 Fr catheters in casualty (**Table 1**).

With increasing number of attempts, the chances of urethral injury increase significantly.<sup>10</sup> Forceful catheterization leads to false passages, the most common site of injury being the bulbar and posterior urethra.<sup>11</sup> One should suspect urethral injury in patients complaining of pain in penile or perineal region following catheterization attempts. Presence of blood at urethral meatus also point towards possible urethral injury. Number of

Parameters Studied	Catheterization successful (24)	Catheterization Failed (23)	p value
Prostate size (Gr I/II/III)	4/14/6	3/13/7	0.888853
Median Lobe/ intra vesical prostatic protrusion	2	13	0.000396
Serum PSA ( 0-4/ 4-10/ >10ng/ml)	7/13/4	10/9/4	0.53903
Cystoscopy-False Track	3	19	0.00001
Cystoscopy- Bladder Neck Contracture	0	1	>0.05
Cystoscopy- High bladder Neck	4	18	0.00001
Cystoscopy- Stricture Urethra	0	4	<0.05
Number of attempts at catheterization (single/multiple)	19/5	8/15	0.002

previous attempts was a significant predictor for failed catheterization in our study (**Table 2**). Presence of false track on Cystoscopy was much higher in failed catheterization group as compared to those successfully catheterized ( $p=0.00001$ ).

Presence of large median lobe with intra vesical prostatic protrusion distorts the normal curvature of the posterior urethra; pushing the bladder neck high. In such angulated posterior urethra, catheterization is difficult and may require digital rectal guidance for successful catheterization. Bladder neck elevation angle of  $> 35^\circ$  on cysto-urethroscopy was found to be associated with higher bladder outlet obstruction index (BOOI).<sup>12</sup> Another study comparing BOO index according to Posterior urethral angle (PUA), found that patients with higher PUA had higher BOO index than those with lower PUA ( $30.6 \pm 1.8$  vs.  $23.6 \pm 1.8$ ,  $P=.006$ ). The area under the curve of PUA was significant for BOO.<sup>13</sup>

Many studies have evaluated non invasive predictors for bladder outlet obstruction and acute urinary retention in patients with benign prostatic hyperplasia. It was found that Detrusor wall thickness (DWT) and intra vesical prostatic protrusion on ultrasound correlated significantly with BOO and AUR.<sup>14,15</sup>

In the current study both presence of median lobe of prostate with intra vesical protrusion and high bladder neck were significant predictors for failed catheterization, while size of the prostate gland, serum PSA levels correlated insignificantly.

## CONCLUSIONS

Technique of urethral catheterization is the most important predictor for failed attempts at catheterization. Improper multiple attempts at catheterization leads to significant urethral injuries which cause significant pain and distress to the patients. Moreover such iatrogenic injuries are the leading cause for urethral stricture development later on. As such it is imperative for all emergency health care professionals to have proper training in the technique for urethral catheterization.

Patients with benign prostatic enlargement presenting with acute urinary retention should be categorized in two groups: low risk and high risk for failed catheterization on the basis of pre procedure evaluation including ultrasonography.

High risk for failed catheterization:

1. Multiple previous attempts at catheterization
2. Complains of penile/ perineal pain & tenderness post catheterization attempt
3. Presence of blood at urethral meatus post catheterization attempt
4. Ultrasound- Presence of median lobe with intra vesical protrusion
5. Ultrasound- Increased Detrusor wall thickness (DWT)

In high risk cases difficult catheterization should be anticipated and such patients should be evaluated by urologists for urethral injury and urinary diversion.

## END NOTE

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**Conflict of Interest:** None declared

**Editor's Remarks:** This study has a lot of practical value in emergency room management. The actual difficulties encountered are mentioned and analysed. The reduction of long term urethral injury is achieved by this.

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