

**Catheter Induced Urethral Injury in Surgical ICU of Tertiary Care Hospital in Nepal**

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**ABSTRACT**

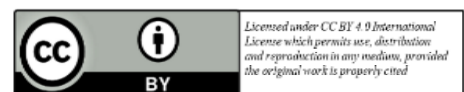
**Introduction:** Urethral catheterization is one of the most common procedures in urology. Most common complications of urethral catheterization is urethral injury. We conducted this study to find the prevalence of catheter induced urethral injury in surgical intensive care unit of tertiary care hospital in Nepal.

**Methods:** A retrospective chart review was carried out in all patients admitted in surgical ICU in between January 2022 to January 2024. All cases who had iatrogenic urethral injury while catheterization was recorded with an aim of studying the prevalence, cause, implication and management of urethral injury in tertiary care hospital. Data collection was started after getting ethical approval from Institutional Review Committee of Manipal College of Medical Sciences (Reference number -MEMG/479/IRC). SPSS version 21.0 was used for data analysis, p-value less than 0.05 as statistically significant at 95% confidence interval.

**Results:** Total 509 patients were taken for study. Thirty-six patients (7.07%) developed catheterization induced trauma. There were no significant differences when the catheterization was done by junior (6.56%) or senior health workers (8.59%) ( $p=0.44$ ). Similarly, there was no statistically significant difference in injuries when catheterization was done during regular (5.36%) or on call hours (8.22%) ( $p=0.22$ ). However, the mean number of attempts in catheterization before seeking help from the seniors had significant difference in the number of injuries ( $P<0.001$ )

**Conclusions:** Prevalence of catheterization induced urethral injury was higher compared to past studies. Iatrogenic catheterization injuries represent a significant cause of patient morbidity. Most occur due to inadequate knowledge of catheterizations. Most injuries are seen to occur while multiple unsuccessful catheterization attempts.

**Keywords:** *Bleeding; Iatrogenic; Urethral catheterization.*



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## INTRODUCTION

Urethral catheter is one of the most commonly used tools in urology. [1] There are many indications for urethral catheterization which includes neurogenic bladder dysfunction, urinary incontinence, social and hygiene reasons, acutely ill patients requiring close urinary output measurement, chemotherapy drug delivery, bladder irrigation, measurement of urodynamics, sample collection for urinalysis, and radiographic studies. [2]

Despite efforts to educate and train health care professionals on urethral catheterization insertion technique, iatrogenic urethral injuries are still common in hospital.[3] Most of the catheter related injuries are due to technical fault and are preventable.[4] Few case reports and institution-based studies are available related to catheter induced urethral injury in SICU and its actual prevalence is unknown. [5-8] This study has been conducted to know the prevalence of catheter induced urethral injury in SICU of tertiary care hospital in Nepal.

## METHODS

A retrospective chart review was done for all cases admitted in Surgical Intensive care Unit (SICU) and Neurosurgery Intensive care Unit (NICU) in all cases who had iatrogenic urethral injury while catheterization in these critical care units over the period of two years (1<sup>st</sup> January 2022-30 January 2024) with an aim of studying the prevalence, causes, implications and management of catheterization induced urethral trauma in a tertiary center of Nepal. Iatrogenic injury was defined as failed or difficult catheterization with one of the following clinical symptoms: hematuria, blood at urethral meatus, perineal or urethral pain, no urinary output or distended bladder. Patient who already had urethral injury elsewhere or before presentation to the hospital, self-inflicted trauma or trauma due to intermittent self-catheterization were excluded from the study.

All age groups and both genders were included. An institutional ethical clearance was taken from Institutional Ethical Committee before commencing the study (Ref Id - MEMG/479/IRC).

Data were taken from the departmental and medical record section. Variables such age, gender, time of hours when the injury occurred on both regular or on call hours, settings where injury occurred (Emergency room or ICU), number of attempts of catheterization before help of senior was sought, level of health care workers attempting catheterization (Auxiliary health worker like nurses or health assistants, interns, medical officers, residents), management done for catheterization after injury had been inflicted, complications in form of presence or absence of stricture.

After an incident of catheter induced urethral trauma, the patient is usually attended by an urologist. The patient is evaluated and then either catheterized by the urologist himself. If the trial of catheterization by the urologist fails then either a suprapubic catheter is inserted or the patient is taken to the operation theater and a rigid cystoscopy is done to see the injury. If the injury is partial then a foleys catheter is inserted under rigid cystoscopy assistance. If the injury is complete then a suprapubic catheter (SPC) is inserted. These patients are kept under catheterization for 6 weeks. After a period of 4-6 weeks, the catheter is removed and if the patient has difficulty in urination, he is further evaluated with a micturating cystogram and a USG urethra-sonogram. Similarly in case of patient under suprapubic catheter, he is given a trial for self-void after transiently clamping the SPC. If the patient can void well the SPC is removed or else he is again evaluated with a micturating cystourethrogram and USG urethra-sonogram to rule out stricture. In cases of stricture the patient is managed with

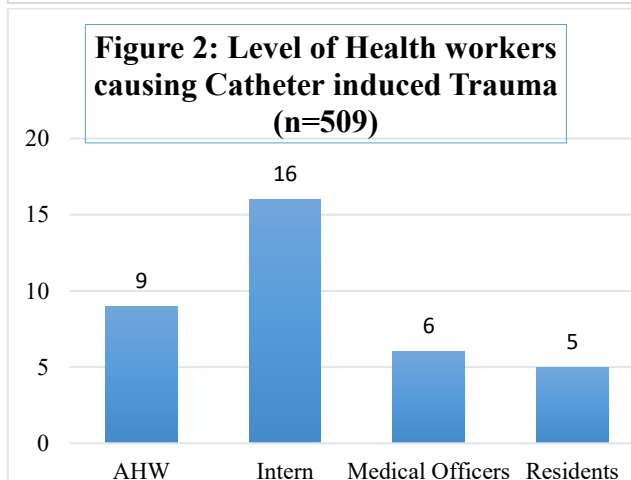
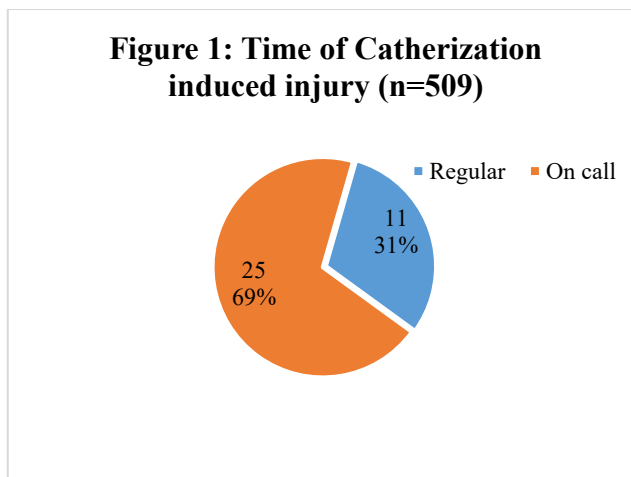
either serial endo-dilation or openstricturoplasty as deemed suitable.

Data were collected on a preformed proforma and all the continuous variables were presented as mean +\_ SD and categorical variables were presented as percentage. Chi square test was used to test the differences between the categorical variables whereas students t test were used to test mean differences. IBM SPSS 22.0 was used for statistical analysis.

**RESULTS**

A total of 818 patients were admitted in Surgical and Neuro ICU of Manipal Teaching Hospital, Pokhara, Nepal during the study period. Out of these, 162 patients had already been catheterized from elsewhere while they were received in the emergency department, 147 patients did not require catheterization while they received short term observation in the ICU, out of the remaining 509 patients 36 (7.07%) patients developed catheterization induced urethral trauma in our hospital during the 2 years of our study period. All patients were males with mean age of 47±21.49 years (16-90).

Indication of catheterization of all the cases in this series were for monitoring of urinary output in the ICU. Out of the 36 cases, 25 (69.44%) cases had injury sustained in the on-call hour (Figure1) and 9 (25%) cases were catheterized by the Auxiliary Heath Workers (AHW) which included the nurses and the health assistants posted at the emergency and ICU, 16 (44.45%) cases were catheterized by the intern doctors, 6 (16.67%) cases by the medical officers and 5 (13.89%) cases by the resident doctors (Figure 2).



It was observed that 11(30.56%) cases had injuries in the first attempt of catheterization itself, 10 (27.78%) cases on 2 attempts and 15 (41.66%) cases had injuries after more than 2 attempts of catheterization before a call was sent to the urologist. In most of the cases (29,80.56%) of injury it was seen that the injury was due to inflating the balloon in the urethra, whereas in 7 (19.44%) cases it was noticed that the tip of the catheter had created a false passage while multiple attempts of failed catheterization attempts were made by the health workers.

In 15(41.66%) cases of injury, catheterization attempt after copious lubrication and careful attempt by the urologist was successful. A single attempt was only made by the urologist in such cases. In rest of the cases (21, 58.33%) where the attempt was unsuccessful in the first attempt, patients were shifted to the operation

theatre and catheterization was attempted under rigid cystoscopy guidance for stable patient and at bedside suprapubic catheterization for unstable patient, which was successful in 9 (42.86%) cases and suprapubic catheterization was required in 12 (57.14%) cases after failed rigid cystoscopy assisted catheterization. Out of the 36 cases only 7 (19.44%) cases developed stricture on long term follow up of 6 weeks and out of these 4 (57.14%) were managed with serial endodilatation of the urethra and 3 (42.86%) required optical internal urethrotomy.

An analysis was done to see the percentages of catheterization induced urethral injuries when performed by the various level of health workers. For these the health workers were categorized into two categories: senior health workers (medical officers and residents) and juniors (AHWs and Interns). It was seen that there was no significant difference between the injuries when catheterization was done by junior or senior health workers ( $p=0.44$ ). Similarly, there was no statistically significant difference in injuries when catheterization was done during regular or on call hours ( $p=0.22$ ). However, the mean number of attempts in catheterization before seeking help from the seniors had significant difference in the number of injuries ( $P<0.001$ ) (Table 1).

**Table 1: Various factors and their association with catheterization induced urethral trauma (n=509)**

S. N	Parameters	Injury	No Injury	P Value
1	Level of Health Workers			0.44
	Seniors 128	11	117	
	Juniors 381	25	356	
2	Time of Injury			0.22
	Regular 205	11	194	
	On Call 304	25	279	
3	Mean number of attempts	2.56+1.23	1.47+0.66	<0.001*

## DISCUSSION

Iatrogenic injury to the urethra while catheterization was 7.07% in our study. This is higher than the usual prevalences of catheter associated injury in all hospitalized patients which was around 3.2- 6.7 per 1000 catheterizations in all hospitalized patients. [9-13] Since we only included cases in ICU that too in surgical and neurosurgical ICUs where the patient usually present with prostatic hyperplasia, spinal traumas or low consciousness levels with polytraumas the prevalences might have been higher than other studies.

In our study most of the injuries or failure to catheterization that occurred were during on-call hours (69.44%). This happens mostly as the catheterization done during on call hours are by the junior health workers and that too because the on-call hours are lengthier than the regular hours. Similar study have reported 29/37 patients having injuries to the urethra during on call hours. [3] In our study, 11 cases with injuries or failed catheterizations were done by the seniors (medical officers or residents) and 25 (69.45%) were catheterized by the juniors (AHW and Interns). The difference between the injuries while catheterizations were done by seniors and juniors were however not significant. Similar study also had reported that injuries to the urethra were significantly higher when catheterization was done by junior doctors than the seniors.[10]

Previous study also reported that in more than 67.5% cases there were more than 2 attempts of failed catheterizations before help was sought from the seniors. [10] past study reported that the mean number of catheterizations attempted before a help was sought from a urologist was 3.2. [3] In our study, it was observed that 11 cases had injuries in the first attempt of catheterization itself, 10 cases on 2 attempts and 15 cases had injuries after more than 2 attempts

of catheterization before a call was sent to the urologist. The mean number of attempts in our study in the injury group was 2.56±1.23 before a help was sought and it was significantly different than the non-injured group ( $P < 0.0001$ ). We thus feel that the rules in any hospital should be that, after a single failed attempt of catheterization a help from the senior should be sought.

In most of the cases (29) of injury it was seen that the injury was due to inflating the balloon in the urethra, whereas in 7 cases it was noticed that the tip of the catheter had created a false passage while multiple attempts of failed catheterization attempts were made by the health workers. We believe that all the health workers should be thoroughly taught about the steps of catheterization in males and they it should be emphasized that the balloon should not be inflated without confirming its position in the bladder by aspirating few amounts of urine from the catheter. Other previous study also emphasize in educating on a safe catheterization the technique as an important preventive step in avoiding catheter induced trauma. [14]

Out of the 36 cases only 7 cases developed stricture on long term follow up and out of these 4 were managed with serial endo-dilatation of the urethra and 3 required optical internal urethrotomy. Other previous studies found 78% of their patients developing strictures following traumatic catheterizations of which 11 have required at least one urethral dilation and two have required one urethrotomy. [15] Three patients required long-term indwelling suprapubic catheter placement and there were eight patient mortalities; one of which was due to severe urosepsis resulting from catheter balloon inflation in the urethra. In our series we did not encounter any mortalities.

## CONCLUSIONS

The prevalence of catheterization induced urethral injury was higher as compared to past studies. Iatrogenic urinary catheterization injuries represent a significant cause of patient morbidity. Most of them occur due to inadequate knowledge of catheterizations amongst the health workers. Most of the injuries are seen to occur while multiple unsuccessful catheterization attempts are done before seeking for help from a senior consultant.

## CONFLICT OF INTEREST

None

## SOURCES OF FUNDING

None

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