

# Impact of Intermittent Self-Catheterization (ISC) with 12 FR Catheter as A Nursing Intervention in Reducing Recurrence of Female Urethral Stricture Disease following Urethral Dilatation

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## ABSTRACT

**Objective:** To study the impact of intermittent self-catheterization (ISC), performed by the patient after trained by a specialist nurse, on reducing the recurrence of female urethral stricture disease after their urethral dilation.

**Study Design:** Randomized controlled trial (RCT) study

**Place and Duration of Study:** This study was conducted at the Urology Department of Shaikh Zayed Hospital, Lahore, Pakistan from December 2024 to May 2025.

**Methods:** A total of 132 female patients (aged 31-60 years) were recruited and randomized into two groups. Intervention group (n=66) performed intermittent self-catheterization (ISC) twice a week at home, whereas the control group (n=66) did not perform ISC at home at all. Both the groups were followed up by the researcher after every 15 days of recruitment for 12 consecutive weeks. Urethral stricture recurrence was assessed on every follow up visit by passing a 12Fr Nelton and catheterization failure was labelled as urethral stricture recurrence.

**Results:** Intervention group showed statistically significant ( $p=0.005$ ) reduction in the recurrence 07/27 (25.93%) in comparison with 20/27 (70.07 %) recurrence in control group. The main bulk of recurrences 18/27 (66.67%) were reported on the very first follow up within first 15 days, irrespective of their group allocation.

**Conclusion:** After urethral dilatation intermittent self-catheterization (ISC) performed by patients themselves after adequate training by a specialist nurse significantly reduces the stricture recurrence.

**Key Words:** Female urethral stricture disease, Urethral dilatation, Intermittent self-catheterization, Specialist nurse, Stricture recurrence.

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## INTRODUCTION

When a female urethra is narrowed in a such a way that it does not allow insertion of any instrument through it without injuring its mucosa, it is said to have stricture disease (Lumen et al., 2021)<sup>1</sup>. A urethral stricture is always suspected whenever there is a failure to pass a 12Fr catheter per urethra in a patient with urinary retention which may be confirmed by urethroscopy (Aldamanhori and Inman, 2018)<sup>2</sup>.

4%–13% of the women having obstructive urinary symptoms like straining, weak flow, stop–start pattern, poor bladder emptying have urethral stricture disease (Chua et al., 2021)<sup>3</sup>. In North America, about 5000 new patients with urethral stricture are added per year in the registry with the total expenses of around \$200 million every year (Xu et al., 2022)<sup>4</sup>.

Absence of any definitive diagnostic parameters, low index of suspicion for urethral stricture in a women and possible delays in the disease management all are possible reasons for fewer (0.1 to 1%) reported diagnosed cases of urethral stricture and thus contributing data scarcity on the disease prevalence and its management (Sarin et al., 2021)<sup>5</sup>. This is even worse on the national level where only 2.7 -8% are actually reported to have urethral stricture (Hassan et al., 2022)<sup>6</sup>. Urethral dilatation alone provides promising short term relief in voiding symptoms, however it has rather higher recurrence rates in the long run. That is why intermittent self-catheterization (ISC) is practically an acceptable adjunct in order to minimize urethral

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stricture recurrence (Campos-Juanatey et al., 2021)<sup>7</sup>. Intermittent catheterization (IC) helps maintaining bladder capacities and volumes as well as prevents renal function abnormalities and urinary infections in contrast to permanent bladder catheter (Blanc et al., 2021)<sup>8</sup>. Intermittent self-catheterization (ISC) is safe, easy-to-perform repeatedly and delays the need for reconstructive urethral surgery. (Hussein et al., 2024)<sup>9</sup>. We enrolled only those female who had already been treated with urethral dilatation by the urologist and were subsequently advised intermittent self-catheterization (ISC) which in our study was performed by the patients themselves at home after they were trained by the specialist nurse, to analyze the effect of Intermittent Catheterization (IC) in minimizing the recurrence rates.

## METHODS

Following approvals from relevant review boards and ethical committees and registration at clinicaltrials.gov via ID NCT06064968, this Randomized Controlled Trial (RCT) was carried out as a collaborative research work between Institute of Nursing, University of Health Sciences, Lahore and Department of Urology, Shaikh Zayed Hospital, Lahore, Punjab, Pakistan from December 2024 to May 2025.

Already diagnosed cases of urethral strictures after their urethral dilatation were referred by the Urologist to the specialist nurse researchers for training for intermittent self-catheterization (ISC). All the participants were females having age range of 31 to 60 years, body mass index (BMI) lower than 30, abbreviated mental test score (AMTS) of at least 7 and/or above, American Urological Association (AUA) score for evaluating lower urinary tract symptoms severity ranged from 8 to 35 in order to exclude obese, physically and/or mentally challenged patients and to gauge the overall improvement in symptoms.

A convenience sampling was used to include participants (n=132) who were then randomly allocated through lottery method in two equal groups each having (n=66) recruits. The control arm (n= 66) participants was offered catheterization with 12Fr Nelton catheter only on their follow up visits with the specialist nurse. In contrast, however, in the intervention group (n=66), self-catheterization was performed by the patients themselves at home twice a week for a period of 12 consecutive weeks. For performing self-catheterization, all the patients in the intervention group first received proper training by the specialist nurse. This self-catheterization was advised in a full urinary

bladder in morning at the time of first void in to minimize any unnecessary bladder discomfort.

Proper one-to-one counselling of the participants, their detailed briefing about the procedure as well as practical demonstration of catheterization procedure on mannequin followed by real-time self-catheterization by the patients on their own selves; every step was taught and supervised by the specialist nurse. Preferred positions for catheterization were lying supine with frog leg position (Fig-1) and/or in crouching position just like using an Indian toilet seat. After detailed practical demonstrations, patients were also handed over written instructions and provided procedural videos for their guidance for the successful catheterization at home.

For catheterization, under clean and aseptic conditions, a topical jelly (lignocaine gel 2%) is to be instilled in the urethra followed by insertion of a size 12Fr (3French= 1mm) Nelton tube (Fig-2) after applying jelly at its tip also. Tube is to be advanced into the filled urinary bladder until urine starts pouring out through Nelton, which confirmed that catheter has fully traversed the urethra and entered the bladder. After the bladder is completely drained, Nelton is removed gently.

Every participant from each group was followed fortnightly for a period of 12 weeks. On each follow up a 12Fr Nelton catheter is passed per urethra by the researcher nurse. Successful passage of catheter confirmed patency of urethra and such patients were booked for the next follow up visit. However, failure to pass Nelton tube confirmed narrowing of urethra and the patients were labelled as having stricture recurrence and were referred back to the urologist.

## RESULTS

Intervention group showed statistically significant (p=0.005) reduction in the recurrence 07/27 (25.93%) in comparison with 20/27 (70.07 %) recurrence in control group. The main bulk of recurrences 18/27 (66.67%) were reported on the very first follow up within first 15 days, irrespective of their group allocation.

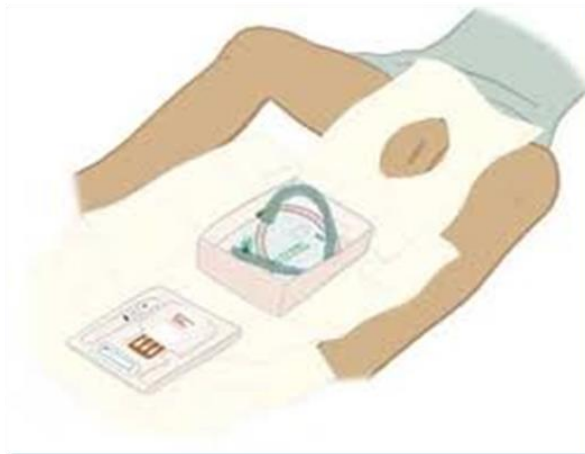
In the control group (n=66) where no intermittent catheterization was being performed at home, 20 participants (30.30 %) experienced urethral recurrence. However, only 07 patients (10.60%) reported to have recurrence of disease in the intervention group because they were performing intermittent catheterization twice weekly at home taught by the researcher nurse. Chi-square test applied and the difference of the recurrence rates between the two groups was statistically significant (p-value 0.005).

**Table No.1: Descriptive statistics of intervention and control groups:**

Parameters	Groups	N	Minimum	Maximum	Mean	Standard Deviation
Age	Intervention	66	31 years	59 years	48.36 years	7.13
	Control	66	33 years	56 years	46.79 years	4.28
Weight	Intervention	66	64 Kg	88 Kg	79 Kg	2.76
	Control	66	66 Kg	92 Kg	81 Kg	3.01
Height	Intervention	66	1.56 m	1.78 m	1.65 m	0.10
	Control	66	1.57 m	1.79 m	1.66 m	0.11
Body Mass Index (BMI)	Intervention	66	26.3 Kg/m <sup>2</sup>	27.8 Kg/m <sup>2</sup>	29 Kg/m <sup>2</sup>	0.95
	Control	66	26.8 Kg/m <sup>2</sup>	28.7 Kg/m <sup>2</sup>	29.4 Kg/m <sup>2</sup>	1.16

**Table No.2: Comparison of “Urethral Strictures Recurrence” between intervention and control groups**

Groups	Recurrence		Total	Significance
	No	Yes		
Control	46 (69.70 %)	20 (30.30 %)	66	p = 0.005
Intervention	59 (89.40 %)	07 (10.60 %)	66	
<b>Total</b>	<b>105 (79.55%)</b>	<b>27 (20.45%)</b>	<b>132</b>	



**Figure No.1: Frog leg position for performing IC**



**Figure No.2: Nelton catheters of various sizes**

## DISCUSSION

Current study included treated cases of urethral strictures with females with between 31 years to 60 years with a mean of  $48.36 \pm 7.13$  in intervention group and  $46.79 \pm 4.28$  in control group. These figures correspond to a study on female population with urethral stricture disease with a mean age of 48 years with age range of 26-76years (Hassan et al., 2022)<sup>6</sup>. In the females of this age range there was high likelihood of finding definite cases of urethral stricture disease where cognition and functional capacity (assessed via AMTS score in our study) is preserved along with dexterity needed to perform ISC of the recruits which is possible with this BMI range. All the above factors reportedly have been associated with the success of the study (Engberg et al., 2020)<sup>10</sup>. A total of 136 female patients with a diagnosis urethral stricture were randomized into intervention and control groups having 68 patients in each group. In published data worldwide, however, rather lower numbers of female participants in different studies have been reported i.e. from only 7 patients to as much as 82 patients with variety of diagnoses ranging from metal stenosis to bladder neck contractures to functional urethral syndrome (Kore and Martins, 2022)<sup>11</sup>. None of these studies focused on the female urethral stricture exclusively in contrast to our study. However, some researchers did recruit only the confirmed cases despite the low prevalence (2.7 to 23 %) and controversies in the standardizing the diagnosing criteria for female urethral stricture disease (Nagabhairava et al., 2024)<sup>12</sup>. Male urethral stricture disease, in contrast to female urethral stricture, has been reported to have more definite diagnostic criteria, hence a much higher incidence (0.6% - 0.9%) has been presented in various studies (Pang et al., 2021)<sup>13</sup>, (Madec et al., 2024)<sup>14</sup>.

The size of the urethral catheter which was used for intermittent catheterization (IC) in our research was 12Fr in order to maintain the patency of urethra. This catheter size selection corresponds to the data available in a study where they have recommended the use of urethral catheters as small as 5 Fr catheter to as large as 22 Fr catheter for intermittent catheter (IC) and maintaining the minimal normal urethral patency (Newman, 2021)<sup>15</sup>.

All the patients were followed up by the trained nurse (researcher herself) after every two weeks for a period of three months (i.e.12 weeks) and a Nelton catheter of 14Fr was used for catheterization by the participants twice a week for 3 months in intervention group after acquiring proper training by the researcher. Likewise, researches have also reported successful intermittent self-catheterization (ISC) performed by the patient after their training by the registered nurse (Gray et al., 2019)<sup>16</sup>. However, traditionally in our health care system, doctors have been reported to teach the patient how to perform intermittent catheterization using Nelton catheters of varying sizes to be used for a variable period of follow up spanning from 02 to 12 months post procedure (Ullah et al., 2023, Khan et al., 2011)<sup>17,18</sup>.

Out of all the recurrences in both groups combined (n=10) in our study, the timing of every individual case in each group was also analyzed. It was noticed that majority (7 /10) of these recurrences appear on first follow up after two weeks' time with 05 cases in 'control group' and 02 cases in 'intervention group'. Rest of the 03 cases with urethral stricture recurrence were reported in 'control group' only with 02 cases at the 3rd follow-up and 01 participants at the 4th follow-up. Although similar recurrence rates have been mentioned within a certain follow up time ranging from 08 weeks to 01 year, however, none of these show specifically the time of recurrence of individual case (Ullah et al., 2023)<sup>17</sup> (Kumar et al., 2019)<sup>19</sup>, (Khan et al., 2011)<sup>18</sup>.

## CONCLUSION

A well planned and scheduled intermittent self-catheterization (ISC) when performed by a properly trained patient on her own, does reduce the recurrence of female urethral stricture. Moreover, in our conventional health care system a trained nurse can may be a reliable alternative to a specialized doctor for training and supervising patients undergoing self-catheterization breaking through the stereotype. However, further studies are required focusing mainly on documenting true incidence of female urethral stricture disease in local population and role of intermittent self-catheterization after urethral dilation with much longer duration of follow up than that of 3 months as in this study.

## Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Farah Naz, Samina Kausar
Drafting or Revising Critically:	Shazia Taj, Maria sharif
Final Approval of version:	All the above authors
Agreement to accountable for all aspects of work:	All the above authors

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