

1 Late Outcome of Direct Vision Urethrotomy in Patients with  
2 Urethral Stricture at Kilimanjaro Christian Medical Center  
3 (KCMC), Moshi-Tanzania

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7  
8 **Abstract**

9 Background: Dilation and direct vision urethrotomy are the most common procedures used by  
10 majority of urologist to manage urethral stricture disease. This includes urologists in both  
11 developed world as well as developing world. Dilation and direct vision urethrotomy are now  
12 regarded as neither cost effective nor efficacious as long term strategy for management of  
13 urethral stricture disease. Despite the initial enthusiasm and good results reported by earlier  
14 studies, more recent studies have demonstrated a poor long-term success rate for direct vision  
15 urethrotomy. Broad objective: The aim of this study is to document the late outcome of DVU  
16 as seen in patients with urethral stricture at KCMC. Methodology: This is a hospital based  
17 retrospective cohort study that involved patients who presented to urology department at  
18 KCMC with urethral stricture and underwent direct vision urethrotomy from January 2006 to  
19 December 2013.

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21 **Index terms**— urethral stricture, outcome.

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26 strategy for management of urethral stricture disease.

27 Despite the initial enthusiasm and good results reported by earlier studies, more recent studies have  
28 demonstrated a poor long-term success rate for direct vision urethrotomy.

29 Broad objective: The aim of this study is to document the late outcome of DVU as seen in patients with  
30 urethral stricture at KCMC.

31 Methodology: This is a hospital based retrospective cohort study that involved patients who presented to  
32 urology department at KCMC with urethral stricture and underwent direct vision urethrotomy from January  
33 2006 to December 2013.

34 Results: A total of 648 cases of urethral stricture disease were managed at KCMC between January 2006 and  
35 December 2013, out of these 365 (56.3%) underwent DVU and 283 (43.7%) underwent urethroplasty. Of the  
36 patients who underwent urethroplasty, 191 (67.5%) underwent anastomotic urethroplasty, 64 (22.6%) underwent  
37 staged urethroplasty and 28 (9.9%) underwent substitutional urethroplasty. Out of 365 patients who underwent  
38 DVU during the study period 227 (62.2%) met the inclusion criteria, and 138 (37.8%) did not meet the inclusion  
39 criteria. Eighty six point four percent of participants were 40 years or older. One hundred and three participants  
40 (45.4%) had urethral strictures from iatrogenic causes. Most strictures were located in the bulbous part of urethra  
41 (63.9%). The majority of participants (66.1%) had strictures 1cm long or shorter. Most participants (90.8%)  
42 had a single stricture. Out of the 227 participants, 102 (44.93%) needed a re-operation. Of the 102 patients  
43 who required reoperation; 59 (57.84%) required the operation within six months; 18 (17.65%) within one year; 9

## 1 I. BACKGROUND AND LITERATURE REVIEW

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44 (8.82%) within two years; 12 (11.76%) within five years; and 4 (3.92%) required the operation beyond five years.  
45 Conclusion: DVU is still the commonest treatment option for patients with urethral stricture at KCMC. Most  
46 patients (63%) who underwent DVU were 60 years or above.

47 The overall long term success rate of DVU was 55.07%

48 The outcome of DVU was good when stricture was single, the length was 1 cm or less and located in the  
49 bulbous urethra.

50 Recurrence of urethral stricture post DVU is significantly high for strictures which are long, multiple and  
51 located in other sites apart from bulbous urethra.

52 Age of the patient and etiology of the urethral stricture have no influence on the outcome of DVU Keywords:  
53 urethral stricture, outcome.

## 54 1 I. Background and Literature Review

55 ince the introduction of DVU by Sachse in 1974, the wheel has come a full circle. Earlier studies demonstrated  
56 excellent outcomes following DVU and poor success of urethroplasty techniques. However the last two decades  
57 have witnessed a revolution in techniques of urethroplasty and many state-of-art centers have reported excellent  
58 long-term outcome coupled with the expansion of urethroplasty techniques, studies have highlighted extremely  
59 poor long-term outcomes for DVU [Lumen et al, 2009].

60 Dilatation and DVU are the most common procedures used by the majority of urologists in the United States.  
61 Recently, several authors analyzed the trends in male urethral stricture management in the United States using  
62 the data from the 1992-2001 Medicare claims. These authors concluded that despite the poor overall efficacy of  
63 dilation and DVU, urethroplasty rates were the lowest of all treatments [Barbagli et al, 2012].

64 Optical urethrotomy is a widely accepted treatment in approximately 80% of patients with urethral strictures.  
65 Repeated dilatation and open urethroplasty are other treatment procedures for urethral strictures. Optical  
66 urethrotomy (OU) has been performed either under general or spinal anesthesia. There are few excellent reports  
67 on use of local anesthesia. Generally optical urethrotomy is considered ideal for short segments (less than 2 cm).  
68 However, some authors believe that length is not a limiting factor for urethrotomy of anterior urethral strictures.  
69 OU has many advantages including day care procedures, early mobilization, shorter period of indwelling catheter  
70 and good short term results. However, significant percentage of patients recurs following OU. Most of these  
71 patients require either self-dilatation, dilatation by urologist in clinic, repeat OU or open urethroplasty [Zehri et  
72 al, 2009].

73 In a study done in Dar es Salaam a total of 111 patients with urethral strictures were recruited into the  
74 study, all were male with age range of 10 -97 years with a mean of 52.7 years. DVIU was the most performed  
75 procedure accounting for 73 (65.8%) of all patients followed by primary urethroplasty at 31 (27.9%) and multistage  
76 urethroplasty at 7 (6.3%) [Nyongole et al, 2013].

77 In a study done at KCMC DVU was done in 50% of cases of urethral stricture [Mteta et al, 2009].

78 Visual internal urethrotomy provides a safe first line therapeutic option for pediatric urethral stricture shorter  
79 than 1 cm, independent of etiology and location. For patients with more than one recurrence or with strictures  
80 longer than one centimeter, who are at high risk for recurrence after internal urethrotomy, open Urethroplasty  
81 remains the treatment of choice [Hafez et al, 2005].

82 The classical DVIU includes a single cut made at 12 o'clock position in the scar tissue, till the scar is incised  
83 completely. Concerns have been raised about the correct position of the incision. Some authors advocate multiple  
84 radial incisions for better incision of the scar. However, there is no reported difference in the outcome of single  
85 versus multiple incisions [Santucci et al, 2010].

86 Laser urethrotomy using different lasers has been attempted to improve outcomes. One prospective study  
87 demonstrated superior outcomes using a neodymium-doped yttrium aluminium garnet laser. In this study,  
88 recurrence rates following laser urethrotomy were 30% compared to 65% with DVIU over 12-month follow  
89 up. However other studies have reported similar success rates after laser and cold knife incision [Turek et  
90 al, 1992;Kamp et al, 2006].

91 In a double-blind, randomized, placebocontrolled study it was shown that injection of triamcinolone acetone  
92 did not improve significantly the outcome of DVU. ??Tavakkoli et al, 2011].

93 The reported duration following urethrotomy ranges from one day to three months. As yet there is no  
94 convincing evidence that extending the duration of catheterization has an impact on the outcome. Contrary to  
95 the popularly held belief, leaving the urethral catheter in place for three days or less is associated with lower  
96 recurrence rate (34%), compared to leaving it for four to seven days or more than seven days (recurrence rates  
97 of 43% and 65% respectively). Most studies have reported catheterization duration of one to four days [Dubey,  
98 2011].

99 Various techniques have been employed to follow patients following visual internal urethrotomy. These  
100 include urethral calibration with a catheter, uroflowmetry, flexible cystourethroscopy, AUA symptom index,  
101 urethrographic studies and the need for a repeat procedure. There is no uniformly accepted method of follow-up.  
102 Using a peak flow rate of less than 15 ml/sec, stricture recurrence could be diagnosed in 84% patients who had  
103 stricture recurrence ??Pandasoro et al, 1996].

104 A retrospective study done in Detroit, Michigan from January 1994 through March 2009 to assess the success  
105 of DVIU in series of 76 patients with simple urethral strictures, in this study Time to Recurrence (TTR) was

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106 defined as the time from urethrotomy until first subjective or objective sign of recurrence (if known), or actual  
107 date of subsequent repeat urethrotomy. Sign of recurrence included decreased force of stream, incomplete bladder  
108 emptying, recurrent urinary tract infections, increased post-void residual urine, obstructive pattern on uroflow  
109 study or definitive radiographic or cystoscopic evidence or recurrent stricture [Santucci et al, 2010].

110 In a study done in Germany including two university hospitals, Mainz university (group 1) and Bonn University  
111 ( group 2) with a mean follow up of 4.6 years in group 1 and 3.2 years in group 2. The stricture recurrence rate  
112 in Group 1 was 26.9%, whereas in Group 2 was 44.6%. Subgroup analysis revealed a higher preponderance of  
113 idiopathic stricture in Group 1 and iatrogenic strictures in Group 2. These authors concluded that idiopathic  
114 strictures have a more favorable prognosis [Albers et al, 1996].

115 In a study done in Italy, 224 patients were followed for longer than 60 months after optical urethrotomy and  
116 a preoperative peak flow of less than 15 millilitres per second. The mean patient age was 62 years. The success  
117 rate (peak flow rate of more than 15 millilitres per second) was 32% overall, and 42%, 16% and 11% among  
118 patients with bulbar, penile and penile bulbar strictures respectively [Pansadoro et al, 1996].

119 Stricture recurrence has been shown to be directly proportional to stricture length. It has been shown that  
120 recurrence rate is high with strictures longer than 1cm. In a study done in Italy success rate was 71% for strictures  
121 shorter than 1cm versus only 18% for longer strictures [Pansadoro et al, 1996].

122 In a study by Albers et al, 1996 which was done in Germany, stricture length was analyzed by retrograde  
123 urethrography. The recurrence was 27.8% for strictures less than 1cm which was less compared to long strictures  
124 of which recurrence was 50.5% following internal urethrotomy. In a study done in Nigeria a total of 23 patients  
125 needed a repeat urethrotomy within 48 months of follow up (recurrence of 32.9%) [Ramyil et al, 2007].

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127 In another study by Zehri et al, 2009 it was shown that strictures length more than two centimetres was  
128 significantly associated with recurrence following DVU, (P Value 0.0001).

129 A study by Javier et al, 2014 in patients who underwent urethrotomy, the procedure was performed a mean  
130 of  $1.32 \pm 0.94$  times; in 20% of the subjects, the treatment included urethroplasty due to the poor results of the  
131 previous endoscopic treatment. Analysis of the studied parameters revealed that the length of the stricture was  
132 the only factor that influenced sole treatment or treatment with urethrotomy and subsequent urethroplasty.

133 In a study by Mandhani et al, 2005 the degree of spongiofibrosis associated with strictures may also predict  
134 stricture recurrence. However, spongiofibrosis is difficult to quantify. Percentage narrowing on retrograde  
135 urethrography can be used to predict stricture recurrence. From January 1991 to June 2002 patients with  
136 primary bulbar urethral strictures who underwent DVU were selected for the study. Patients with a history of  
137 intervention, complete block of the urethral lumen and stricture greater than 2 cm were excluded from study.  
138 Urethral diameter at the area of maximum stenosis and at the normal distal urethra was measured on RGU with  
139 Vernier caliper and percentage narrowing was derived. Patients were followed 3 times monthly with symptoms,  
140 calibration and whenever required with RGU. Recurrence of symptoms, failure to self-calibrate and the need for  
141 secondary procedure were considered treatment failure. Complete follow up data were available in 105 patients  
142 (44 grade 1 and 61 grade 2). Mean bulbar urethral stricture length was 0.86 cm. Inflammation was the cause of  
143 stricture in 83 (79%) and trauma the cause in 22 (21%) patients. In the Cox proportional hazards model only  
144 grade of narrowing had a significant impact on outcome. There were 41 cases of treatment failure in the total  
145 follow up of 46 +/-9 months. Mean recurrence-free duration +/-SD was 13 +/-15 and 44.52 +/-19 months in  
146 cases of treatment failure and success, respectively (p <0.0001). Mean percentage narrowing was significantly  
147 higher with treatment failure (69.9% +/-16.1% vs 48.55% +/-17.3%, p <0.0001). A cutoff of 74% for urethral  
148 narrowing was derived to predict the outcome with 78% probability.

149 In a study done by Albers et al, 1996 in Germany strictures were in bulbous urethra in 52.6% of the cases and  
150 multiple in 21.9%. Penile strictures (28.6%) had the highest recurrence rates (42.5%), bulbar strictures had the  
151 lowest recurrence rate (34.3%). Location did not significantly influence recurrence rate.

152 The location of the stricture did not influence outcome of DVU. Among short strictures those in the bulbar  
153 showed lower recurrence rates than, for example, those in the penile urethra, which may be explained by the  
154 better vascularization of the proximal urethra. Nonetheless, the process and scarring certainly depend more on  
155 aetiology than stricture location [Albers et al, 1996].

156 In a systematic review by Dubey, some studies have found that iatrogenic strictures had higher recurrence  
157 rates than inflammatory or traumatic strictures, whereas another study showed better results for iatrogenic  
158 strictures. Inflammatory strictures occurring after long-term catheterization or genital infection were found to  
159 be associated with higher chance of recurrence. Others have found no relationship between stricture etiology and  
160 risk of recurrence. There is no consensus on whether stricture etiology predicts recurrence, as different studies  
161 have proposed different aetiologies as poor responders to DVU.

162 In a study by Heyns et al, 1998 a single dilatation or a DVU, not followed by restricturing at 3 months, the  
163 stricture recurrence rate was 55-60% at 24 months and 50-60% at 48 months. After a second DVU for stricture  
164 recurrence at 3 months, the stricture-free rate was 30-50% at 24 months and 0-40% at 48 months. After a  
165 third dilatation or DVU for stricture recurrence at 3 and 6 months, the stricture -free rate at 24 months was  
166 0. Urethrotomy has no role when stricture recurrence occurs within 3 months of DVU or recurs after a second  
167 urethrotomy.

168 In a study by Pansadoro et al, 1996 only 2 of the 47 patients treated with multiple urethrotomies achieved a  
169 good result and a third or fourth urethrotomy always failed. In a study involving 126 patients who underwent  
170 internal urethrotomy and got recurrence underwent either a subsequent urethrotomy or urethroplasty. It was  
171 demonstrated that repeat urethrotomy was neither costeffective nor clinically effective.

172 In a study by ??jaeergard et al, 1988 43 patients were randomized to either weekly CISC for one year or no  
173 CISC. The stricture recurrence was 68% in those who did not perform CISC versus 19% in those who did, clearly  
174 demonstrating the beneficial effects for CISC.

175 In a study by Bubey, 2011 it was shown that biweekly intermittent self-dilation (ISD) when continued for  
176 longer than 12 months, had a much lower rate of stricture recurrence (16%) when compared with the group that  
177 performed ISD for 6 months (40%). There is no role for short-term ISD following urethrectomy.

## 178 3 II. Methods

### 179 4 a) Study design

180 This was a retrospective hospital based cohort study conducted at KCMC, which is a tertiary referral hospital  
181 receiving patients from districts and regional hospitals from the Central and northern zone of Tanzania but also  
182 from other zones and neighboring

## 183 5 III. Results

184 A total of 648 cases of urethral stricture disease were managed at KCMC between January 2006 and December  
185 2013, out of these 365 (56.3%) underwent DVU and 283 (43.7%) underwent urethroplasty. One hundred ninety  
186 one (67.5%) patients underwent anastomotic urethroplasty, 64 (22.6%) underwent staged urethroplasty and 28  
187 (9.9%) underwent substitutional urethroplasty. Out of 365 patients who underwent DVU during the study period  
188 227 (62.2%) met the inclusion criteria, and 138 (37.8%) did not meet the inclusion criteria. Sixty three percent  
189 of participants were aged 60 years or above 60 years as shown in Figure 1; Iatrogenic urethral injuries were found  
190 to be the main cause of urethral strictures in 45.4% cases as shown in Figure 3. Sixty six point one participants  
191 had strictures of 1 cm long or less than 1cm as shown in figure 5 above. Out of the 227 participants, 102 (44.9%)  
192 needed a re-operation. Of the 102 patients who required reoperation; 59 (57.8%) required the operation within  
193 six months; 18 (17.7%) within one year; 9 (8.8%) within two years; 12 (11.8%) within five years; and 4 (3.9%)  
194 required the operation beyond five years as shown in table 1 above. There was no statistical significant difference  
195 in the outcome of DVU in the different age groups (using Fisher's Exact Test P value 0.77) The recurrence of  
196 stricture following DVU increased proportionally to stricture length. Stricture recurrence rates were 20%, 62.5%  
197 and 66.67% for strictures less than 1 cm, 1 to 3 cm and above 3 cm respectively. The difference was statistically  
198 significant. (Chi-Square 41.1251, DF 2, P value < 0.0001) Bulbous urethral strictures showed a better outcome  
199 compared to strictures at other sites. Recurrence of stricture following DVU for bulbous stricture was 37.93%  
200 while for other sites was 57.32% as shown in Table 4. This difference is statistically significant. (Chi-Square  
201 7.9557, DF 1, P value 0.005) Single strictures had better outcome after DVU compared to multiple strictures.  
202 Stricture recurrence was 42.72% for single strictures compared to 66.67% for multiple strictures and the difference  
203 is statistically significant. (Chi Square 4.4172, DF 1 P value 0.04)

## 204 6 IV. Discussion

205 In this study patients with urethral stricture treated by DVU at KCMC had age range from 4 years to 93 years  
206 with a mean age of 61.9 years. Age distribution of patients who underwent DVU at KCMC is similar to the  
207 findings in most studies done in developed countries (Italy, the mean age of patients was 62 years, range 11 to 90  
208 years, Pansadoro et al, 1996) The mean age is higher compared to findings in other African countries whereby  
209 the mean age was younger. In Nigeria the mean age was 30.6 years [Ramyl et al, 2007] and in Ethiopia the  
210 median age was 43 years [Hagos, 2008].

211 The difference in mean age between this study and the ones done in other African countries could be explained  
212 by the etiological factors of urethral strictures, whereby in these other African countries infection was the leading  
213 cause of urethral stricture (61.4% in Nigeria and 82.4% in Ethiopia). In this study infection contributed only  
214 23.4% of urethral strictures while majority of urethral strictures were caused by iatrogenic injuries (45.4%). These  
215 findings are similar to the ones in studies done in developed world where iatrogenic causes accounted for 45% of  
216 urethral strictures while urethritis accounted for 20% of cases [Tritschler et al, 2013]. In another study done in  
217 Europe iatrogenic causes accounted for 45.5% of strictures. In patients younger than 45 years the main causes  
218 were idiopathic, hypospadias surgery and pelvic fracture. In patients older than 45 years the main causes were  
219 transurethral resection and idiopathic [Lumen et al, 2009].

220 Most patients in this study had strictures located in bulbous urethra (63.9%) which is higher compared to  
221 results found in other studies, (Pansadoro and Emilliozi 49%, Albers 52.6% and Tritschler et al 50%).

222 In this study it was found that overall stricture recurrence rate was 44.9% which is similar to what was found  
223 by a study by Albers et al (44.8%) and Tritschler et al (50%). Other studies had very high stricture recurrence  
224 rates of up to 93% to 94%. In a study by Santucci et al stricture free rate (SFR) at five years was 7% and in the

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225 one done by Pansadoro et al it was 6%. In both these two studies the sample sizes were small, 76 cases and 47  
226 cases respectively.

227 The long term outcome of DVU was found to be better for strictures located in bulbous urethra and this  
228 difference was statistically significant (P value 0.005). Albers et al found less recurrence with bulbous urethral  
229 strictures but without statistical significance. This is explained by more cases of urethral stricture in this study  
230 being bulbous and most of them were short compared to other studies and which explains the better results in  
231 this site.

232 In this study length of urethral stricture was associated with recurrence following DVU and this finding  
233 was statistically significant (P-Value less than 0.0001). The chance of urethral stricture recurrence is directly  
234 proportional to stricture length. This finding is similar to the ones found in other studies [Albers et al,  
235 1996;Pansadoro et al, 1996].

236 Urethral stricture aetiology was found not to influence the outcome of DVU in this study (P value 0.21), this  
237 is similar to what other studies found. Albers et al found that iatrogenic strictures had less recurrence rate with  
238 statistical significance.

239 Patients with multiple strictures who underwent DVU showed poorer outcomes compared to those with a  
240 single stricture, this difference was found to be statistically significant (P value 0.04). This is similar to what  
241 Pansadoro et al found.

## 242 **7 a) Study limitations**

243 Inadequate documentations of patients' case notes especially on the symptoms/ clinical findings at surgery,  
244 significant number of patients were lost to follow up post operatively and some of the urethrogram reports were  
245 very deficient.

## 246 **8 V. Conclusion**

247 DVU is still the commonest treatment option for patients with urethral stricture at KCMC. Most patients (63%)  
248 who underwent DVU were 60 years or above.

249 The overall long term success rate of DVU was 55.07%

250 The outcome of DVU was good when stricture was single; the length was 1 cm or less and located in the  
251 bulbous urethra.

252 Recurrence of urethral stricture post DVU is significantly high for strictures which are long, multiple and  
253 located in other sites apart from bulbous urethra.

254 Age of the patient and etiology of the urethral stricture have no influence on the outcome of DVU

## 255 **9 VI. Recommendation**

256 DVU should be the first line treatment only for short urethral strictures, single and located in the bulbous  
257 urethra.

258 Prospective studies are needed to assess the long term outcome post DVU in patients with urethral stricture  
259 including validation of a tool for outcome measure.

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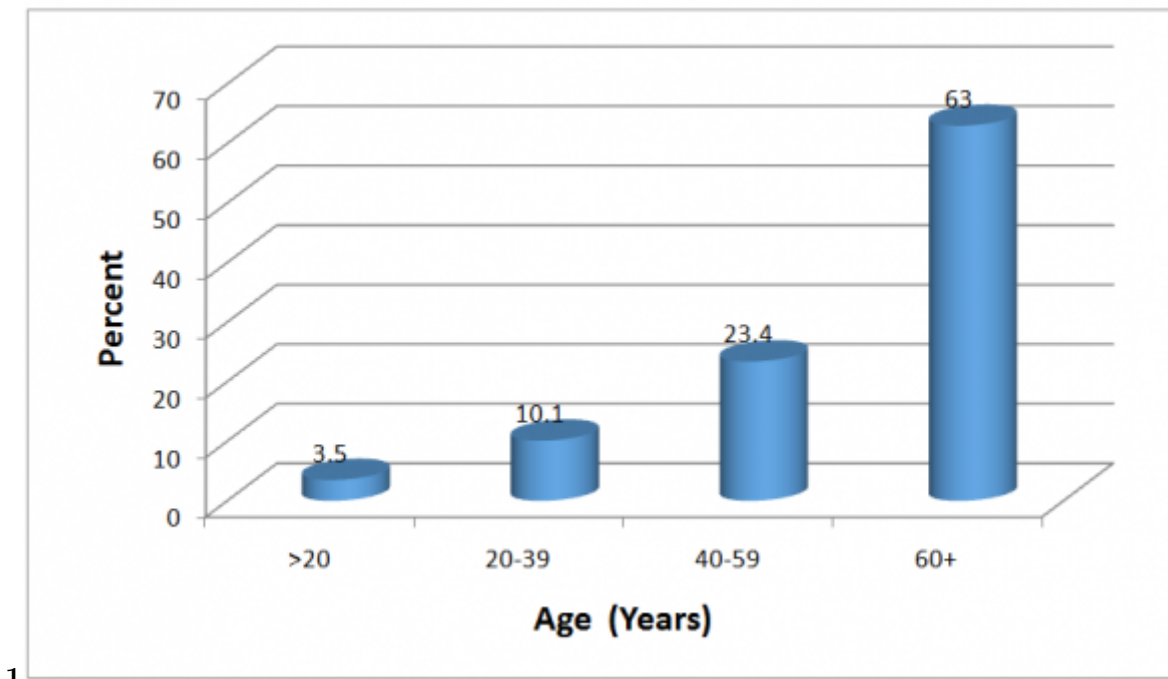
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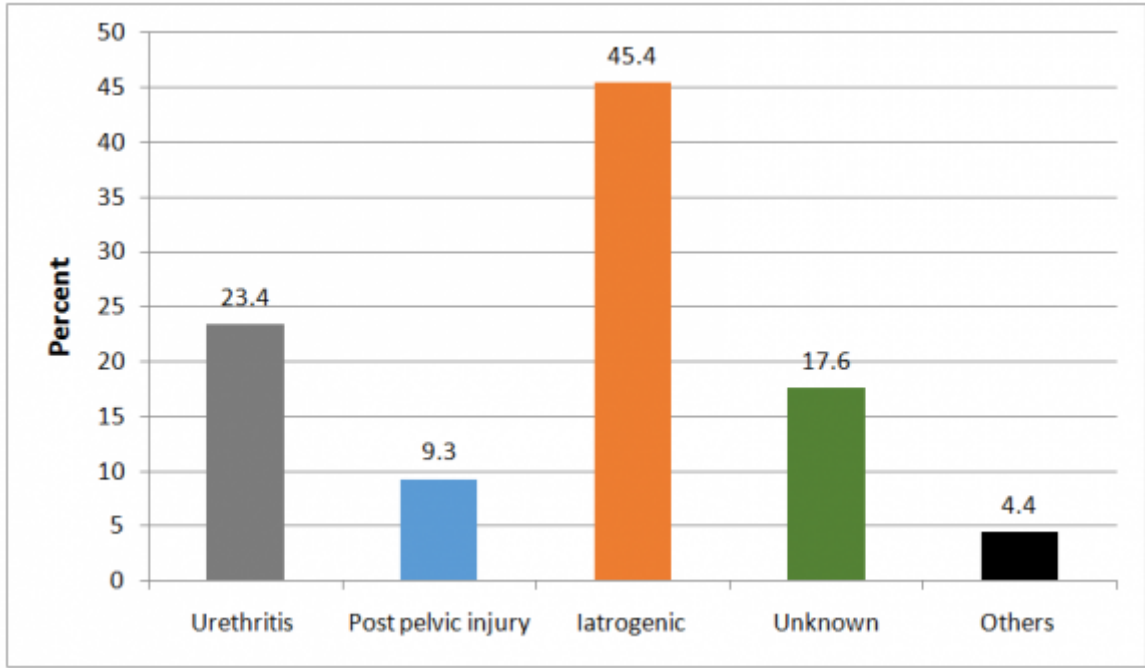


Figure 1:



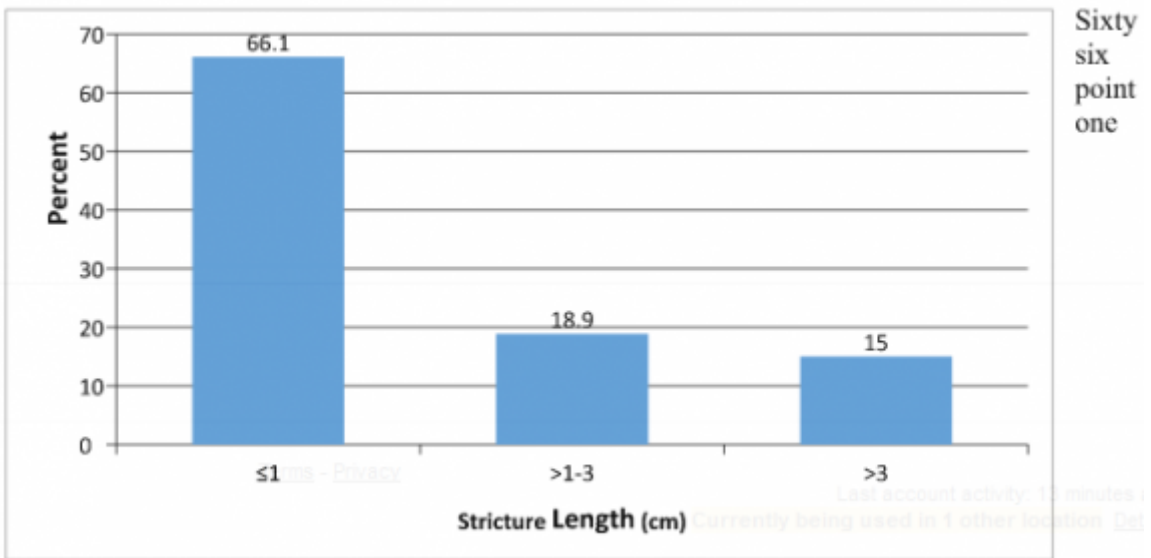
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Figure 2: Figure 1 :



3

Figure 3: Figure 3 :



4

Figure 4: Figure 4 :

Figure 5:

1

Number

Percent

Figure 6: Table 1 :

2

Age group	Outcome of DVU		
	Recurrence	No Recurrence	Total
<20	5 (62.5%)	3 (37.5%)	8 (3.52%)
20-39	10 (43.48%)	13 (56.52%)	23 (10.13%)
40-59	25 (47.17%)	28 (52.83 %)	53 (23.35%)
?60	62 (43.36%)	81 (56.64%)	143 (63.00%)
Total	102 (44.93%)	125 (55.07%)	227 (100%)

Figure 7: Table 2 :

3

Length of stricture (cm)	Outcome of DVU		
	No Recurrence	Recurrence	Total
<1	76 (80.00%)	19 (20.00%)	95 (41.85%)
1-3	45 (37.5%)	75 (62.5%)	120 (52.86%)
>3	4 (33.33%)	8 (66.67%)	12 (5.29%)
Total	125 (55.07%)	102 (44.93%)	227 (100%)

Figure 8: Table 3 :

4

Stricture Location	Outcome of DVU		
	No Recurrence	Recurrence	Total
Bulbous	90 (62.07%)	55 (37.93%)	145 (63.88%)
Others	35 (42.68%)	47 (57.32%)	82 (36.12%)
Total	125 (55.07%)	102 (44.93%)	227 (100%)

Figure 9: Table 4 :

5

Number of strictures	Outcome		
	No Recurrence	Recurrence	Total
Single	118 (57.28%)	88 (42.72%)	206 (90.75%)
Multiple	7 (33.33%)	14 (66.67%)	21(9.25%)
Total	125 (55.07%)	102 (44.93%)	227 (100%)

Figure 10: Table 5 :

.1 Competing interests

The authors declare no competing interests.

.2 VII. Acknowledgement

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