

Dorsal Onlay Urethroplasty Using Buccal Mucosal Graft and Vaginal Wall Graft for Female Urethral Stricture; Outcome of a Tertiary Care Hospital

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ABSTRACT

Background: Normally female urethral stricture (FUS) is uncommon and underdiagnosed condition. It is raising a diagnostic challenge for the physicians. It is the one of the rarely known urological entity. Urethral dilatation is the traditionally used treatment for urethral stricture (FUS). The female urethroplasty have shown the promising outcomes.

Objective: The objective of the study was to compare the outcome of the dorsal onlay urethroplasty FU obtained by using buccal mucosal graft and vaginal wall graft. The FU is more effective treatment for female urethral stricture (FUS) as compared to the repeated dilatation.

Study design: It is a retrospective study with the statistical approach, conducted at Urology Department, Pakistan Institute of Medical Sciences Islamabad from June 2021 to November 2021.

Material and Methods: The women who underwent the dorsal onlay urethroplasty at the urology department of the hospital were included in the study. The outcomes of BMG and VWG were compared. The re-intervention was marked as failure. The association symptom score, postvoid residual urine (PVR), cystourethrogram, cystoscopy and urethral calibration were included in the assessment. Operating time, catheter time, etiology, location, length, prior interventions and suprapubic cystostomy were the other parameters that was also reported. For the statistical analysis the Mann-Whitney test, t-test and proportion test was performed.

Results: The calculated mean age of the patients included in the group was 48 years. Its range was between the 26 to 76 years. The women visited the urology department of the hospital from June 2021 to June 2022. The average follow-up was for 26 months. The AUA symptoms changes from 22 to 6, Qmax from 4ml/s to 26ml/s and RVR from 185ml to 7ml. The operating time was the only parameter showed the difference, while other remained the same. The 94% was the overall urethral patency rate.

Conclusion: For the substitution of dorsal onlay urethroplasty the use of VWG and BMG is highly recommended. It is an efficient and reliable treatment method. There are very low chances of complication and it has an easy protocol. Apparently, no specific change was observed in the FUS treatment by BMG and VWG.

Keywords: Female urethral stricture (FUS), buccal mucosal graft, vaginal wall graft, postvoid residual urine (PVR), dorsal onlay urethroplasty.

INTRODUCTION

Female urethral stricture is one of the rarely reported condition. The one of the challenging condition for the physicians is the diagnosis of bladder outlet obstruction. The repeated instrumentation has impacted the etiology of the FUS. It became iatrogenic¹. The breach in the mucosa is as a result of the repeated instrumentation trauma. The extravasation that resulted in the fibrosis ultimately leads to the stricture formation. The incidence of urethral stricture in the women is reported to be range from 4 to 13%. The 2.7% to 8% of the women having low urinary tract symptoms usually diagnosed with the FUS²⁻³.

The diverticulum surgery, difficult catheterization, prior urethral dilatation, pelvic fracture and exposure to radiations can cause the formation of urethral stricture. Limited knowledge is present on the diagnosis criteria, optimum management algorithm and follow-ups. The diagnostic criteria are not documented for this disease. The need of the hour is to improve the treatment efficacy and diagnostic techniques for the disease. The recurrent urinary tract infection, voiding and storage lower urinary tract symptoms are observed in the patients suffering from FUS⁴. This can ultimately leads to the renal failure that affect the quality of life badly. In most of the cases the stricture is usually located distally to the external urethral sphincter. The measurement of residual volume and uroflowmetry are normally used for the local examinations⁵⁻⁶.

The internal urethrotomies and urethral dilatation are traditionally used for the treatment of the female urethral stricture. The physicians are considering surgical reconstruction for the treatment of FUS. The promising results are observed by the substitution urethroplasty aided with the local flaps and different grafts. The two types of substitution are onlay and inlay⁷⁻⁸. The dilatation and intermittent catheterization also yield good results but with the higher reported complications. However the results obtained from the dorsal onlay urethroplasty aided with the buccal

mucosal graph and vaginal wall graph were compared. These treatment are proved to be more effective with better results and less reported complications⁹⁻¹⁰.

MATERIAL AND METHODS

The study was conducted on the 79 women, out of which 42 was diagnosed with urethral stricture at the Urology department of our teaching hospital from June 2021 to June 2022. Only 35 patients were included in the study. The ethical committee of the hospital approved the study.

The informed consent was taken from all the participants. For the diagnostic criteria the urinary flow less than 10ml/s, inability of the patient to calibrate urethra with 10 Fr catheter, and narrowing of urethra with proximal dilatation on micturating cystourethrogram were considers.

The data about the history, physical examination, micturating cystourethrogram, uroflowmetry, and residual volume were collected. The incomplete voiding and poor flow were observed in the most of patients while recurrent urinary tract infection was reported in four patients and the other four had complaint of frequency and urgency. The flimsy stricture were observed in the 5 patients. The acute urinary retention were observed in the three patients.

The clinical examination, urological association symptom score, uroflowmetry urethral calibration and PVR. The cystoscopy was used for the final diagnosis. The SPSS was used for the statistical analysis.

RESULTS

For this study, the mean age was calculated (48 years), and the range was 26 to 76 years. Among the two groups, the patients of the BMG group were younger having average age of 44 than VWG group having mean age of 54. All the interventions were noticed before further proceeding for stricture localization, etiology length,

urethroplasty, and time of catheter after the operation, different other complicated issues and follow up conditions in both cohorts.

All of these attributes were compared and represented in the table below.

Table 1: Comparison of attributes in BMG and VWG.

| Attributes | BMG Cohort | VWG Cohort | %age (BMG - VWG) | Value of P (2 samples in t-test) | value of P (proportion test) |
|---|------------|------------|------------------|-----------------------------------|------------------------------|
| Mean age in years | 44.0 | 54.0 | - | 0.056 | - |
| SPC (Suprapubic cystostomy) | 3.0 | 0.0 | - | 0.063 | - |
| mean of previous interventions | 3.0 | 3.0 | - | 0.923 | - |
| Position | | | | | |
| Distal position | 1.0 | 0.0 | 4.6 - 0.0 | - | - |
| Distal - middle position | 10.0 | 8.0 | 41.9 - 62.6 | - | - |
| Middle position | 5.0 | 1.0 | 22.8-9.2 | - | - |
| Middle-proximal position | 5.0 | 1.0 | 22.8-9.3 | - | - |
| Pan - urethral position | 1.0 | 3.0 | 4.7-17.2 | - | - |
| Size in cm | 1.6 | 1.7 | - | 0.853 | - |
| Etiology of graft | | | | | |
| Upright dilatation | 12.0 | 2.0 | 51.3-19.2 | - | - |
| Post-caruncle editing | 1.0 | 1.0 | 4.9-0 | - | - |
| Post-catheterization | 2.0 | 2.0 | 9.3 - 17.2 | - | - |
| Idiopathic insertion | 7.0 | 3.0 | 28.7 - 28.3 | - | - |
| Post TURBT (bladder tumor) | 1.0 | 1.0 | 4.7- 9.2 | - | - |
| After diverticulectomy | 0.0 | 1.0 | 0- 9.2 | - | - |
| Post-sling | 0.0 | 1.0 | 0-9.2 | - | - |
| Mean time of operation in minutes | 129 | 96 | - | 0.029 | - |
| Mean time of Post-operative catheter in minutes | 13 | 13 | - | 0.775 | - |
| Problems in "Clavien Dindo" Grade 1 and 2 (number of individuals) | 5.0 | 5.0 | - | 0.221 | - |
| Follow up time in month | 26 | 29 | - | 0.377 | - |
| Success rate | 20 of 22 | 13 of 13 | - | - | 0.7631 |

In the buccal mucosal grafting group, the score of the symptoms of AUA was upgraded from the average value of 22 to 6 with a range 5-8. The value of Q max was improved from its mean value to 29 ml/sec further. In the vaginal wall graft, the score of the symptoms of AUA was upgraded from the mean value of 22 to 8. And the value of Q max was also upgraded from its mean value to 25 ml/sec. An average duration of about 27 months was selected and better results were observed in the symptom score of AUA.

No statistical difference was observed in both cohorts, and the mean operation time was 92 minutes. For the BMG cohort, the average operating time was more because of the tracing of its localization. For 5 patients Clavien Dindo grade 1 was observed and infection of UTI canal was predicted in some patients in the follow up visits. Some of the patients had urinary obstruction as well in the case of BMG.

About 5 patients from the VWG cohort, had mild symptoms like UTI, and dysuria. Few numbers of patients had a decrease in the rate of urination and this patient also had a stricture in the urethra. Before the initiation of urethroplasty, the patient had dilation of the urethra, and no further treatment was given. The rate of successful treatment was 93 % and no statistical difference was observed.

DISCUSSION

The prevalence rate of FUS is low and there is no particular treatment method for this disease yet. The restrictions due to this disease is between 2.8 % to 22 % in the female population. Among these complications, 78 % of the restrictions have observing effects and 7 % of the complications have an indirect effects¹¹. For the identification of FUS, still, no appropriate diagnostic method is available, therefore, it is difficult to predict the medical condition of the patient on the basis of basic symptoms. Usually, low efficient methods are available like uroflowmetry, and cystoscopy is used¹²⁻¹³.

In this research work, different attributes of the patients were selected for the diagnostic purpose. Different factors play a role in the identification of the FUS Apart from catheterization and different types of instrumentation, iatrogenic factors and trauma play their role. Different etiological attributes also play their role and dilation of the urethra is also accounted for in this study. In the vaginal wall grafting group the different etiological attributes were

equally distributed. Mostly, restrictions were present in the middle and distal zone of the ureter. In the bladder and proximal part of the urethra, restrictions were observed rarely¹⁴⁻¹⁵.

For the treatment of these issues, hygienic treatment through catheterization and by the dilation of the urethra are the available methods. However, further progress is undergoing in the treatment of this FUS disease by some surgical methods. In case of urethroplasty, the grafting of dorsal and ventral sides was done in previous years with about more than 70 to 100 % success rate. Many further modifications are still employed for the further improvement of FU, but due to the lack of data about these patients hurdles the study¹⁶.

In this research work, different factors like localization of stricture, time period for catheterization, urethroplasty, and other issues were considered for two groups BMG and VWG. The mean age for BMG was less as compared to the VWG. All of these parameters were selected by expert surgeons on the basis of their involvement in the initiation or progression of the diseases. Some patients need extra treatments before the initiation of urethroplasty. The requirement for extra treatment may be due to the variable selection of patients from different geographical regions¹⁷⁻¹⁸. The same protocols of surgery were applied to the BMG and VWG group. However, in the case of BMG group, extra effort was required for the localization of obstruction within the urethra which enhances the treatment time. To resolve this problem, the BMG was performed by two groups separately, but both the groups face the same kind of issues during surgery or grafting procedure indicating the resistance toward operations by both groups. All the functional aspects were the same in both the groups no statistical variations were observed¹⁹.

The vaginal complications due to the labium minora and labium majora were not observed in both of the cases during grafting procedures. The anatomy of the urethra was unclear during this surgery. The dorsal and ventral sides were identified and the interior region was defined as the dorsal region and the ventral side was assigned to the posterior region. When surgery was performed on the dorsal region, the clitoris was damaged along with bleeding issues. But on the ventral side, the surgical procedure was quite easy and the fistula rate was higher²⁰.

In the case of males, urethroplasty, the grafting by buccal mucosa was considered a more efficient replacement, and a

number of other factors play their role in the successful implantation of the tissues. In the case of females, due to the smaller length of the urethra and small obstructions, only a small piece of tissue is required for the grafting. The buccal mucosal grafting is advantageous over VWG due to the narrowing of the vagina, but VWG has the advantage in case of patients having unhygienic conditions, smoking, and some oral infections. In the case of VWG, local anesthesia was given to the patients, but in some cases, general anesthesia also needed to be utilized²¹⁻²².

However, the patients were not much aware of the disease condition, the grafted tissues were not randomly selected, instead, recommendations of expert surgeons were considered to avoid any kind of tissue rejection by the recipient²³.

CONCLUSION

The use of VWG and BMG is safe for the substitution of dorsal onlay urethroplasty. It is an efficient and reliable treatment method of FUS. There are very low chances of complication and it has an easy protocol. Apparently, no specific change was observed in the FUS treatment by BMG and VWG.

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