

Does Tobacco Consumption Influence Outcome of Oral Mucosa Graft Urethroplasty?

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Introduction: In a prospective study, outcome of oral mucosa graft urethroplasty (OMGU) was assessed in patients suffering from stricture of the urethra.

Materials and Methods: Patients who underwent OMGU between July 2005 and December 2007 were included in this prospective study. Forty-eight patients with stricture of the urethra were divided into 2 groups of those who consumed tobacco and had poor oral hygiene and those who did not consume tobacco and had satisfactory oral hygiene. The oral cavity was inspected. The type of tobacco consumption and the duration of exposure to tobacco were noted. The mean follow-up was 18.2 months (range, 6 to 36 months). The patients were evaluated to assess the outcome of OMGU.

Results: The final outcome was analyzed in 42 patients. Thirty-one patients were asymptomatic and/or satisfied with their urinary flow rate, who were considered to have a successful outcome (73.8 %). Successful outcome in patients who consumed tobacco was significantly less (58.3%) compared to that in the tobacco nonusers (94.4%; $P = .008$).

Conclusion: Failure rate of OMGU was higher in patients who consumed tobacco and had a poor oral hygiene, which might be due to adverse effects of these substances on the oral mucosa, leading to a poor graft quality.

Keywords: urethral stricture, tobacco, smoking, lime-piper betel quid, treatment outcome, oral mucosa

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INTRODUCTION

Chewing and smoking tobacco and consumption of *paan* (betel leaves) or *paan masala* (dried mixture of betel leaves with areca nut and slaked lime, consumed with or without tobacco along with other condiments) are popular in India.^(1,2)

The consumption of tobacco (in any form) results in poor oral hygiene and has an adverse effect on the oral mucosa.⁽¹⁻⁴⁾ Thus, patients suffering from stricture of the urethra who consume tobacco in any form might have an unsatisfactory outcome following oral mucosa graft urethroplasty (OMGU) due to poor quality of

the oral graft.⁽¹⁻⁴⁾ We carried out a prospective study of patients suffering from stricture of the urethra to assess the impact of the quality of oral mucosa on the outcome of OMGU.

MATERIALS AND METHODS

Patients

Forty-eight patients with stricture of the urethra of more than 2 cm in length underwent OMGU between July 2005 and December 2007. They were included in this prospective study and their last follow-up was in June 2008. Patients with a short stricture

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(< 2 cm) were excluded from the study. Written informed consent was obtained from all the eligible patients. Ethical clearance for this study was obtained from the institutional ethics committee and was in accordance with the Declaration of Helsinki. General data of all the patients e.g. name, age, sex, address and phone number were recorded for the purpose of identification and correspondence. Routine laboratory and specific radiological evaluations were performed prior to surgery.

Oral hygiene was inspected and those with doubtful oral hygiene were referred to the dental department for further opinion. Graft from these patients was only harvested if the dental department cleared these patients for OMGU. Of the patients, 28 were consumers of tobacco, paan, or paan masala (group 1) and 20 were not users of these substances (group 2). Distribution of the patients according to the type of tobacco, paan, or paan masala consumption and the total duration of exposure are summarized in Table 1.

Procedure

Ventral onlay urethroplasty was done for all the bulbar or bulbopenile urethral strictures, while dorsal onlay and modified dorsal onlay urethroplasty were done for all the strictures in the penile urethra.⁽⁵⁻⁷⁾ In case of pananterior urethral strictures or 2 separate strictures, dorsal or modified dorsal onlay was done in the penile

portion, while ventral onlay was carried out for the bulbar portion.

The oral mucosa graft was harvested under general anesthesia (nasal or oral intubation) in 12 patients (7 in group 1 and 5 in group 2) and under local anesthesia in 36 patients (21 in group 1 and 15 in group 2) based on our technique.^(8,9) The tongue mucosa was supplemented along with the cheek mucosa in 3 patients of group 1 and 2 of group 2, and the lower lip mucosa was supplemented in 3 patients of group 1 and 1 of group 2, due to the long length of the stricture. Two surgical teams worked simultaneously with separate instruments.

The penile urethra was exposed by degloving the penis with a circumcoronal incision. For proximal penile and bulbar urethral dissection, a midline perineal incision was made. The scrotum was not bivalved; a tunnel was created between penile and perineal exposure, if needed. A 16-F perurethral catheter was placed prior to closure. We do not insert a drain or suprapubic catheter on routine basis.

In the postoperative phase, the patients were put on anti-erection drugs (eg, diazepam) with dosages modified according to body weight. The patients were discharged 1 week after the operation with catheters and visited after 2 to 3 weeks in the clinic, where pericatheter study was done. If no extravasation was visible, the perurethral catheter was removed and the patient was given voiding trial. If urine flow was satisfactory, the suprapubic catheter, if any, was removed later.

The patients were then visited every 3 months for the rest of the study period. In case they were unable to present, then they were contacted by phone or letters. Irrespective of the phone calls and letters, the majority of the patients came to the clinic for follow-up. A proforma which was prepared at the time of admission was used to document all the raw data. Follow-up data was collected by an interviewer. The interviewer understood the significance and meaning of the questions and asked the questions in Hindi language, which is the spoken language in the northern India.

Uroflowmetry with postvoid residual urine

Table 1. Type of Tobacco or Paan and Duration of Exposure in Patients Who Underwent Oral Mucosa Graft Urethroplasty

Type of Substance	Number of patients	Exposure to Tobacco or Paan		
		< 5 Years	5 to 10 Years	> 10 Years
Paan masala	3	1	1	1
Tobacco chewing	3	1	1	1
Tobacco smoking	3	1	1	1
Paan masala with tobacco chewing	6	3	2	1
Paan masala with tobacco smoking	4	2	1	1
Tobacco chewing and smoking	3	1	1	1
Paan masala with tobacco chewing and smoking	6	4	1	1

measurement was done and repeated at regular intervals during the follow-up period. If the patient complained of poor flow or if his flow was less than 14 mL/sec, additional investigations including retrograde urethrography and/or cystoscopy were done.

The definition of failure of urethroplasty is not consistent in the literature; for this study, failure was defined as the need to carry out any intervention or invasive procedure in the urethra following the complaint of decreased urinary flow by the patient.

Statistical Analyses

The data were analyzed using the SPSS software (Statistical Package for the Social Sciences, version 15.0, SPSS Inc, Chicago, Illinois, USA). The mean \pm standard deviations were calculated for continuous variables (age and different stricture lengths variables), and proportions (percentages) were calculated for dichotomous variables. The chi-square test was used to compare dichotomous and categorical variables, and the paired *t* test was used to detect significance from baseline value to follow-up time in case of continuous variables. A *P* value less than .05 was considered significant.

RESULTS

All of the 48 patients were followed up 1 month postoperatively. Thereafter, 6 patients with pananterior urethral strictures were lost to follow-up or died of nonsurgical causes (4 in group 1 and 2 in group 2). Therefore, the final outcome was analyzed in 42 patients.

The mean age of the patients was 40.2 ± 14.7 years (range, 22 to 72 years) in group 1 and 32.0 ± 18.2 years (range, 12 to 68 years) in group 2. The mean age of all the patients (*n* = 48) was 36.6 ± 16.9 years (range, 12 to 72 years). The mean follow-up of the patients was 18.2 months (range, 6 to 36 months). The mean duration of disease in all the patients (*n* = 48) was 5.8 ± 4.9 years (range, 4 months to 15 years) and was comparable between the two groups. Etiology was unknown in the majority of the patients (56.3%), while it was trauma in 22.9%, inflammatory disease in 10.4%, prior urethral catheterization in 6.3%, and Lichen

sclerosis in 4.2%, distributed comparably between the two groups.

Six patients in group 1 and 5 in group 2 had comorbidities, including diabetes mellitus, hypertension, hepatitis B-positive status, and ischemic heart disease at the time of admission. These comorbidities did not have any impact on the final outcome of this study. Twenty patients in group 1 and 14 in group 2 had undergone one or multiple prior procedures like dilation of the urethra and optical internal urethrotomy and 7 of whom (4 in group 1 and 3 in group 2) were admitted with a suprapubic catheter in place.

The mean stricture length in the patients was 9.88 ± 5.21 cm (range, 2.0 to 17.8 cm). The graft length was 10.42 ± 5.12 cm (range, 2.5 to 18.0 cm) and the graft width was 2.62 ± 0.18 cm (range, 2.3 to 3.1 cm). These measurements were similar between the patients in groups 1 and 2. The operative time was comparable between the two groups and had no significant impact on the success rate. Intra-operative complications occurred in 3 patients of group 1 (increased bleeding from the recipient site, hypotension for a short duration, and tooth dislodgement, each in 1 patient) and had no impact on postoperative recovery or the success rate.

Thirty-one patients were asymptomatic and/or satisfied with their urinary flow rate, which were considered to have a successful outcome (73.8%). The overall success rate was 58.3% in the patients of group 1 and 94.4% in those of group 2 (*P* = .008). The final outcomes based on the site of stricture and the technique of urethroplasty are outlined in Tables 2 and 3, respectively.

Uroflowmetry at the beginning of the study could be done in 36 patients only (22 in group 1 and 14 in group 2) who were not catheterized at the time of admission and could void with a reasonable flow (patients on catheter or those with poor flow were excluded). Uroflowmetry at the end of the study was done in the 31 patients (14 in group 1 and 17 in group 2) who had a successful outcome (Table 4).

Postoperative complications were observed in 12 patients (10 in group 1 and 2 in group 2). Two patients in group 2 had extravasation at the time of postoperative pericatheter study, which

Table 2. Final Outcome of Oral Mucosa Graft Urethroplasty Based on the Site of Stricture in Users and Nonusers of Tobacco, Paan, and Paan Masala*

Stricture Site	Tobacco Users		Tobacco Nonusers		Overall Successful Outcome
	Number of Patients	Successful Outcome	Number of Patients	Successful Outcome	
Penile	3	1 (33.3)	2	2 (100)	3 (60.0)
Bulbar	7	5 (71.4)	5	5 (100)	10 (83.3)
Bulbopenile†	10	7 (70.0%)	8	8 (100)	15 (83.3)
Panterior	3	0	2	1 (50.0)	1 (20.0)
Two separate strictures	1	1 (100)	1	1 (100)	2 (100)
All	24	14 (58.3)	18	17 (94.4)	31 (73.8)

*Values in parentheses are percents.

†Strictures mainly involved the bulbar urethra, but extended slightly into the adjacent proximal penile urethra, too.

Table 3. Final Outcome of Oral Mucosa Graft Urethroplasty Based on the Technique of Urethroplasty in Users and Nonusers of Tobacco, Paan, and Paan Masala

Technique	Tobacco Users		Tobacco Nonusers		Overall Successful Outcome
	Number of Patients	Successful Outcome	Number of Patients	Successful Outcome	
Ventral onlay	17	12 (70.6)	13	13 (100)	25 (83.3)
Dorsal onlay	7	2 (28.6)	5	4 (80.0)	6 (50.0)
All	24	14 (58.3)	18	17 (94.4)	31 (73.8)

Table 4. Pre-operative and Postoperative Uroflowmetry Outcomes

Uroflowmetry	Tobacco Users	Tobacco Nonusers
Preoperative	5.14 ± 2.58	6.28 ± 3.86
Postoperative	14.44 ± 3.86	21.63 ± 6.06
Mean Improvement*	14.49 ± 6.42	15.32 ± 3.28

* $P < .001$ (paired t test)

healed when the perurethral catheter was kept for 2 weeks more. In group 1, stenosis of the urethra and fistula was observed each in 3 patients and decreased urinary flow was observed in 4 patients (2 had objective complaints while 2 were diagnosed following uroflowmetry). All of the patients in group 1 were declared failures as they had to undergo further intervention. In 1 patient, the stenosis was at the site of distal anastomosis; in 1, it was at the site of the proximal anastomosis and 1 patient had narrowing of the entire urethral segment. Two patients required optical internal urethrotomy and 1 patient was subjected to co-axial dilation, and then all the 3 were put on clean intermittent self-catheterization. Patients with fistula were kept on prolonged perurethral catheter, and then, repeat OMGU at the fistula site was attempted. Only 2 of the 4 patients with poor flow opted for further treatment, and they underwent co-axial dilation followed by clean intermittent self-catheterization.

DISCUSSION

Oral mucosa urethroplasty is a well-established procedure for long strictures of the urethra, where excision and anastomotic urethroplasty is not feasible.⁽¹⁰⁻¹²⁾ To date, no study has focused on the impact of tobacco or oral hygiene on the final outcome of OMGU. Our center is one of the largest tertiary-level referral government centers in northern India where all the urethroplasties are performed by qualified urologists with extensive training and experience in reconstructive urology. Majority of the expense is borne by the hospital (government) and the patient has to spend a small amount of money. This study focused primarily on the outcome at recipient site. Hence, we did not go into the details of the oral hygiene or dental history apart from judging whether the patient is an appropriate candidate for oral graft harvest or not. We asked the patient to open his mouth and assessed the oral cavity. If we thought it was unhealthy (inadequate opening probably due to sub-mucous fibrosis, whitish plaque probably due to leukoplakia, etc) or if the patient gave a history of tobacco consumption for a long period, then the patient was referred to the dentistry department and the oral graft was only taken if he was treated by the dentist.

In our study, tobacco users with poor oral

hygiene had worst outcomes even though the patients were evenly distributed between the two groups. They had poorer outcomes even when compared in terms of site of stricture and technique of urethroplasty. This finding did not reach statistical significance due to the small number of patients and is one of the limitations of this study. Also, no significant relationship was observed between the etiology of stricture and the success rate. A large number of patients (56.3%) were unaware of the cause of stricture. Many of the patients had undergone multiple minimally invasive methods in the peripheral hospitals before coming to our hospital. In our study, patients with pananterior urethral strictures had a poor outcome, which is supported by the studies of Morey and coworkers,^(10,12) who have stated that long strictures were associated with poorer outcomes.

Several authors have reported higher success rates with ventral onlay⁽¹³⁻¹⁵⁾; however, Morey and McAninch⁽¹⁶⁾ and Andrich and Mundy⁽¹⁷⁾ have reported a higher success rate with dorsal onlay technique, while Pansadoro and coworkers⁽¹⁸⁾ and Markiewicz and colleagues⁽¹⁹⁾ have stated that both dorsal and ventral onlay have similar outcomes. In our study, we used both of the techniques, dorsal onlay for stricture in the penile urethra and ventral onlay for bulbar strictures. The outcome according to the site of stricture or technique of urethroplasty could not be compared due to uneven distribution of the patients. Dubey and colleagues⁽²⁰⁾ concluded in a randomized trial that technique is not influenced by the site of stricture.

Postoperative uroflowmetry confirmed that the difference in improvement was statistically significant ($P = .001$), which is consistent with the findings of Kane and associates⁽¹³⁾ who noted that the peak urinary flow rates improved postoperatively. In our study, the patients who underwent uroflowmetry in the pre-operative phase and those in the postoperative period were exactly not the same, and this is another limitation of this study.

In this study, a statistically significant correlation was observed between the length of the stricture and success rate. On statistical analysis, patients

who had a stricture length of more than 8 cm had a poor outcome when compared to those with strictures shorter than 8 cm irrespective of their tobacco consumption status and oral hygiene.

The overall outcomes of our OMGUs were inferior to that mentioned in the literature. This may be due to the fact that patients in our study had long strictures for a longer duration and had poor oral hygiene. The outcome in the tobacco user group with poor oral hygiene was dismal (58.3%), but the outcome in the nonuser group with good oral hygiene was comparable to that in the world literature (94.4%).⁽²¹⁾ Even though the duration of study was only 3 years and it is a limitation of this study, it did bring out the difference in outcome between the tobacco users and nonusers. Tobacco use is known to have systemic effect on the microvasculature and that in turn may hamper the graft take at the recipient site. This may be a confounding factor in this study since it might be difficult to distinguish between failures due to microvasculature or graft quality. Even if this is taken as a limitation, it may still help us forewarn tobacco users regarding poorer outcome following OMGU.

We have presumed that all tobacco users had a poor oral hygiene and all nonusers had a good oral hygiene. There may be that rare patient who consumes tobacco and still has a good oral hygiene and there may be a nonuser with bad oral hygiene; such substratification was not possible in this study due to limited number of patients. We tried to overcome this bias by referring our patients to the dentistry department. It is already known that long-term use of tobacco denudes the epithelium of the oral mucosa and makes it prone to colonization by the pathogenic bacteria. This has an adverse impact on the oral hygiene. Nonetheless, we accept this as a limitation of this study.

The strength of this study is that it was a prospective study in a homogenous group of patients who were followed regularly for almost 3 years. This is probably the first study to focus on the impact of the quality of graft (related to tobacco consumption or oral hygiene) on the final outcome of OMGU and adds a new dimension to the existing literature on OMGU.

CONCLUSION

Oral mucosa graft urethroplasty remains a good option for patients with stricture of the urethra, but careful thought must go into selecting the appropriate patient based on the oral hygiene and the site and length of the stricture. If the quality of oral mucosa is unsatisfactory due to poor oral hygiene or tobacco consumption, then the patient should be forewarned regarding poorer outcome. In the near future, histopathological evaluation of the oral graft could be a new line of investigation which may provide information at the cellular and molecular level and may help us in predicting the success of OMGU. Further study with larger number of patients and longer follow-up is needed to validate the findings of this study.

CONFLICT OF INTEREST

None declared.

REFERENCES

- Balaram P, Sridhar H, Rajkumar T, et al. Oral cancer in southern India: the influence of smoking, drinking, paan-chewing and oral hygiene. *Int J Cancer*. 2002;98:440-5.
- Mathew AL, Pai KM, Sholapurkar AA, Vengal M. The prevalence of oral mucosal lesions in patients visiting a dental school in Southern India. *Indian J Dent Res*. 2008;19:99-103.
- Tan D, Goerlitz DS, Dumitrescu RG, et al. Associations between cigarette smoking and mitochondrial DNA abnormalities in buccal cells. *Carcinogenesis*. 2008;29:1170-7.
- Proia NK, Paszkiewicz GM, Nasca MA, Franke GE, Pauly JL. Smoking and smokeless tobacco-associated human buccal cell mutations and their association with oral cancer—a review. *Cancer Epidemiol Biomarkers Prev*. 2006;15:1061-77.
- Wessells H. Ventral onlay graft techniques for urethroplasty. *Urol Clin North Am*. 2002;29:381-7, vii.
- Asopa HS, Garg M, Singhal GG, Singh L, Asopa J, Nischal A. Dorsal free graft urethroplasty for urethral stricture by ventral sagittal urethrotomy approach. *Urology*. 2001;58:657-9.
- Barbagli G, Palminteri E, Lazzeri M. Dorsal onlay techniques for urethroplasty. *Urol Clin North Am*. 2002;29:389-95, vii.
- Goel A, Dalela D, Sinha RJ, Sankhwar SN. Harvesting buccal mucosa graft under local infiltration analgesia—mitigating need for general anesthesia. *Urology*. 2008;72:675-6.
- Sinha RJ, Singh V, Sankhwar SN, Dalela D. Donor site morbidity in oral mucosa graft urethroplasty: implications of tobacco consumption. *BMC Urol*. 2009;9:15.
- Morey A. Urethral stricture is now an open surgical disease. *J Urol*. 2009;181:953-4.
- Fichtner J, Filipas D, Fisch M, Hohenfellner R, Thuroff JW. Long-term outcome of ventral buccal mucosa onlay graft urethroplasty for urethral stricture repair. *Urology*. 2004;64:648-50.
- Morey AF, Duckett CP, McAninch JW. Failed anterior urethroplasty: guidelines for reconstruction. *J Urol*. 1997;158:1383-7.
- Kane CJ, Tarman GJ, Summerton DJ, et al. Multi-institutional experience with buccal mucosa onlay urethroplasty for bulbar urethral reconstruction. *J Urol*. 2002;167:1314-7.
- Heinke T, Gerharz EW, Bonfig R, Riedmiller H. Ventral onlay urethroplasty using buccal mucosa for complex stricture repair. *Urology*. 2003;61:1004-7.
- Elliott SP, Metro MJ, McAninch JW. Long-term followup of the ventrally placed buccal mucosa onlay graft in bulbar urethral reconstruction. *J Urol*. 2003;169:1754-7.
- Morey AF, McAninch JW. Technique of harvesting buccal mucosa for urethral reconstruction. *J Urol*. 1996;155:1696-7.
- Andrich DE, Mundy AR. Substitution urethroplasty with buccal mucosal-free grafts. *J Urol*. 2001;165:1131-3.
- Pansadoro V, Emiliozzi P, Gaffi M, Scarpone P. Buccal mucosa urethroplasty for the treatment of bulbar urethral strictures. *J Urol*. 1999;161:1501-3.
- Markiewicz MR, Lukose MA, Margarone JE, 3rd, Barbagli G, Miller KS, Chuang SK. The oral mucosa graft: a systematic review. *J Urol*. 2007;178:387-94.
- Dubey D, Vijjan V, Kapoor R, et al. Dorsal onlay buccal mucosa versus penile skin flap urethroplasty for anterior urethral strictures: results from a randomized prospective trial. *J Urol*. 2007;178:2466-9.
- Barbagli G, Guazzoni G, Lazzeri M. One-stage bulbar urethroplasty: retrospective analysis of the results in 375 patients. *Eur Urol*. 2008;53:828-33.