

Is Lingual Graft better than Buccal Mucosal Graft in Substitution Urethroplasty for Anterior Urethral Stricture ?

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Conflict of interest: Nil

Abstract

Background Incidence of urethral stricture is on the rise due to rise in high velocity trauma rendering it a major problem to urologists. Stricture affects the quality of life of patients. Principle operative procedures for stricture urethra surgery are regeneration procedures, anastomotic and substitution urethroplasty. Oral mucosa is the best donor tissue for substitution urethroplasty (buccal graft from inner cheek and lingual graft from lateral and undersurface of tongue).

Objective To compare outcomes of lingual versus buccal mucosal graft urethroplasty and to compare the morbidity of donor site.

Methods Retrospective and Prospective study (6 years). Total 30 patients were included in the study (Group A- 15 patients of lingual graft prospectively and group B- 15 patients of buccal mucosal graft retrospectively). Outcome was compared in terms of patency (urethrogram), stream, uroflometry, restriecture rate and donor site morbidity.

Results Urethrogram done after 1, 3 and 6 months showed that group A patients were better in terms of lumen patency compared to group B. Uroflometry revealed that postoperative mean peak flow rate was 0.8 ml/sec better in group A than group B patients. One patient in group B had restriecture while none in group A (on 6 months follow up). There was significant donor site morbidity in group B. However, slurring of speech was seen only in one patient of group A.

Conclusion Our study showed that lingual graft is better than buccal graft for substitution urethroplasty (both for the donor and recipient site).

Keywords: Buccal mucosal graft urethroplasty, lingual mucosal graft urethroplasty, urethral stricture disease

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Introduction

A urethral stricture is caused by any process that injures urethral epithelium or corpus spongiosum to an extent that a scar is

formed. 45% of urethral strictures are iatrogenic, 30% idiopathic, and 20% due to bacterial urethritis. Increase in incidence of

high velocity trauma has lead to increase in cases of urethral stricture rendering it as a major problem to surgeons all over the world. Stricture leads to a considerable morbidity to the patients and affecting the quality of life.[1-4]

There are two main principles of urethroplasty: Anastomotic technique and Tissue transfer. Currently, oral mucosa is unsurpassed as donor substitute material in anterior urethroplasty. This includes the buccal graft taken from the inner cheek and lingual graft taken from the lateral and undersurface of the tongue. Length of urethral stricture (greater than 4 cm), prior urethroplasty and failed endoscopic therapy are predictive of failure after urethroplasty. Smoking and diabetes mellitus also may predict failure potentially secondary to microvascular damage.[5,6]

Three principle operative procedures for stricture urethra repair available are regeneration procedures, excision and anastomosis, and substitution urethroplasty. Some patients may require a combination of these procedures and some multiple sittings.[1-6]

Materials and Methods

Study was conducted in Department of General Surgery, Hamidia hospital, Bhopal,

includes both a prospective arm which included patients admitted from March 2012 to December 2014 as well as retrospective analysis of all the patients treated since December 2008. A total of 30 patients were included in the study. In the prospective arm 15 patients of lingual graft were included and in the retrospective arm 15 patients of buccal mucosal graft were included.

Criteria for assessment of post operative results

Good results

Post-op Urethrogram - uniformly good caliber
Good stream

Post op peak flow - 20 to 25 ml/sec

Fair results

Some narrowing and irregularity

Weak stream but happy

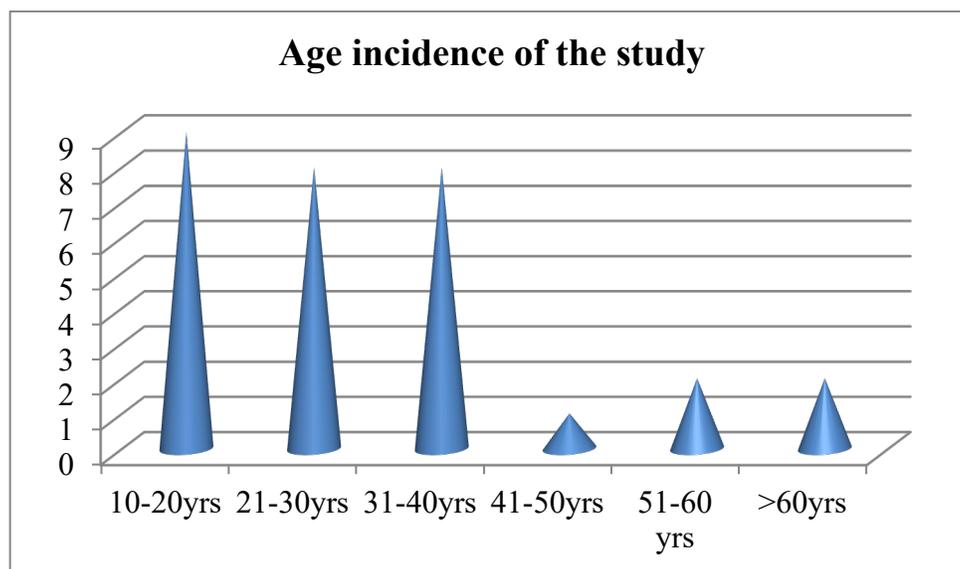
15 and 20 ml/sec.

Poor results

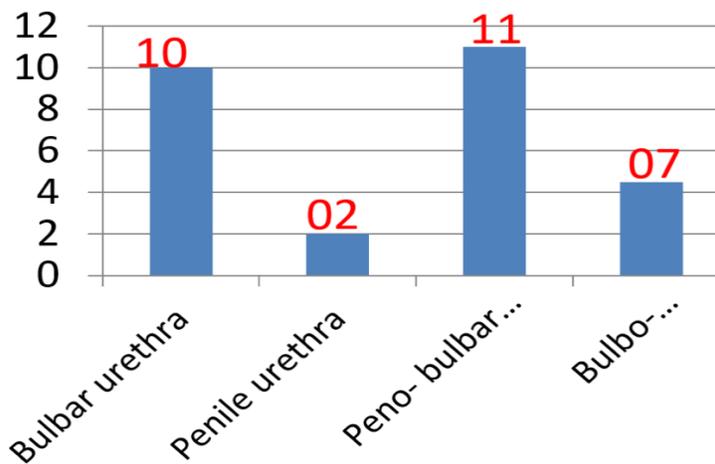
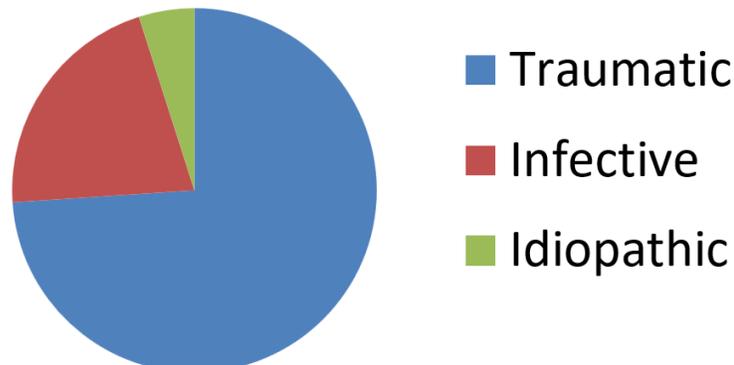
Very narrow lumen

weak stream with straining or not passing urine per urethra below 15 ml/sec

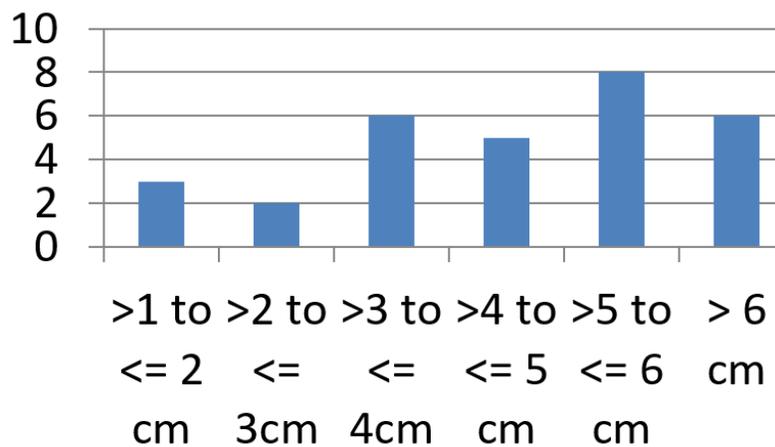
Observation Chart



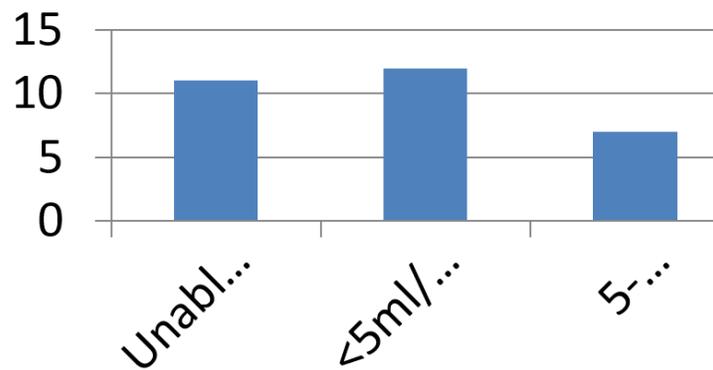
Etiology of stricture in the study



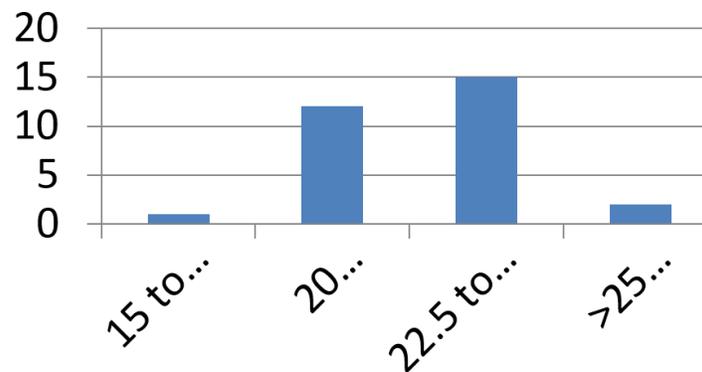
Length of Stricture



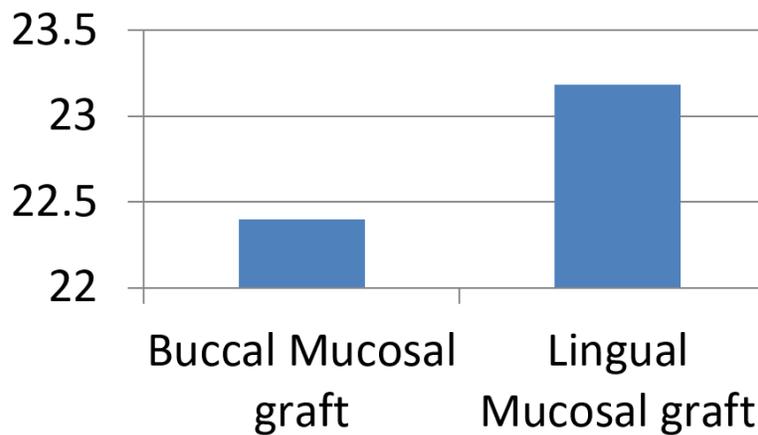
Pre operative peak flow rates

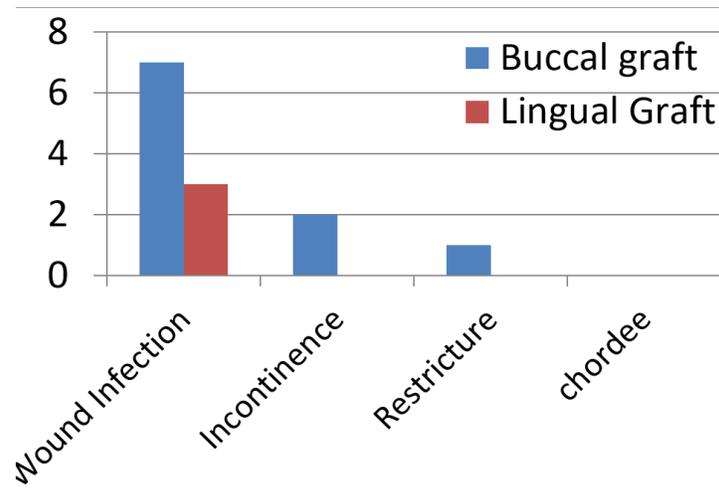


Post operative Peak flow rates



Average Post operative Peak flow rates (ml/ sec)





Results

The most common age group affected in stricture disease is 15 to 30 years. Almost universally male patients are affected by stricture urethra. The most common etiology of stricture urethra is trauma. The most common segment involved in stricture urethra in our study is peno-bulbar urethra. Long segment strictures are usually very well managed by substitution urethroplasty. The peak flow rates with lingual mucosal urethroplasty are better than buccal mucosal urethroplasty. The rate of recipient site complication is much less in lingual mucosal urethroplasty than in buccal mucosal urethroplasty. The incidence of donor site morbidity is much less in lingual than in buccal mucosal urethroplasty.

Statistical Analysis:

The collected data was summarized by using frequency, percentage, mean & S.D. To compare the qualitative outcome measures Chi-square test or Fisher's exact test was used. To compare the quantitative outcome measures Independent t test was used. If data was not following normal distribution, Mann Whitney U test was used. SPSS version 22 software was used to analyse the collected data. p value of <0.05 was considered to be statistically significant.

Discussion

Simonato A, Gregori A et al evaluated the use of lingual mucosal graft (LMG) in anterior urethral strictures. Criteria for

successful reconstruction were spontaneous voiding with no postvoid residual urine and no postoperative instrumentation of any kind. Clinical assessment included the donor site morbidity. The overall early recurrence rate was 20.7%. Patients with the graft harvested from the tongue reported only slight oral discomfort at the donor site and difficulty in talking for 1 or 2 days. So it was concluded that the mucosa of the tongue, which is identical to the mucosa of the rest of the oral cavity, is a safe and effective graft material in the armamentarium for urethral reconstruction with potential minor risks of donor site complications. LMG may be used alone for short strictures (<5 cm) or in combination with buccal mucosa when longer grafts are needed.[7]

Barbagli G et al in a similar study investigated the tolerability, safety, and efficacy of using the lingual mucosal graft (LMG) for anterior urethroplasty. Ten patients (average age, 41 yr) underwent substitution urethroplasty LMG. Nine cases (90%) were successful and one (10%) was a failure. No patient developed early or late postoperative complications on the harvest site related to the tongue surgery. They concluded that the surgical technique for harvesting a graft from the tongue is simple and safe. The tongue may be the best alternative donor site to the lip when a thin graft is required for urethroplasty

or when the cheek harvesting is not possible.[8]

In a very similar study like ours, Kumar A et al compared the results of substitution urethroplasty and donor site morbidity between buccal mucosal graft (BMG) and lingual mucosal graft (LMG). Patients who underwent buccal (cheek, lip) mucosal graft urethroplasty were included in group I and those who underwent LMG urethroplasty (tongue) were included in group II. All patients underwent complete evaluation of the stricture including inspection of the oral cavity. The results of urethroplasty were similar in both groups in terms of blood loss, duration of postoperative hospitalization, complications encountered at urethroplasty site, mean postoperative Q_{max} and mean postoperative AUA symptom score. Early slurring of speech complications was seen in group II, but not in group I. The long-term complications of persistent oral discomfort, perioral numbness and tightness of the mouth were seen only in group I. So it was concluded that LMG urethroplasty is a good substitute for BMG urethroplasty with equally good results of urethroplasty with lower donor site morbidity.[9]

A prospective comparative analysis was done by Sharma AK et al. They compared lingual and buccal mucosa graft urethroplasty for anterior urethral stricture with respect to intraoperative, postoperative parameters and urethroplasty outcome. Patients were evaluated for postoperative, tongue protrusion, oral opening, and difficulty in speech and swallowing pain score. Surgical outcome was evaluated with pre- and postoperative work-up involving retrograde urethrogram, uroflow and urethroscopy. Mean age, stricture length and overall pain score were comparable in two groups. All the patients were mostly pain free by postoperative day 7. Group 1 patients had significant difficulty in speech and delayed return to normal diet as compared with group 2. The group 2 patients had a significant reduction in oral opening for the first week

after surgery. At mean follow up of 14.5 months, urethroplasty outcome was comparable in the two groups with one failure in group 1, and two failures in group 2. Lingual mucosa graft urethroplasty provides outcomes equivalent to those of buccal mucosa graft urethroplasty. Postoperative morbidity and long-term change in speech make it a second choice for strictures >7 cm, only for cases where buccal mucosa graft is unavailable.[10] A prospective study to compare the outcomes of lingual versus buccal mucosal graft urethroplasty in patients with long segment anterior urethral strictures disease was done by Pal DK et al. Long-term complications of salivary disturbance, tightness of the mouth, persistent pain at graft site, perioral numbness, seen only in group I (BMGU). LMG urethroplasty is an excellent alternative to BMG urethroplasty with comparable results of urethroplasty and minimal donor site complications. Fu Q, Zhang Y et al did comparison between lingual mucosa graft and pedicled skin flap. The aim of this study was to compare the effectiveness and outcomes of lingual mucosa graft (LMG) urethroplasty versus pedicled skin flap (PSF) urethroplasty in the repair of anterior urethral strictures. Overall, PSF and LMG had similar success rates (83.4% vs 85.1%, $p=0.713$). In distal penile urethra, penile skin flaps and LMG achieved similar success rates (87.7% vs 82.1%, $p=0.297$), but in proximal penile urethra, scrotal flaps had relatively low success rates (69.0% vs LMG 83.3%, $p=0.345$) and in bulbar urethra, perineal skin flaps had significantly lower success rates than LMG (66.7% vs 92.3%, $p=0.036$). Lingual mucosa is a good material for the repair of urethral defects and achieves results similar to or even better than those of PSF. Scrotal skin and perineal skin had lower success rates.[11,12] Kumar A et al studied oral complications at donor site after lingual mucosal graft harvesting for urethroplasty. Donor site complications, that is, pain, slurring of speech, pain during speech, salivatory changes and

difficulty in protrusion of tongue were noted. There was no bleeding, haematoma or infection at donor site. All patients were able to resume oral fluid within 24 h, eat soft solid diet in 48–72 h and return to normal diet after 4–5 days of surgery. No patient complained of difficulty in opening the mouth, salivation disturbances, perioral numbness or difficulty in protrusion of tongue. No long-term functional or aesthetic complications were reported. The authors concluded that lingual mucosal graft harvesting is feasible, provides a long graft, is easy to carry out and is the least morbid procedure.[13]

Srivastava A et al shared their initial experience with lingual mucosal graft urethroplasty for anterior urethral strictures. Success was defined as normal uroflowmetry rates at 3 months in the absence of any postoperative instrumentation. Tongue was assessed for any residual pain, taste disturbances or restricted movement at 3 months. Two patients developed stricture at the proximal anastomotic site. There were no donor site complications. Lingual mucosal graft harvesting is simple, gives graft lengths comparable to buccal mucosa and is associated with negligible donor site morbidity. Abrate A et al did a systematic review and meta-analysis on long term follow up of lingual mucosal graft urethroplasty. Their objective was to evaluate the functional results and complications of the lingual mucosal graft (LMG) urethroplasty and to sum up the current state of the art of this surgical technique. [14,15]

Our study showed that lingual graft is better than buccal graft for substitution urethroplasty (both for the donor and recipient site. Very good functional results have been reported by different authors for LMG urethroplasty, with lower rate of oral complications than BMG. LMG urethroplasty can be reasonably considered a first choice technique for urethral stricture with very good results. Oral complications are temporary and minimally

disabling, basically less than those for BMG, and depend mainly on the graft extent.

Conclusion

All patients were able to resume oral fluid within 24 h, eat soft solid diet in 48–72 h and return to normal diet after 4–5 days of surgery. No patient complained of difficulty in opening the mouth, salivation disturbances, perioral numbness or difficulty in protrusion of tongue. No long-term functional or aesthetic complications were reported. Our study showed that lingual graft is better than buccal graft for substitution urethroplasty (both for the donor and recipient site)

Declarations:

Funding: None **Conflicts of interest/Competing interests:** None **Availability of data and material:** Department of General Surgery, Hamidia hospital, Bhopal **Code availability:** Not applicable **Consent to participate:** Consent taken **Ethical Consideration:** There are no ethical conflicts related to this study. **Consent for publication:** Consent taken

References

1. Doiron RC, Rourke KF. An overview of urethral injury. Canadian Urological Association Journal. 2019 Jun;13(6 Suppl4):S61.
2. Barratt RC, Bernard J, Mundy AR, Greenwell TJ. Pelvic fracture urethral injury in males—mechanisms of injury, management options and outcomes. Translational andrology and urology. 2018 Mar;7(Suppl 1):S29.
3. Andrich DE, Mundy AR. What is the best technique for urethroplasty?. European urology. 2008 Nov 1;54(5):1031-41.
4. Mundy AR. Results and complications of urethroplasty and its future. British journal of urology. 1993 Mar;71(3):322-5.
5. Barbagli G, Selli C, Tosto A, Palminteri E. Dorsal free graft urethroplasty. The Journal of urology. 1996 Jan;155(1):123-6.
6. Breyer BN, McAninch JW, Whitson JM, Eisenberg ML, Mehdizadeh JF, Myers JB, Voelzke BB. Multivariate analysis of risk

- factors for long-term urethroplasty outcome. *The Journal of urology*. 2010 Feb;183(2):613-7.
7. Simonato A, Gregori A, Ambruosi C, Venzano F, Varca V, Romagnoli A, Carmignani G. Lingual mucosal graft urethroplasty for anterior urethral reconstruction. *European urology*. 2008 Jul 1;54(1):79-87.
 8. Barbagli G, De Angelis M, Romano G, Ciabatti PG, Lazzeri M. The use of lingual mucosal graft in adult anterior urethroplasty: surgical steps and short-term outcome. *European urology*. 2008 Sep 1;54(3):671-6.
 9. Kumar A, Das SK, Trivedi S, Dwivedi US, Singh PB. Substitution urethroplasty for anterior urethral strictures: buccal versus lingual mucosal graft. *Urologia Internationalis*. 2010;84(1):78-83.
 10. Sharma AK, Chandrashekar R, Keshavamurthy R, Nelvigi GG, Kamath AJ, Sharma S, Venkatesh GK. Lingual versus buccal mucosa graft urethroplasty for anterior urethral stricture: a prospective comparative analysis. *International Journal of Urology*. 2013 Dec;20(12):1199-203.
 11. Pal DK, Gupta DK, Ghosh B, Bera MK. A comparative study of lingual mucosal graft urethroplasty with buccal mucosal graft urethroplasty in urethral stricture disease: an institutional experience. *Urology Annals*. 2016 Apr;8(2):157.
 12. Fu Q, Zhang Y, Zhang J, Xie H, Sa YL, Jin S. Substitution urethroplasty for anterior urethral stricture repair: comparison between lingual mucosa graft and pedicled skin flap. *Scandinavian Journal of Urology*. 2017 Nov 2;51(6):479-83.
 13. Kumar A, Goyal NK, Das SK, Trivedi S, Dwivedi US, Singh PB. Oral complications after lingual mucosal graft harvest for urethroplasty. *ANZ Journal of Surgery*. 2007 Nov;77(11):970-3.
 14. Srivastava A, Dutta A, Jain DK. Initial experience with lingual mucosal graft urethroplasty for anterior urethral strictures. *Medical Journal Armed Forces India*. 2013 Jan 1;69(1):16-20.
 15. Abrate A, Gregori A, Simonato A. Lingual mucosal graft urethroplasty 12 years later: Systematic review and meta-analysis. *Asian Journal of Urology*. 2019 Jul 1;6(3):230-41.