Original Research Article

Dorsal onlay buccal mucosal graft urethroplasty in inflammatory stricture of urethra - Our experience

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Abstract

Urethral stricture is a common disease with changing etiology and changing practices in management. Management options were grossly determined by cause, site, length of stricture and also by other factors like prior attempts of repair and local genital skin condition. Treatment options vary from dilatation, optical urethrotomy to various types of urethroplasty. Substitution urtethroplasty is done using various types of graft materials like skin, buccal mucosa, bladder mucosa or colonic mucosa. Over the past 10-15 years buccal mucosa grafts have been increasingly used in the urethral reconstruction. Barbagli technique (Dorsal onlay technique) has the advantages of no sacculation which is seen with ventral onlay grafts, good neovascularity and less shrinkage (10%) rate. We have presented the results and complications of doral onlay buccal mucosa graft urethroplasty (Barbagli technique) in 20 cases performed over a period of 30 months in our institution. Our study showed a success rate of 80% at the end of 2yrs follow up, comparable with other studies, with a restructure rate of 20%. None of our patients developed urethrocutaneous fistula and urethral diverticulum.

Key words

Urethroplasty, Stricture of urethra, Dorsal onlay buccal mucosal graft.

Introduction

Urethral stricture disease is a common condition with changing etiology and changing practices in management [1]. The annual rate of urethral stricture disease increases with age. Management options were grossly determined by cause, site,

length of stricture and also by other factors like prior attempts of repair and local genital skin condition [2]. Etiology includes traumatic, iatrogenic, post inflammatory due to repeated/ neglected urinary tract infections, sexually transmitted infections, Balanitis xerotica obliterans, and idiopathic etc. Treatment options vary from blind dilatation to perineal urethrotomy, with a wide range of treatments in between like visual internal urethrotomy, urethroplasty using genital skin or extra genital skin grafts or flaps, either as patches or tubes. Graft materials can be skin, buccal mucosa, bladder mucosa or colonic mucosa. .Direct Visual internal urethrotomy is the line of management of most inflammatory strictures, but recurrence rate is as high as 40-60%. Self dilatations may prolong the time to recurrence but cannot completely prevent recurrence [3]. Skin grafts and flaps were used since a long time with satisfactory initial results but term results were poor. Ventral application of grafts and flaps have been shown to procedure complications like sacculations with its associated problems like sequestration of urine and semen causing post void dribbling and difficulty in ejaculation. To overcome these problems, in 1996 Barbagli has proposed the dorsal application of grafts, which offers a more secure bed with improved chances of improved chances of neovascularisation and decreased chance of sacculation problems [4].

Over the post 10-15 years buccal mucosal grafts have been increasingly used in urethral reconstruction because of its advantages in harvesting graft characteristics and minimal morbidity of donor site. Humby in 1940 (Br. Jr. Surg. 29-84, 1941) credited with being the first person to use buccal grafts for urethroplasty [5]. Though buccal grafts were used initially as ventral grafts, nowadays they are used dorsally by Barbagli technique. Buccal mucosa has the advantage of being thin with thicker epithelium and thinner sub mucosa which has rich vascular plexus (Pan Laminar). It is easily available, non hair bearing, easy to harvest and easily to handle during application at recipient site. It is resistant in infections and skin diseases like balantitis xerotica obliterans. Buccal mucosa easily adjusts to the environment in the urethra. Barbagli technique (dorsal onlay) advantages are no sacculation seen unlike in ventral onlay grafts (Asopa Hari 2001), good support for the graft, good neovasularity and less shrinkage (10%). Corpus spongiosum is thin dorsally at bulbar urethra and no interference is seen in vascularity with this technique [6].

We have studied the results and complications of buccal mucosal graft augmentation urerthroplasty using Barbagli technique in 20 cases over a period of 30 months.

The advantages of dorsal onlay buccal mucosal graft urethroplasty are:

- Simple and quick to perform
- Does not increase the risk of punch formation and post micturition dribble.
- Does not increase the risk of fistula or patch necrosis.
- Reduces the chance of graft shrinkage and sacculation.
- Decreases the risk of spongiosal bleeding [7].
- Versatile procedure, which may be combined with a pedicled flap or an augmented roof anastomotic repair.
- Attractive in reoperative cases in which a ventral onlay had been previously used.
- Does not require extensive training in reconstructive procedures using tissue transfer techniques.

Objectives

To evaluate the results and complications of free Buccal Mucosal Graft Urethroplasty by using Barbagli technique in inflammatory strictures of urethra

Materials and methods

A total number of 20 patients were studied prospectively from August 2013 to February 2016 at Osmania General Hospital, Hyderabad with a mean follow up period of 18 months.

Out of 20 patients, 8 had prior internal urethrotomies (1-2 times)

Inclusion criteria

- Long segment inflammatory strictures i.e. >3 cm in bulbar urethra and >1cm in penile urethra.
- Recurrent anterior urethral strictures following failed visual internal urethrotomy
- Diffuse penile and bulbar strictures in Balanitis xerotica obliterans (Lichen sclerosus)
- Urethral strictures requiring repeated VDs or VIUs.

Exclusion criteria

- Strictures due to pelvic fracture and urethral distraction defects(Traumatic)
- Patients with poor and bad oral cavity (oral submucosal fibrosis).
- Iatrogenic strictures occurring as a result of TURP/Radical prostatectomy.
- Post radiation strictures.
- Post inflammatory obliterative strictures of urethra(compete block)

Most patients presented with a history of weak stream, straining to pass urine, post void dribbling and burning micturition. Pus discharge from urethra in was noted in few cases.

Pre-operative evaluation

It was done in all patients.

- History and physical examination, including oral cavity inspection
- Complete urine examination
- Urine culture and sensitivity
- Blood sugar
- Renal function tests
- Ultrasound abdomen
- UFR
- RGU and or MCUG
- Urethroscopy

Urine culture was positive in 12 patients, most common organism being the E.coli (9/12). All these patients received at least three days of culture sensitive antibiotic before surgery and continued in post operative period. Urinary flow rates ranged from 2.3 to 10.5 ml/sec. Most patients had flow rates between 6.0 to 9.0 ml/sec. Ultra sound evaluation of upper tracts were normal in all the cases. Retrograde urethrogram showed the site and length of stricture

Preoperative preparation

- Betadine mouth gargles for 2 days.
- Genital cleaning with betadine scrub one day before and on the day of surgery.
- Approximate measurement of required graft length was made.
- Appropriate prophylactic antibiotics were given

Anesthesia

General anesthesia with naso tracheal intubation with or without epidural catheter placement for intra and post operative analgesia.

Harvestation

Buccal mucosal graft was harvested either unilaterally or bilaterally based on the length of the stricture. With mouth gag in place, submucosa was infiltrated with 2% xylocaine with adrenaline saline mixed with normal saline in equal parts and waited for 10 minutes. Orifice of the Parotid duct was identified and an incision was made 2-3 mm below the duct running from angle of mouth to molar tooth [8]. Another parallel incision made towards the mandible about 1.5-1.8 cm from the upper incision and both incisions were joined at the ends. Graft was elevated with submucosal fat using sharp scissors and any obvious bleeders were coagulated using bipolar cautery. Donor site was left open and packed with pressure dressing for one day. The graft was defatted during bench dissection and made ready for use. Buccal mucosa was harvested unilaterally in 14 cases, bilaterally in 6 cases.

Bed preparation and operative steps

Position

Patients with penile stricture were placed in supine position, whereas in bulbar, Peno bulbar

and complete anterior urethral strictures, patient was placed in lithiotomy position

Procedure (Barbagli technique)

Two team approach (most often) - In pure penile strictures, the penis was incised ventrally or it was completely degloved through a circumcoronal incision. In complete anterior urethral strictures, the penis was degloved and brought in to the perineal incision ,urethra mobilized all around up to fossa navicularis and dosal meatotomy is given and graft fixed to meatus and slided down into incision and graft fixed to the corpora and to the urethral edges over a catheter (Kulkarni technique). In bulbar strictures, urethra was exposed through a midline perineal incision. Required length of strictured urethra was mobilized, rotated to 180 degrees and dorsal urethrotomy was given extending 1 cm on to either side of normal mucosa.

Meanwhile the second team harvested and prepared the buccal graft [9]. The buccal graft was quilted over the corporal bodies, mucosa facing towards urethral lumen. The urethral edges were sutured with both edges of BMG. A 16F silicone Foley catheter was placed. Suction drain was kept in all cases. Supra pubic cystostomy was done. Wound was closed in layers. Throughout the procedure wound was irrigated with antibiotic solution (Amikacin).

Post-operative management

Intra venous antibiotics (Ceftriaxone + Amikacin+ Metrogyl) or according to the urinary c/s report) were given at least for 5 days and later converted to oral antibiotics. Drains were removed between 3rd to 5th post operative day. Pericatheter RGU was done 4 weeks after surgery and catheter was removed, provided there was no contrast leak. In case of any leak, catheter removal was postponed for another one to two weeks based on the degree of leak.

Follow up

After catheter removal patients were followed up at 3 monthly intervals for first year, at 6 monthly intervals for second year, then once in a year. Patients were followed with history and uroflowmetry at every visit [10]. Cystoscopy was done at the end of 3 months in all cases. Retrograde urethrogram was done when patients presented with symptoms suggestive of recurrent stricture. We had follow up of 20 patients, period ranging from 3 months to 18 months.

Results

Total 2 of these patients had post operative wound infection (10%). Overall, restrictures were seen in 4 patients (20%). Of the recurrent strictures, most common site was the proximal end of the grafted area. Two of the patients were settled with single visual internal urethrotomy. Two patients with BXO, required meatal dilatation due to inadequate graft placement near the meatus and required regular visual dilatation. Blood transfusion was required in three cases (3.4%). There was no gross bleeding from the donor site. All patients developed pain and swelling of the cheek, lasting for 2-3 days. All patients could tolerate semi solid diet by the end of third post operative day. Most patients complained inability to open their mouth completely, for 1-2 weeks. Mouth opening was normal in all the patients at the end of 3 months. None complained of numbness, paresthesia or decreased salivation**.**

Discussion

Resection with end to end anastamotic urethroplasty is the gold standard treatment for any stricture of less than 2 cm in bulbar urethra and less than 1 cm in penile urethra, with a high success rate of 95%. The practice of one stage urethroplasty has generally developed from the patch procedures described by various authors. One stage stricturotomy and patch urethroplasty using genital skin flaps has shown a restricture rate of 11% at one year and 19% at five years, rising to 40% at ten years. Success rate of free graft urethroplasty for urethral stricture varies from 50-95%. Free graft placement on the bulbar urethra has shown 93% success rate when compared to 40% on penile urethra [11]. More distal strictures in the pendulous urethra beyond

the termination of the bulbocavernosus muscle can be reconstructed with free graft, with prior series reporting excellent results, however more recent procedures argue for flap procedures. Patient age may be a significant factor due to inferior vascular supply or coexisting disease, both of which compromise quality of graft bed. Mundy felt that as BXO is a disease of genital skin, a better tissue for reconstruction is the Buccal mucosa . In their study graft shrinkage was less than 10% for buccal mucosa compared with 20% to 40% for skin and bladder. Shrinkage rate was similar for the onlay and tube technique. Though the shrinkage rate was similar, Andrich and Mundy in 2001 showed a restricture rate of 11% for patch grafts and 45% for tube grafts. They concluded that 2 stage is more reliable than 1 stage approach for circumferential reconstruction of the urethra. In 2002 Palmineri et al presented their experience with 2 stage buccal mucosal graft urethroplasty for complex bulbar urethral strictures with a success rate of 92.8%. But in 2003, one study showed that complete removal and replacement of the urethral mucosa using a circumferential buccal mucosa graft promotes successful one stage urethral reconstruction. One study stated that buccal mucosa graft appears to be the most versatile urethral substitute, as it can be successfully used for both one and two stage reconstruction of the entire urethra.

Either the free grafts or flaps can be used ventrally or dorsally. Flaps and grafts were used as ventral onlay, with unique post operative problems like sacculation with sequestration of urine and semen resulting in post void dribbling and difficulty in ejaculation. In 1996, Barbagli published the results of dorsal augmentation, where in urethra is completely mobilized at the site of stricture and rotated 180 degrees and stricturotomy done dorsally. Graft is fixed to the corporal bed using quilting sutures and urethra is sutured to the graft edges. Not only the technique of graft procurement but also placing the graft is crucial, as the blood supply of the recipient area and the graft support are both vital in take up and subsequent loosening of the graft. Later a number of studies have shown high success rate of dorsal onlay graft urethroplasty. The initial success rate was as high as 97% but one study in 2001 showed that long term follow up of their patients from 21.5 to 48 months resulted in a decline of success rate from 92% to 85% emphasizing the need for long term follow up before any conclusions can be made. In a comparative study of dorsal and ventral onlay techniques using grafts and flaps, Dubey et al from SGPGI, Lucknow showed that complications were more common with ventral onlay than dorsal onlay, which included fistulas (21% to 13%), ejaculatory dysfunction (20% to 5%). Urethral pseudo diverticulum (26% to 3%), postvoid dribbling (39% to 21%). Penile angulation, torsion deformity and diminution of penile sensation were higher for dorsal onlay than ventral onlay. Stricture recurrence was not significantly different among the four groups.

Our study

Overall success rate of 80% (16 of 20 patients) in our study was comparable with other studies at the end of two years of follow up. We had a restricture rate of 20% which was relatively higher than that in Barbagli series (13.3%) and in Gupta, et al. series (15.3%). Two of these patients, who developed restrictures in our study were due to under estimation of stricture length and occurred at the proximal augmentation site. Two patients with BXO developed restricture due to inadequate placement of the graft at the meatus and due to long segment stricture>10 cm. None of our patients developed either post operative hematoma or chordee. VIU required for short segment strictures situated mostly at proximal end of the graft was done for 2 patients and regular VD for 2 patients with BXO who had restricture. No urethrocutaneous fistula was seen in our study (unlike ventral grafts). No one developed chordee or urethral diverticulum.

Conclusion

Buccal Mucosal free grafts appear to be a satisfactory material in substitution urethroplasty, especially for long recurrent or complex

inflammatory strictures. BMG is useful where genital skin is diseased or not available for reconstruction. Dorsal onlay free grafts (Barbagli's technique), can be done easily with very few complications and good success rate. Onlay grafts carry less complication rates compared to tube grafts. Long term follow up is needed to judge the efficacy of BMG urethroplasty. Urine culture was positive in 9 out of 20 cases (45%). No one complained of oral pain after 3 months but had pain and paresthesias in the initial period. No urethrocutaneous fistula occurred in our study unlike ventral graft. Dorsal onlay buccal mucosal graft urethroplasty can be done by a novice urologist with good success who has adequate exposure in urethroplasty.

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