RECONSTRUCTIVE UROLOGY

Donor-site morbidity in buccal mucosa urethroplasty: lower lip or inner cheek?

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Objective: To evaluate donor-site complications of buccal mucosa urethroplasty and whether there is a difference in morbidity between harvesting the mucosa graft from the inner cheek or the lower lip.

Patients and Methods: Twenty-four consecutive patients with recurrent urethral strictures were treated with buccal mucosa urethroplasty in our department between September 2002 and April 2004. In 12 patients the graft was harvested from the lower lip or cheek and lower lip (group 1), and in 12 patients from the cheek (group 2). The mean (range) age of patients was 51 (26-66) years in group 1 and 53 (32-75) years in group 2. The mean (range) graft length was 6.2 (2-16) cm in group 1 and 5.7 (2-13) cm in group 2. All patients were followed up using a mailed questionnaire that asked about pain, numbness, difficulties in mouth opening or ingestion, and satisfaction, monthly for the first 3 months and then every 6 months. The mean (range) follow-up was 12.5 (6-23) months.

Results: There were no bleeding complications or disturbances in wound healing. All of the patients reported numbness in the area of the mental and buccal nerves, and graft-site tenderness after surgery. In group 1, the pain lasted for a mean (range) of 5.9 (0.5-22) months, compared to 1 (0.1-7) months in group 2 (P = 0.022). Perioral numbness lasted for a mean (range) of 10.3 (0.5-23) months in group 1 and 0.85 (0.1-3) months (P = 0.0027) in group 2. There were no statistically significant differences in problems with mouth opening or food intake between the two groups, but the patients in group 1 seemed to be less satisfied (6/12 patients satisfied) than those in group 2 (11/12 patients satisfied).

Conclusions: Buccal mucosa graft harvesting from the lower lip and the inner cheek are both feasible, but harvesting from the lower lip resulted in a significantly greater long-term morbidity, which resulted in a lower proportion of satisfied patients. This seems to be due to a long-lasting neuropathy of the mental nerve. We therefore have changed our technique entirely from lower lip to inner cheek graft harvesting, whenever possible.

Editorial Comment

During the last 25 years, the buccal mucosa graft became the first choice in the field of urethral reconstructive surgery after being unused or even forgotten for over half a century prior. The buccal mucosa is probably the endothel closest to the urothelium and has been demonstrated to be the best graft for urethral reconstruction with the lowest tendency of tissue contraction.

The presented paper investigated the morbidity on the donor side of the buccal mucosa. Two harvesting locations were compared: the inner lip vs. the inner cheek with a follow-up of up to 23 months (mean 12.5). Kamp et al. demonstrated that pain and numbness are important factors for the donor location, whereas, infection has no influence because of the disinfectant qualities of the saliva enzymes.

In the donor location, the lower lip pain lasts 5 times longer vs. harvests from the inner cheek; the numbness lasts 10 months vs. one month for the inner cheek. In our experience, we close the wound of the inner cheek, whereas the lower lip is left open to prevent cosmetic poor results. The harvest tissue is dissected in a hexagon pattern to make a cosmetic closure of the wound possible. In addition the hexagon shaped tissue fits immediately into the recipient location without any further trimming. For the wound closure of the inner cheek, the edges are brought together to decrease possible numbness to the smallest area possible. By using inverted

interrupted sutures, the patient does not feel the wound 2 weeks after surgery. The closing of the wound of the inner cheek might even pronounce the difference of lasting numbness compared to the open procedure of the lower lip.

The harvested buccal mucosa of the inner cheek is a durable transplant for the reconstructive area. With the data presented, it is noted that the location of the inner cheek should be favored because of its significantly lower morbidity for pain and numbness. The lower lip is still available but should only be used in those cases with a long stricture. Finally, it is preferred to treat urethral stricture sufficiently early when the stricture itself is still shorter in order to have the best surgical outcome in the harvest location and the reconstructed urethra.

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Bulbar urethroplasty using buccal mucosa grafts placed on the ventral, dorsal or lateral surface of the urethra: are results affected by the surgical technique?

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Purpose: The use of buccal mucosa graft onlay urethroplasty represents the most widespread method of bulbar urethral stricture repair. The graft may be placed on the ventral or dorsal urethral surface according to surgeon experience and preference. We investigated whether the results are affected by the surgical technique by comparing the outcome of 3 types of bulbar urethroplasty using buccal mucosa graft.

Material and Methods: We repaired 50 bulbar urethral strictures with buccal mucosa grafts from 1997 to 2002. Mean patient age was 42 years. The etiology of stricture was ischemia in 12 cases, trauma in 6, instrumentation in 4 and unknown in 28. Patients with lichen sclerosus, failed hypospadias or urethroplasty and stricture extending into the penile urethra were not included. A total of 47 patients (94%) had undergone previous urethrotomy or dilation. The buccal mucosa graft was always harvested from the cheek using a 2 team approach. Mean graft length was 4.2 cm. The graft was placed on the ventral, dorsal and lateral bulbar urethral surface in 17, 27 and 6 cases, respectively. Clinical outcome was considered a success or failure at the time that any postoperative procedure was needed, including dilation. Mean followup was 42 months (range 12 to 76).

Results: Of 50 cases 42 (84%) were successful and 8 (16%) failed. The 17 ventral grafts provided success in 14 cases (83%) and failure in 3 (17%). The 27 dorsal grafts provided success in 23 cases (85%) and failure in 4 (15%). The 6 lateral grafts provided success in 5 cases (83%) and failure in 1 (17%). No surgical complications were observed. Failures involved the anastomotic site (distal in 2 and proximal in 3) and the whole grafted area in 3 cases. They were treated with urethrotomy in 5 cases and 2-stage urethroplasty in 3.

Conclusions: In our experience the placement of buccal mucosa grafts into the ventral, dorsal or lateral surface of the bulbar urethra showed the same success rates (83% to 85%) and the outcome was not affected by the surgical technique. Moreover, stricture recurrence was uniformly distributed in all patients.

Editorial Comment

The outcome of using a buccal mucosa onlay graft improved during recent years to over 85% in the long-term follow-up. Strictures in the area of the anastomoses still occur. It might be possible to reduce those

strictures with the increased knowledge of pathology in the areas of anastomoses, which are not functional or even macroscopically visual at the time of the surgery.

With increased knowledge of urethral anatomy, the best approach to urethral strictures makes it possible to perform reconstruction with the best outcome. It not only allows reconstruction of the lumen of the urethra, it keeps the urethra functional. Its importance of function was not understood for a long time.

The presented data of urethral repair with a buccal mucosa onlay flap were performed in three different locations of the stricture: ventral, dorsal and lateral. The documented success rate of Barbagli et al. describes a trend for the 3 approaches but cannot be used to attribute preference to one approach or another. Despite the fact that most sacculations occurred in patients with a ventral graft, which is the most performed method, that indeed requires further explanation.

There is an attempt to explain the urethral sacculation or post voiding dribbling with the results of the Yucel & Baskin investigations (1). The approach with innervation of the bulbospongiosous muscles might lead to the correct direction; however, other factors probably influence the sacculation as well. The buccal mucosa graft is one of the best tissues for the urethral reconstruction, but it has never been investigated as to how the urine flows through the "tube" with its physiological curbs to bring pressure towards the graft. This patch becomes a part of the "tube"-wall and the pressure that appears might weaken the graft; whereas, in a different location, it might not be influenced as strongly. This might be an explanation of the late occurrence of sacculation in the follow-up after 2 years.

Other factors, including the 2 discussed, might influence the functional outcome. The understanding of the physiology and the physics are important in addition to prospective studies in order to perform urethral reconstruction with the highest success rate and the best functional outcome in the long term.

Reference

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Bladder growth and development after complete primary repair of bladder exstrophy in the newborn with comparison to staged approach

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Purpose: We assessed bladder growth and dynamics following complete primary repair of bladder exstrophy (CPRE) compared to the staged approach.

Materials and Methods: We reviewed the records of 16 boys and 7 girls who underwent CPRE within 3 days of life from 1996 to 2004 and compared them to the records of 8 boys and 6 girls treated with a staged repair from 1979 to 1996. Screening methods included voiding cystourethrogram, radionuclide cystogram and urodynamic study. We estimated growth curves for bladder capacity following repair in each group, and compared

percent predicted bladder capacity (PPBC), compliance and detrusor overactivity between the CPRE and staged repair groups following bladder neck reconstruction.

Results: Bladder capacity in the staged repair group was 69.8 ml (95% CI 46.7-104.4) immediately after bladder neck reconstruction and increased by 15.0% per year thereafter (95% CI 6.2-24.5, p = 0.002). In the CPRE group bladder capacity was 29.0 ml (95% CI 21.3-39.5) initially and increased by 28.9% per year thereafter (95% CI 17.4-41.5, p <0.001). PPBC started at 45.6% (95% CI 35.7-55.5) and increased 1.2% per year (95% CI -1.1-3.5, p = 0.29) following repair for all genders and surgery groups. Compliance was 124.4% (95% CI 22.6-310.7, p = 0.01) greater in the CPRE group at all times following repair. Detrusor overactivity was present in 0 of 19 patients in the CPRE group and 6 of 13 (46%) in the staged group (exact p = 0.002).

Conclusions: Within the CPRE group bladder stability was universal, and sphincter electromyography was normal suggesting no neuromuscular compromise of the pelvic floor. At early followup, our results suggest that PPBC is equivalent irrespective of gender or management. Further objective evaluation is needed in both groups.

Magnetic resonance imaging of pelvic musculoskeletal and genitourinary anatomy in patients before and after complete primary repair of bladder exstrophy

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Purpose: We characterize pelvic soft tissue and bony anatomy of patients before and after complete primary repair of exstrophy (CPRE).

Materials and Methods: We evaluated 15 measurements on pelvic magnetic resonance imaging (MRI) in patients who underwent CPRE without osteotomy at our institution from 1996 to 2004. MRI protocols included axial, sagittal and coronal fast spin echo proton density sequences. Measurements were compared before and after CPRE using a paired t test, and between patients after CPRE, and age and gender matched controls using linear regression adjusting for the matched case-control groups. Patients older than 3 years with continent intervals longer than 3 hours after CPRE were compared to age and gender matched controls using linear regression.

Results: A total of 29 MRIs in 18 patients with exstrophy were available for analysis. Median patient age at postoperative MRI was 25 months (range 4 to 36). The configuration of the post-CPRE pelvis was significantly different from that of controls in all parameters measured including wider symphyseal diastasis (34.5 mm vs less than 1 mm) and more obtuse iliac wing (121 degrees vs 98 degrees), puborectalis (94 degrees vs 49 degrees) and ileococcygeus angles (111 degrees vs 98 degrees). The anatomy of continent patients after CPRE was not significantly different from that of controls in most parameters measured.

Conclusions: Comparison of the pelvic anatomy in patients before and after CPRE suggests that after CPRE patients have parameters that more closely approximate, but are still significantly different, from those of control patients. Patients with greater than 3-hour continent intervals after CPRE have anatomic parameters most similar to those of age matched controls.

Editorial Comment

The authors compared their data regarding lower urinary tract function as well as renal function in 16 boys and 7 girls treated with a complete primary repair of bladder exstrophy. Early primary repair is defined as

repair within the first 3 days of life; these patients were compared to a group of 8 boys and 6 girls treated with a staged repair in bladder exstrophy. Furthermore the same authors studied MRI findings in 18 of these patients at various intervals after complete primary repair (and in some patients also prior to surgery).

Bladder capacity, compliance and detrusor overactivity were surrogates for detrusor function in both primary and staged repair groups. The "percent predicted bladder capacity" per individual patient was not different between neither surgical groups nor gender. The conclusion was therefore that bladder capacity is more dependent on intrinsic factors than surgical technique. 72% of female and 86% of male patients did require a bladder neck reconstruction in the long-term follow up after complete primary repair in order to achieve continence. It is therefore speculated that the better results after early primary repair regarding overactivity (none of the patients in the primary repair group did show detrusor overactivity versus 46% in the staged group) may be the result of a decreased bladder outlet resistance.

The results concerning compliance were also better in the primary repair group, which can be partially explained by decreased outlet resistance. It is a fact that in both groups male patients showed a decline in compliance, which supports the speculation about the role of resistance and bladder function in the long term.

Apart from bladder function, complete voiding and continence are additional important long-term outcome parameters and it is only partially resolved. Among the anatomical landmarks seen upon endoscopy in adolescence and adults, location of the verumontanum and length and width of the urethral sphincteric segment are important. Even for the most experienced surgeons it is extremely difficult to adequately reconstruct the sphincteric structures within the first few days of life. Good functionality of the earliest possible reconstruction is here hampered by what the surgeon can do with only partially developed and in times invisible structures.

In an attempt to predict continence in patients with complete primary repair with the same group studied an array of measurements in pelvic MRI using various bone and soft tissue landmarks and angles. It is not surprising that the measurements performed were significantly different from age for most parameters. However, the closer the landmarks and angles of the treated exstrophy patients were compared to normal age- and gender matched controls, the better were the results with regards to continence and bladder capacity. Whether all these measurements can be reduced for practicality e.g. symphyseal diastases and the puborectalis sling angle will have to be proven in larger studies with more patients.

These 2 papers nicely demonstrate that early reconstruction seems to improve the physiological function of the exstrophy bladder smooth muscle cell. However, some of the sphincteric structures are not sufficiently developed to allow a satisfactory reconstruction in most patients. Furthermore we need to include the reconstruction of the entire bony and muscular pelvis to achieve success with storage, emptying and continence. The liberal and sophisticated use of new imaging techniques can be helpful as in many other parts of reconstructive surgery.

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