

Urethral Reconstruction with Rectal Mucosa Graft Onlay: A Novel, Minimally Invasive Technique



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Abbreviations and Acronyms

LS = lichen sclerosus
OMG = oral mucosa graft
RMG = rectal mucosa graft
TEM = transanal endoscopic microsurgery

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Purpose: Alternative grafts are needed for patients who are not suitable candidates for oral mucosa graft harvest or who have a paucity of oral mucosa graft available for reconstruction. Circumferential colonic mucosal grafts have demonstrated feasibility for urethral reconstruction, although sigmoid resection has been required for graft retrieval. We report the feasibility and short-term outcomes of urethral reconstruction using a rectal mucosa graft harvested by a novel, minimally invasive, transanal endoscopic microsurgical technique.

Materials and Methods: We retrospectively reviewed the records of all patients who underwent transanal endoscopic microsurgical rectal mucosa graft harvest and onlay urethroplasty since the technique was first implemented in 2013. Graft failure was defined as inability to pass a 16Fr cystoscope in the grafted urethra.

Results: All 4 strictures were bulbopendulous with a median length of 13.5 cm (range 10 to 21). Median followup was 18 months (range 12 to 28). Stricture etiology was lichen sclerosus in 3 patients and failed hypospadias interventions in 1. Three patients had undergone at least 1 prior urethroplasty. In 1 patient stricture recurred in the graft 10 months following reconstruction. There were no colorectal complications.

Conclusions: To our knowledge this is the first study demonstrating urethral reconstruction using a rectal mucosa graft harvested by the transanal endoscopic microsurgical technique. Initial data revealed that this technique is feasible and safe, and minimizes graft harvest morbidity. Transanal endoscopic microsurgical harvest of a rectal mucosa graft may provide an alternative graft material for patients with long segment urethral strictures who are not candidates for oral mucosa graft harvest. Further experience and longer followup are needed to validate these findings.

Key Words: urethral stricture, autografts, rectum, mucous membrane, lichen sclerosus et atrophicus

COMPLEX urethral strictures present significant morbidity and can be difficult to repair. Substitution urethroplasty has become the primary surgical modality for long segment strictures. OMG offers an exceptional graft material for urethral reconstruction with success rates ranging

between 81% and 96%.^{1,2} However, in certain patients OMG harvest may be contraindicated or there may be insufficient oral mucosa available for urethral reconstruction as a result of prior graft harvests or recurrent LS after previous stage 1 repairs.³ While skin grafts and fasciocutaneous flaps

would be the logical choice for tissue transfer in patients without adequate OMG, these tissues are generally contraindicated in patients with urethral strictures secondary to LS.⁴ There exists a need for additional graft materials for long segment urethral strictures in patients in whom OMG harvest is not recommended.³

Intestinal mucosa grafts have shown promise for urethral reconstruction. Xu et al explored the use of circumferential colonic mucosa grafts, which were first investigated in the canine model.⁵ Histological examination of the urethra of sacrificed animals showed intact surviving colonic mucosa at 8 weeks and metaplastic transitional epithelium covering a large proportion of the urethra at 12 weeks. This technique was offered to patients and found to be feasible with success in 30 of 35 (86%) at a mean followup of 54 months.⁶ In this cohort the harvest was associated with high morbidity as the graft was harvested via bowel resection. The impracticality of this harvest has likely suppressed the widespread adoption of this technique.

We describe a novel, minimally invasive approach for urethral reconstruction using an onlay RMG harvested via the TEM technique. We report the feasibility, safety and efficacy of our technique.

MATERIALS AND METHODS

Institutional review board approval was obtained to retrospectively review the records of all patients who underwent RMG urethroplasty at our institution between 2013 and 2015. Four patients were identified who underwent urethral reconstruction using a RMG harvested by a TEM approach. No patients who met these inclusion criteria were excluded from analysis. Prior to surgery patients were offered potential re-harvest of the previous OMG site, perineal urethrostomy or TEM RMG urethroplasty. Patients were considered candidates for TEM RMG urethroplasty if they were thought to have inadequate OMG available for the necessary reconstruction. In our cohort 3 of the 4 patients had undergone prior bilateral buccal mucosa graft harvest while 1 with a 21 cm stricture was thought to have inadequate oral mucosa to complete the urethroplasty.

Urethral stricture length, location and etiology along with patient demographics, surgical approach and prior surgical procedures were collected from the electronic medical record. Two fellowship trained reconstructive surgeons (AJV and LNZ) performed the urethral reconstruction procedures and 1 fellowship trained colorectal surgeon (PAM) performed TEM graft harvest. In all patients preoperative evaluation consisted of cystoscopy with retrograde or antegrade urethrography.

Rectal Mucosa Graft Harvest

The patient receives a standardized bowel preparation the night before surgery, and cefazolin, ciprofloxacin and metronidazole as perioperative antibiotic prophylaxis. The patient is placed in the modified lithotomy position.

Flexible endoscopy is performed to look for any inflammatory changes in the rectum or any incidental finding such as a polyp, which would preclude using the rectal mucosa as a graft. This is typically done at the initiation of the procedure before the initial incision.

RMG harvesting begins after the length of the mucosal graft is determined. The procedure is performed using TEM with a long beveled operating proctoscope 40 mm in diameter and an operating system (Richard Wolf Medical Instruments, Vernon Hills, Illinois) (fig. 1). The device is inserted under direct vision and then secured to the table by a support arm. The 4 ports in the operating system allow for the insertion of instruments.

Beginning approximately 2 cm above the dentate line a submucosal injection is performed with saline and epinephrine. Using monopolar diathermy with a hook and grasping forceps the mucosal graft is harvested from the subcutaneous tissue. The mucosal graft is approximately 3 to 4 cm wide and extends upward typically 12 to 15 cm. Dissection is done in the posterior midline to avoid potential entry into the peritoneal cavity. Care is taken during harvest to avoid prolonged applications of thermal energy to the mucosal graft and avoid buttonholing the mucosa. The graft is removed transanally and prepared for implantation. The pneumorectum is reestablished. The wound is irrigated and left open to heal secondarily.

Postoperatively the diet is advanced normally with the addition of stool softeners or fiber supplementation. Occasional rectal bleeding or mucoid drainage would be a normal finding for up to several weeks after the procedure. The patient is seen approximately 2 to 3 months postoperatively. Unprepared office flexible sigmoidoscopy is performed to ensure complete healing of the rectal wound without stricture.

Urethral Reconstruction Technique

After RMG harvest the graft is irrigated with bacitracin/polymyxin solution. After preparation of the RMG on a silicone block a ventral onlay urethroplasty is performed to the previously placed stage 1 OMG or the native/reconstructed urethra (fig. 2).

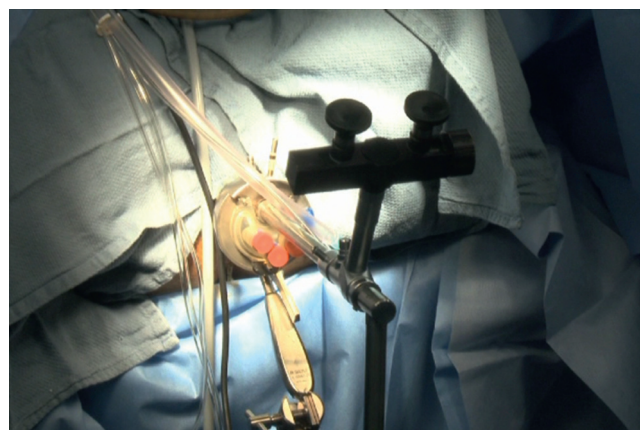


Figure 1. TEM using operating system with long beveled operating proctoscope 40 mm in diameter.

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