



In recent decades, oral mucosa grafts have increasingly replaced flaps and other grafts in the reconstructive urologists' armamentarium for repair of urethral strictures by substitution urethroplasty. With the rise in oral mucosa graft use, there has also been a greater consideration of the potential limitations and morbidity of oral mucosa graft harvesting.<sup>1</sup> As a result, further alternative graft sources have been investigated. Tunica vaginalis has been proposed as a potential alternate graft source for substitution urethroplasty, with several animal model studies and a small series of patients showing promising results in the short term.<sup>2,3</sup> Tunica vaginalis may present some advantages over oral mucosa grafts, including its ease of harvest, lack of morbidity, and larger surface area.

The authors here present an experimental rabbit model study applying tunica vaginalis grafts to substitution urethroplasty with a combined dorsal inlay and ventral onlay approach. The authors showed histologically that with time the mesothelial layer of the tunica vaginalis transformed into urothelium. Radiographically, the experimental groups also showed similar patency of the urethra at the conclusion of the study as compared to the normal controls. These promising results provide additional support for tunica vaginalis grafts as another potential source of graft material for the reconstructive urologist. In particular, tunica vaginalis grafts may be useful in long segment strictures or recurrent strictures after failed prior oral mucosa graft urethroplasty. The authors also note that by performing a combined approach with a dorsal inlay and a narrower ventral onlay graft, concerns of sacculation, or diverticulum formation with tunica vaginalis grafting may be mitigated.

This animal model study highlights the potential application and promise of tunica vaginalis grafting, but also illustrates how far away from widespread clinical use it is. Questions about the long-term success and potential pitfalls of tunica vaginalis graft urethroplasty in humans remain unknown. Without a doubt, further clinical studies in humans are needed; yet this study does present a thoughtful possibility for reconstructive urologists to consider going forward.

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The use of oral mucosa grafts is the best available option for substitution urethroplasty and the high success rate of the procedure has obtained despite the graft position.<sup>1</sup> However, the search for other substitution materials available is still active and the tunica vaginalis is one of substitution materials which has been used.<sup>2</sup>

For a very tight anterior urethral stricture, the augmented anastomotic urethroplasty has been proposed as an option to increase the results of substitution urethroplasty. But, the augmented anastomotic urethroplasty has limits regarding the length of the stricture.<sup>3</sup> Moreover, increasing the graft or flap width is another option, which can increase the risk of fistulas and diverticulum. To best solve the discrepancy, the procedure of a combined ventral onlay and dorsal inlay graft has been performed.<sup>4</sup>

In our study, we first introduced the bleomycin injection technique to create an animal model of urethral stricture,<sup>5</sup> and then performed urethroplasty using combined dorsal plus ventral double tunica vaginalis grafts. The encouraging results were obtained, evaluated by retrograde urethrography, and histological analysis at different time points, suggesting the procedure can be another option for urethral reconstruction. Though the procedure of a combined dorsal plus ventral double tunica vaginalis graft urethroplasty is promising, we must emphasize that further studies are needed to evaluate longer term success rate prior to clinical application of this technique.

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