Robotic Dorsal-Onlay Urethroplasty: A Case Report

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Abstract

Urethroplasty is considered the gold standard treatment for urethral stricture disease with over 90% success rate. Dorsal-onlay urethroplasty using buccal or skin grafts is a crucial technique for managing long anterior strictures. We report here the feasibility of performing robotic dorsal-onlay urethroplasty utilizing preputial graft. A 63-year-old man was referred for radical prostatectomy. Initial retrograde urethrogram showed urethral stricture within the membranous portion of the urethra extending into the bulb urethra. Plan of conservative management of the prostate cancer, in addition to robotic urethroplasty utilizing a dorsal-onlay skin graft. A preputial graft was harvested and placed dorsally into the bulbomembranous urethra using the Da Vinci Si system. Operative time was 2 hours, and post-operative course was uneventful. After 7.5-year follow-up, the patient remained asymptomatic and no evidence of stricture recurrence on cystoscopy. The patient did not require any intervention for either his stricture disease or prostate cancer, which did not progress on follow-up MR-US Fusion biopsies. Robotic dorsal-onlay urethroplasty is feasible and can be performed without prolonging the length of the surgery. Future directions should focus on performing this surgery using smaller incisions.

Introduction

Urethral stricture affects nearly 5,000 new patients in the US. It is characterized by progressive weak stream, dysuria, and sense of incomplete emptying due to narrowing of the urethral lumen. It can be caused by trauma, previous instrumentation, sexually transmitted diseases, prostate cancer treatment, or could be idiopathic. There several treatment modalities for urethral stricture such as urethral dilatation, internal urethrotomy, and urethroplasty.

Urethroplasty is considered the gold standard treatment for urethral stricture with a high success rate. For short urethral strictures, anastomotic urethroplasty can achieve over 95% success rate. However, for longer urethral stricture extending over 3 cm in length, grafts or skin flaps are needed. Buccal grafts are the most widely used grafts in urethral reconstruction. However, penile skin grafts have also been utilized successfully.

Open perineal bulbar urethroplasty is a standard procedure used by all the major reconstructive centers around the world and is continuously evolving. To further develop this procedure, we demonstrate here the use of robotic technology in the performance of dorsal-onlay bulbar urethroplasty using skin graft taken from the foreskin.

Case Presentation

A 63-year-old man was referred for radical prostatectomy following detection of Gleason 6 (3+3) prostate cancer on prostate biopsy. History included active urethral stricture disease requiring dilation monthly. The patient had seen radiation oncology who recommended against primary radiation due to the urethral stricture. A plan of active surveillance of his prostate cancer was discussed with the patient. Initial dynamic retrograde urethrogram showed a tight urethral stricture within the bulb urethra extending into the membranous urethra. The stricture length was 3 cm (Figure 1A). The patient opted for surgical correction of the urethral stricture utilizing a dorsal-onlay skin graft and using the Da Vinci platform.

Procedure: The patient was placed in lithotomy position. The skin graft was obtained from his foreskin. A midline perineal incision was made. Using the Da Vinci Si system, the spongiosa was dissected circumferentially at the stricture site. A dorsal incision was made in the spongiosa. Apical sutures and quilting sutures using Vicryl sutures were applied first to fix the graft, then lateral continuous closure of the spongiosa was done. The operative time was 2 hours, and estimated blood loss was 100ml. 16 Fr Foley catheter and a closed suction drain were then inserted and closure of the perineal incision was done in layers (Supplementary video). Post-operative dynamic retrograde urethrogram was performed two weeks post-op demonstrating good healing and no extravasation (Figure 1B). All catheters and drains were removed at that time.
After eight years follow up, the patient has not experienced a recurrence and did not require any intervention for his urethral stricture. He has undergone periodic cystoscopy and prostate biopsies including MRI-US Fusion biopsies to monitor his stricture disease and very low-risk prostate cancer. His prostate cancer did not progress and did not require any further treatment. Written informed consent was obtained from the patient for publication of this Case Report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Discussion

Urethroplasty has undergone major development over the years. The first graft to be used in urethral reconstruction was the preputial graft described by Devine et al. Dorsal-onlay urethroplasty is a standard technique nowadays for long bulbar urethral stricture most commonly utilizing buccal mucosa with a high success rate. Urology has always been at the forefront for the use of new technological development. The introduction of the Da Vinci robotic platform has revolutionized the outcome of many urological procedures. In addition to the typical oncological procedures such as partial nephrectomy and radical prostatectomy, robotic technology has been increasingly used in benign reconstructive procedures such as ureteric reimplantation and pyeloplasty. It has been even used successfully for infertility procedures. The use of robotic technology promises less morbidity and smaller incisions. It can benefit a patient by reducing pain and post-operative recovery as has been proven in other procedures such as robotic prostatectomy. The operative time of 2 hours was comparable to the reported operative time for urethroplasty using a graft (140±11.337 minutes), and the estimated blood loss of 100 ml was lower than the reported for open buccal urethroplasty (180 ml). The management of this patient’s prostate cancer through active surveillance represents the standard treatment per the recent guidelines, and the patient’s disease did not progress.

Conclusion

To our knowledge, robotic technology has not been used for anterior urethral reconstructive procedures. In this case report, we establish the feasibility of robotic dorsal-onlay urethroplasty without prolonging the length of the surgery. Future directions should focus on performing this surgery using smaller incisions or single-port incision, as in this case it was performed through a single midline incision. Robotic surgery generally offers less morbidity, better visualization, and better hemostasis. Further technical improvements are needed to achieve better patient outcomes.

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