Extraperitoneal Robot-Assisted Vesicourethral Reconstruction to Manage Anastomotic Stricture Following Radical Prostatectomy

Alexandre Lavollé, Alexandre de la Taille, Charles Chahwan, Cécile M. Champy, David Grinholtz, Andras Hoznek, Rene Yiou, Dimitri Vordos, and Alexandre Ingels

OBJECTIVE To demonstrate the feasibility of robot-assisted vesicourethral reconstruction. Vesicourethral anastomotic stricture following radical prostatectomy is a real challenge for reconstructive surgery when facing several endoscopic management failures.

MATERIAL AND METHODS This is a case series of robot-assisted vesicourethral reconstruction for anastomotic stricture failing endoscopic management. The procedure was performed with an extraperitoneal approach. The fibrotic anastomotic region was resected and a new vesicourethral running suture was performed with well-vascularized tissue. Bladder catheter was removed after 7 days.

RESULTS Six procedures were performed from April 2013 to May 2018 at our department. One patient had a robot-assisted radical prostatectomy at our department; the 5 others were referred from other institutions after receiving open prostatectomies. Three patients had salvage radiation therapy before reconstruction. Mean age was of 73.8 years (68-82). There was no peroperative complication. Mean operative time was of 108 minutes (60-180)], with a mean estimated blood loss of 130 mL (50-300). After surgery, 3 patients presented recurrences managed endoscopically without recurrence after 3, 5, and 11 months. Three patients presented incontinence treated with artificial sphincter implantation. One patient had no residual symptom after 5 years of follow-up.

CONCLUSIONS Robot-assisted vesicourethral reconstruction is a safe procedure. It is an option to consider when facing recurring anastomotic stricture following radical prostatectomy. It is an alternative to the perineal approach and an option before urinary diversion. Patients should be informed of the risks of incontinence and recurrence before surgery especially if they had radiation therapy. UROLOGY 133: 129–134, 2019. © 2019 Elsevier Inc.

Radical prostatectomy is a standard treatment for prostate cancer. Although this procedure is reproducible and safe, immediate postoperative complications such as hematomas or anastomotic leakage can lead to a fibrotic narrowing at the vesicourethral anastomosic site or bladder neck contracture.[1] The symptoms of vesicourethral anastomotic stenosis generally appear within 6 months after surgery and scarcely after 24 months.[2] The symptoms are obstructive: incomplete bladder emptying, hesitancy, weak stream, and straining to void. Recurrent urinary tract infections or urinary retention can be the first symptoms. Dysuria and urinary urgency are particularly common after radiation therapy.

This complication has a major impact on patient's quality of life. Although the incidence of this adverse effect was historically very high (around 30%), the recent technical improvements have made this complication very rare and earlier studies report an incidence of less than 5%.[2-5]

Endoscopic treatments are often described as first-line management since it remains the less invasive option.[6] The overall success of this first-line approach is good,[7] however, after multiple failures, a more aggressive procedure is proposed and requires an individualized complex reconstructive surgery. A classical option for vesicourethral reconstruction is a transperineal approach.[8,9] Although this strategy appears efficient, we believe an extraperitoneal pelvic approach allows maintaining a virgin perineum, which should help the likely future implantation of an artificial urinary sphincter and decreases the morbidity of this potential forecoming procedure. The robotic assistance allows smaller incisions resulting in decreased pain and a better access to the bladder neck and retro-pubic space facilitating the procedure. The minimally invasive approach improves patient recovery time.

Conflicts of interest: *Authors declare conflicts of interest with Intuitive Surgical.*

From the Department of Urology, Mondor Hospital, Créteil, France

Address correspondence to: Alexandre Ingels, M.D., Service d'Urologie, Hôpital Henri Mondor, 51 Avenue du Maréchal de Lattre de Tassigny Créteil 94010, France.
E-mail: alexandre.ingels@gmail.com

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Robotic-assisted laparoscopic treatment of complex recalcitrant vesicourethral anastomotic stricture remains a marginal technique, the literature is limited. The aim of this study is to present our series of patients presenting recurrent vesicourethral anastomotic stricture treated by robot assisted laparoscopic approach at our institution with their outcomes.

MATERIALS AND METHODS

This is a monocentric, single-surgeon experience. After institutional review board approval, data from patients presenting postradical prostatectomy recurrent vesicourethral anastomotic stricture treated with a robot-assisted approach were collected retrospectively for this study.

Patients: Postradical prostatectomy vesicourethral stricture was evocated when the patient harbored urinary obstructive symptoms such as incomplete bladder emptying, hesitancy, weak stream, straining to void, dysuria, and urgency. Recurrent urinary tract infections or urinary retention could also be the first presentation symptoms. Initial diagnostic was made with a cystoscopy revealing the tight impassable fibrotic stricture and its distal extension. An urethrocystography was necessary to visualize the whole lesion and extension. Recurrent vesicourethral anastomotic stricture was considered after at least 1 endoscopic treatment failure. Patients were not considered as good candidates if their symptoms improved with endoscopic management or if there was a long delay from initial endoscopic management and symptoms recurrence. Because of the stricture, preoperative urodynamic studies were not offered to the patients. Before surgery, patients were informed of the high risk of postoperative incontinence that could be restored with an artificial sphincter implantation and the possible recurrence that would be first treated endoscopically.

Surgical Technique: Procedure was performed under general anesthesia. Patient was placed in steep Trendelenburg position, robot docked from the side. The port placement was similar as for robot-assisted radical prostatectomy with an extra peritoneal approach.[10] Optical trocar was placed under the umbilicus in order to spare the peritoneal pouch. The Retzius space was developed with the finger through this first incision. A 12 mm port for the assistant was placed on the left para-rectal line at the tip of the finger, higher than the umbilicus. A dilatation balloon was placed to inflate the space. The camera was placed through the umbilical port and 2 robot ports were placed on each para-rectal line, under the umbilicus. A 5 mm port for the assistant was placed just over the left anteriosuperior iliac spine. Because of the fibrotic area, we usually did not install the fourth robot port. Bladder mobilization was performed with the dissection of the Retzius space on both sides, dissection from the overlying peritoneum and division of anterior postsurgical adherences with the body wall and pubic bone. The dissection should allow a good exposure of the bladder neck and urethra. The assistant lifted up the bladder through the 12 mm port to expose the bladder neck. The bladder was then cut open anteriorly exposing the inner part of the bladder neck and the proximal lesions of bladder neck contracture (Fig. 1). After locating the ureteral meatus, the entire fibrotic tissue was resected leaving a large bladder neck with well-vascularized edges. The resection was prolonged toward the urethra with a possible dissection into the sphincter allowing access to nonfibrotic tissue. In case of large anterior defect, a vascularized vesical flap was performed to cover the anterior part of the reconstructed bladder neck. The bladder neck was reconstructed with a 3-0 V-Loc posterior running suture preserving the ureteral meatus. The previous bladder mobilization and the flap permitted a tension free confrontation between the bladder neck and urethra. A posterior reconstruction was performed to minimize the tension of the vesicourethral anastomosis by stitching the remnant Denonvillier's fascia and posterior detrusor to the posterior urethral rhabdosphincter (Rocco stitch) with a 3-0 V-Loc suture. The vesicourethral anastomosis was then performed with two 3-0 V-Loc running sutures starting from the posterior plan Figure 2. A 20 French urinary

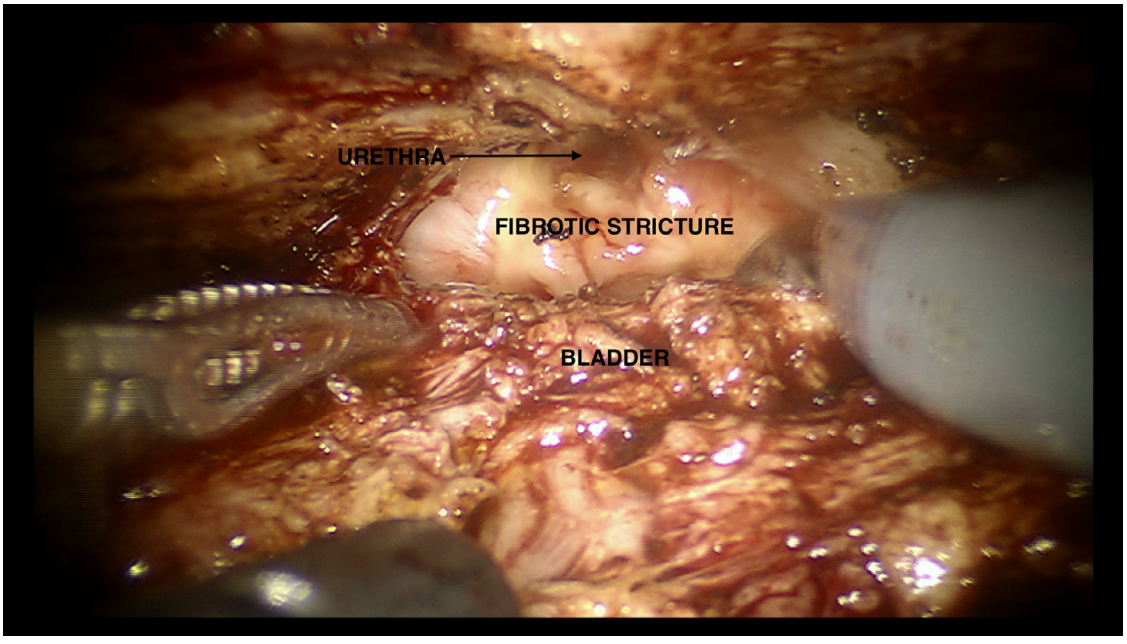

Figure 1. Opening of the anterior bladder neck allowing the exposure of the proximal part of the fibrotic stricture. (Color version available online.)

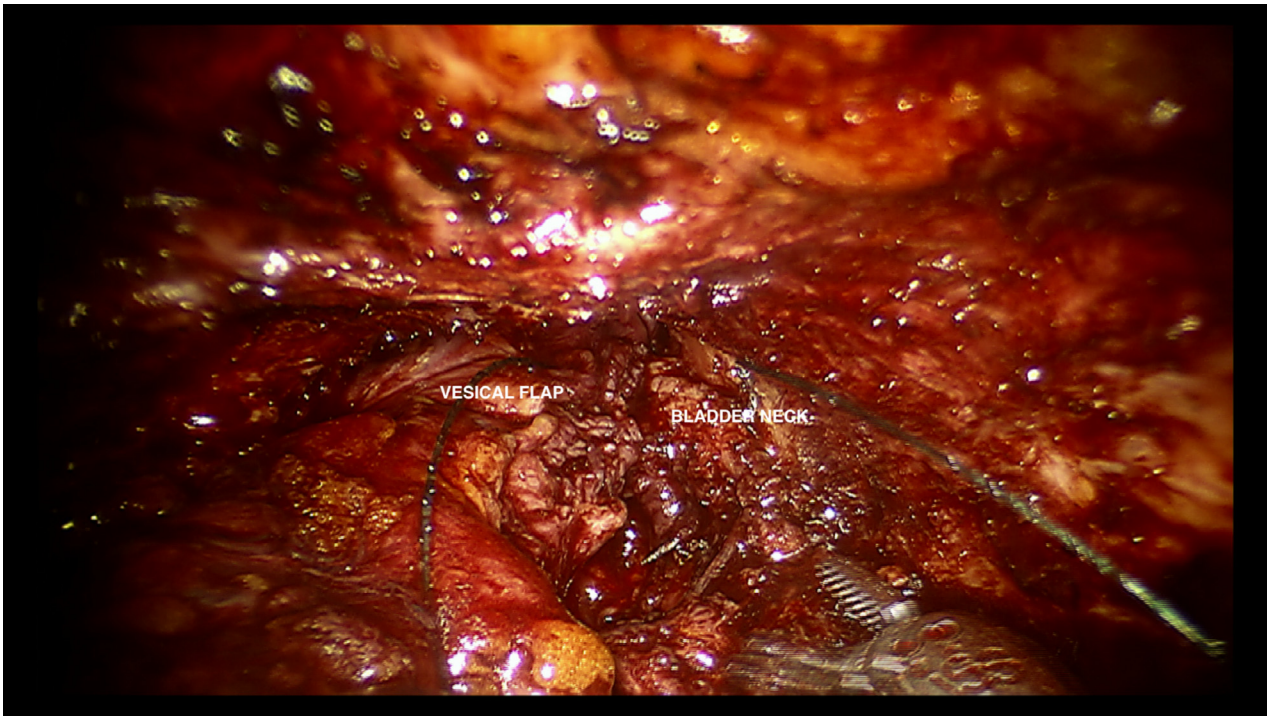

Figure 2. Running suture with a 3/0 V Loc to close the bladder neck after fixing the anterior flap. (Color version available online.)

catheter was inserted before knotting the 2 lateral sutures of the vesicourethral anastomosis. After filling up the catheter balloon with 10 mL, the bladder was irrigated with 60 mL to confirm the watertight reconstruction. A drain was systematically placed in the retzius space.

Postoperative Management: The drain was usually removed at day 1, in the absence of adverse event, the patient was discharged at day 1 and the bladder catheter was removed in an outpatient visit at day 7. In addition to this 7 days postoperative consult, patients were reevaluated at 1 and 3 months after surgery. If there was no specific complication or recurrence for the bladder neck reconstruction, the follow-up scheduled was then aligned with the oncologic follow-up. The postoperative results were appreciated with symptoms reports. An urethral fibroscopy was performed only in case of symptoms recurrence or at time of artificial urinary sphincter implantation when indicated. In this situation, a limited restenosis was tolerated, however, if it did not allow the passage of the fiberoscope, an endoscopic incision was performed before the sphincter implantation.

RESULTS

From April 2013 to May 2018, 6 patients were treated at our department. Five patients were referred after receiving open prostatectomies in others institutions, 1 had a robot assisted radical prostatectomy in our department.

Patients' characteristics are reported in Table 1, each case specific follow-up is reported in Table 2. Mean age was of 73.8 years old (68-82). Before reconstruction, 3 patients underwent salvage external beam radiation for prostate cancer recurrence. These 3 patients remained under androgen deprivation therapy. During the radical prostatectomy postoperative period, 3 patients presented an anastomotic leakage with urinoma and 2 presented a hematoma.

The median time between surgery and vesicourethral anastomotic stricture diagnostic was of 7.6 months. All the patients had at least 1 endoscopic attempt to treat the vesicourethral anastomotic stricture (bladder neck incision).

Mean operative time was of 108 minutes (60-180). Mean estimated blood loss was 130 mL (50-300).

Short and long-term follow-up: Median length of stay was 2 days. At immediate postoperative follow-up, 1 patient presented a complication: a postoperative anastomotic leakage treated conservatively with 2 weeks of bladder catheter drainage.

For the long-term follow-up, the median follow-up after surgery was 18.7 months. Three patients received an artificial sphincter implantation at 5, 6, and 11 months postvesicourethral reconstruction allowing a complete continence restoration and no stricture recurrence at respectively 37, 8, and 14 months follow-up. Three patients received endoscopic bladder neck incisions at 8, 10, and 11 months after the reconstruction. The first patient had neither postoperative complication nor radiation

Table 1. Patients' characteristics

Number of Patients	6
Age (mean, range)	73,8 y (68-82)
Initial surgery	Retro-pubic prostatectomies (5), robot-assisted prostatectomy (1)
Adjuvant treatment	Radiation therapy and androgen deprivation therapy (3)
Operative time (mean, range)	108 min (60-180)
Estimated blood loss (mean, range)	130 mL (50-300)
Median length of stay	2 d
Median follow-up	18.7 mo

Table 2. Patients' individual follow-up

Case	Initial Intervention	Prereconstruction Procedures (Time Postprostatectomy)	Time of Vesicourethral Reconstruction	Postreconstruction Procedures (Time Postreconstruction)	Postreconstruction Follow-up	Recurrence Status at Last Follow-up	Continence Status at Last Follow-up
1	Open radical prostatectomy	2 endoscopic bladder neck incisions (5 and 9 mo)	11 mo	Endoscopic bladder neck incision (11 mos)	14 mos	Free	Continent
2	Open radical prostatectomy	3 endoscopic bladder neck incisions (141, 151, and 169 mo)	172 mo	Artificial sphincter implantation (6 mo after vesicourethral reconstruction)	8 mo	Free	Continent (artificial sphincter)
3	Open radical prostatectomy	1 endoscopic bladder neck incision (6 mo)	10 mo	Artificial sphincter implantation (5 mo after vesicourethral reconstruction)	36 mo	Free	Continent (artificial sphincter)
4	Open radical prostatectomy	1 endoscopic bladder neck incision (8,6 mo)	12 months	Endoscopic bladder neck incision (8 mos) and artificial sphincter implantation (11 mos after vesicourethral reconstruction)	13 mo	Free	Continent (artificial sphincter)
5	Robot assisted radical prostatectomy	8 endoscopic bladder neck incisions (16, 26, 31, 41, 44, 51, 52, 56 mo)	60 mo	0	54 mo	Free	Continent
6	Open radical prostatectomy	2 endoscopic bladder neck incisions (6 and 10 mo)	12 mo	Endoscopic bladder neck incision (10 mo after vesicourethral reconstruction)	21 mo	Free	Continent

therapy, after this single bladder neck incision (8 months after the reconstruction) he has been reoperated for an artificial sphincter implantation (11 months after the reconstruction) and did not present other recurrence during the overall 14 months follow-up. The second patient (incision at 10 months) had an immediate anastomotic leakage treated conservatively, that was the only recurrence during the 21 months follow-up. The last patient (incision at 11 months) received a salvage radiation therapy 8 months after the reconstruction, he secondarily developed a stricture recurrence treated with this incision, and he was continent without voiding symptoms at 16 months of follow-up.

DISCUSSION

To our knowledge, this study is the first to describe a complete anastomotic reconstruction with a preperitoneal approach through an all-robotic approach in the setting of postradical prostatectomy vesicourethral stricture. Our results demonstrate the feasibility and the safety of this procedure with minimal peroperative estimated blood loss, relatively short operative time, and quick postoperative recovery. The functional outcomes are comparable with previous reports using "traditional" transperineal approaches.[11-16] Indeed, postreconstructive surgery endoscopic bladder neck incision and incontinence are very common in the follow-up. In their report, Theodoros et al performed a systematic implantation of an artificial sphincter with the vesicourethral anastomosis reconstruction to overcome this issue.[15] Part of this incontinence is certainly related with the initial complicated radical prostatectomy and unmasked after bladder outlet restoration.

Although transperineal approach is efficient and allows high patency rates in experienced hands, sparing the perineum appears strategic since a secondary artificial urinary sphincter implantation is very common in this setting (3 out of 6 patients in our series). Implanting the artificial sphincter in a virgin zone decreases the risk of infection and overall morbidity. This advantage seems valuable when considering a population that already experienced many complications and recurrences.

There are limited data from the literature on robotic approach for vesicourethral reconstruction. These data are even more limited for the postradical prostatectomy setting.

Our research found 3 reports describing robotic approach for bladder neck contracture reconstruction.

In 2017, Dinerman et al reported a single case of robotic-assisted abdomino-perineal vesicourethral anastomotic reconstruction for a 4.5 cm postprostatectomy stricture. The patient presented postprostatectomy bleeding due to undiagnosed hemophilia that required re-exploration, pudendal artery embolization, and urinary diversion with nephrostomy and surgical drains. Authors described a dual approach for the reconstruction with intraabdominal robotic-assisted mobilization of the bladder combined with a perineal mobilization of the urethra without pubectomy. At 12 months follow-up, the patient was noted to have 1 pad per day incontinence and an open bladder neck on cystoscopy.[17] Our technique is similar to their robotic approach although we simplified the procedure not performing the perineal approach.

In 2018, 2 different teams reported a similar technique describing a robotic Y-V plasty reconstruction. Granieri et al reported a series of 7 patients operated between March 2016 and September 2017. Only 1 patient had a prior radical prostatectomy. Other patients presented strictures after greenlight laser therapy (3 out of 7) or radiation therapy (3 out of 7). Perioperative outcomes were similar to our study (mean operative time 240 minutes, mean estimated blood loss 67 mL). One patient presented a pelvic hematoma managed conservatively with a prolonged bladder catheterization. Two patients had persistent urinary incontinence at 1 pad per day. Authors did not précised how many patients required artificial sphincter implantation.[18] Musch et al reported a series of 12 patients operated with this same Y-V technique from January, 2013 to February, 2016. No patient had prior radical prostatectomy: 9 patients had a transurethral procedure, 2 patients had a simple prostatectomy, and 1 patient had a High-Intensity Focused Ultrasound treatment of prostate. Authors declared no intra or perioperative complications and only 2 cases of refractory bladder neck contractions during the 2 years follow-up.[19] Although this technique is interesting in regards of good outcomes and a simplified procedure performing an anterior Y-V shape reconstruction instead of a whole anastomotic reconstruction, these outcomes are hardly comparable with our series. Indeed among the overall 19 patients described in the 2 studies, only 1 patient had a previous radical prostatectomy with an urethrovesical anastomosis. The concept of approaching the stricture without excising the whole fibrotic tissue seems very risky in the setting of a patient who had already faced multiple complications and interventions.

We believe this technique is to be considered in between endoscopic management failures and external urine derivation surgeries (Monti, Mitrofanoff, Bricker...). It is noteworthy that a recent alternative technique had been reported, describing the association of Mitomycin-C and urethral dilatation for vesicourethral anastomotic stenosis. Authors declared an 86% patency rate after 1 or 2 injections in this series of 29 patients. Twenty patients (69%) needed an anticontinence surgery.[20]

The limitations of this study are the very limited number of patients, the absence of comparison, a relatively short follow-up, and no patient self-reported outcomes through questionnaire. However, because of the rarity of this disease, prospective comparative studies would be very difficult to design.

CONCLUSION

This article reports the cases of 6 patients treated for postprostatectomy vesicourethral stricture with a robotic approach. In our experience, this technique seems feasible and safe. It is probably an interesting option to consider as an alternative to perineal approach and before considering noncontinent urinary diversion. Patients should always be

informed of a high risk of postprocedure incontinence that might impose an artificial urinary sphincter implantation and possible recurrences.

SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found in the online version at https://doi.org/10.1016/j.urology.2019.07.027.

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