Dorsal Vein Complex Preserving Technique During Robot-Assisted Radical Prostatectomy

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Abstract

Background: Recently, two techniques of robot-assisted radical prostatectomy (RARP), which preserve dorsal vein complex (DVC), endopelvic fascia, and full neurovascular bundle (NVB), through anterior approach were reported. The techniques in a relatively large workspace seem less technically demanding than Retzius-sparing RARP. In this case report, we present a further modified technique of transperitoneal-anterior-antegrade approach with a division of the endopelvic fascia to reduce the technical demands.

Case Presentation: In a routine evaluation, a 65-year-old man was shown to have a prostate-specific antigen level of 5.07 ng/mL. Prostatic biopsy revealed a Gleason score of 6 (3+3) adenocarcinoma in 2 of the 12 specimens, and the clinical stage was diagnosed as cT2aN0M0. RARP was performed including transperitoneal full NVB sparing, antegrade preservation of DVC, and division of endopelvic fascia to increase the prostate mobility and reduce technical demands. The patient completely gained continence on the day after removal of the catheter, and potency was recovered 30 days after surgery.

Conclusion: Our DVC preservation technique in the transperitoneal-anterior-antegrade approach with a division of the endopelvic fascia during RARP may be safe, reduce technical demands, and facilitate early recovery of continence and sexual function after surgery.

Keywords: dorsal vein complex preservation, robot, robot-assisted radical prostatectomy

Introduction and Background

ROBOT-ASSISTED RADICAL PROSTATECTOMY (RARP) has become the most preferred surgical procedure for the treatment of organ-confined prostate cancer because of its less invasiveness and excellent oncologic and functional outcomes. Since the first report of RARP in 2001, there have been many technical advances associated with early continence and better sexual recovery after RARP. These techniques included preservation of the bladder neck and prostatic fascia (veil of Aphrodite), athermal division of the dorsal vein complex (DVC), and posterior/anterior surgical reconstruction.

Approach to the prostate in these techniques was made first from its anterior aspect and involved suture ligation and division of the DVC. In 2010, a new technique of posterior approach named Retzius-sparing robot-assisted radical prostatectomy (RS-RARP), which was entirely intrafascial, was reported by Galfano. The immediate continence of RS-RARP was approximately three times better than that

following the anterior approach RARP. This result suggested that the structures of the anterior to the apex of the prostate play an important role for early continence recovery. However, this approach has some challenges. These include small workspace, no lateral aiming point when dissecting the lateral pedicles of the prostate, an inability to look into the bladder after the division of the bladder neck to verify the position of the ureteral orifices, and an inverted relationship between the bladder and the prostate during dissection and reconstruction.

Recently, two modified anterior approach techniques including preservation of DVC, endopelvic fascia, and full neurovascular bundle (NVB) were reported by Cochetti et al. (PERUSIA technique)¹ and De Carvalho and co-workers.² The authors reported that urinary continence was reached immediately on catheter removal in 66.9% to 85.9% of the patients and 96.1% to 98.4% of patients were continent at 1 year, and 80.9% to 86% of the patients were potent at the 1-year assessment, which was nearly equal to the RS-RARP outcome. This anterior approach in a relatively large

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FIG. 1. Port placement. 12 mm = port for assistant, 8 mm = port for robot, camera = port for camera, 5 mm = port for assistant.

workspace seems less technically demanding than RS-RARP. However, preservation of the endopelvic fascia remains challenging because there is no lateral aiming point when dissecting the lateral pedicles of the prostate.

In this case report, we present a further modified technique including transperitoneal full NVB sparing,

antegrade preservation of DVC, and division of the endopelvic fascia to increase prostate mobility and reduce the technical demands.

Presentation of Case

Clinical history

Routine evaluation of a 65-year-old man revealed a prostate-specific antigen (PSA) level of 5.07 ng/mL. Prostatic biopsy revealed a Gleason score of 6 (3 + 3), adenocarcinoma in 2 of the 12 specimens. Multiparametric MRI did not show any findings of extraprostatic extension. The clinical stage was diagnosed as cT2aN0M0. We proposed active surveillance as a recommended option, but the patient hopes to have RARP.

Surgical technique

We used the Da Vinci surgical system Xi (Intuitive Surgical, Sunnyvale, CA). A step-by-step overview of surgical technique used in the case is described in the Supplementary Video S1. Trocar placement, in our technique, is largely similar to the conventional RARP technique. Six ports were inserted as usual (Fig. 1). The patient was placed in a

FIG. 2. Transperitoneal-anterior-antegrade approach with division of endopelvic fascia. (A) The endopelvic fascia was divided into the parietal endopelvic fascia and visceral endopelvic fascia to increase the mobility of the prostate, and clear the lateral aiming point when dissecting the lateral pedicles of the prostate. (B) The release of the neurovascular bundle started posterolaterally according to the Veil of Aphrodite technique. A plane between the prostatic capsule and the prostatic fascia was developed caudally. (C) The dissection of the prostate was performed circumferentially toward the anterior aspect of the prostate, and the anterior dissection was performed to separate the DVC from the anterior fibromuscular stroma of the prostate. (D) Preservation of the DVC, full neurovascular bundle sparing, and a division of the endopelvic fascia. DVC, dorsal vein complex.

Trendelenburg position at an angle of 30°. We used a 0° lens throughout the operation.

An incision of the anterior peritoneum was made lateral to the medial umbilical ligaments to access the Retzius space. This was performed bilaterally with each incision traveling caudally along vas deferens. The overlying fatty tissue adjacent to the prostate was dissected. The anterior surface of the bladder and prostate was exposed, and the superficial dorsal vein was cauterized and divided.

Following our technical modification, the endopelvic fascia was divided into the parietal endopelvic fascia and visceral endopelvic fascia to increase the mobility of the prostate, and clear the lateral aiming point when dissecting the lateral pedicles of the prostate. The division was extended posteriorly that resulted in the exposure of the perirectal fat. (Fig. 2A) The puboprosthetic ligaments were preserved. After identifying the prostatovesical junction, bladder neck preservation was performed, using the lateral approach for bladder neck dissection to expose the urethra.

After the urethra had been cut, the seminal vesicles and the ampulla of vas deferens were identified and dissected. Thereafter, the Denonvilliers fascia was incised and the posterior plane of dissection was developed. The dissection was continued to the prostate–urethral junction while enlarging the retroprostatic space toward the prostatic pedicles. This dissection continued intrafascially, and the release of the NVB started posterolaterally according to the Veil of Aphrodite technique (Fig. 2B). A plane between the prostatic capsule and the prostatic fascia was developed caudally. The dissection of the prostate was performed circumferentially toward the anterior aspect of the prostate and the anterior dissection was carried out to separate the DVC from the anterior fibromuscular stroma of the prostate (Fig. 2C). Posteriorly, the urethra was incised, and the prostate was removed (Fig. 2D). Limited pelvic lymph node dissection was then performed and repeated on the opposite side in this case.

The scissors and Maryland bipolar forceps were replaced with needle drivers. After Rocco stitching had been performed, the DVC was suspended to obtain a sufficient view for anastomosis. The vesicourethral anastomosis was performed with two 3-0 Stratafix spiral PDS Plus™, using the running suture technique. Both ends of the sutures were tied together and a watertight closure was confirmed with 100 mL saline. Anterior reconstruction was performed using 3-0 V-Loc™. The drainage tube was placed in the retroperitoneal space, and the fascias of trocar sites were closed with 2-0 Vicryl.

Outcomes

The operative time, console time, and blood loss were 147 minutes, 105 minutes, and 70 mL, respectively. The catheter was removed on postoperative day 7. The patient gained complete continence a day after the removal of the catheter, and potency was recovered 30 days after surgery. The final pathology report revealed six small foci of adenocarcinoma with Gleason score of 4 + 3, 1y0, v0, pn0, sv0, and pT2c. Three months after surgery, his PSA was undetectable.

Discussion and Literature Review

In this case report, we present a DVC preserving technique in a transperitoneal-anterior-antegrade approach with the division of the endopelvic fascia during RARP. The concept of DVC preservation during radical prostatectomy was first reported by Hoshi et al.³ as a technique performed during laparoscopic radical prostatectomy. RS-RARP also preserves DVC consequent to Retzius space sparing. Moreover, it preserves the endopelvic fascia, the pubovesical ligaments, and pelvic floor musculature, thus, minimizing surgical trauma, and allowing more delicate reconstruction and preservation of a normal pelvic anatomy. In contrast, the importance of suspension of the DVC was reported by Papatsoris and Mandron.⁴

Recently, two modified anterior approach techniques including preservation of DVC, endopelvic fascia, and the full NVB were reported.^{1,2} These techniques do not spare the Retzius space. However, they demonstrate excellent oncologic and functional outcomes, which are almost consistent with the outcome of RS-RARP. PERUSIA technique uses the extraperitoneal approach, and releases NVB anterogradely, whereas De Carvalho's technique uses the transperitoneal approach, and retrogradely releases the NVB. Both techniques preserve endopelvic fascia.

The contribution of endopelvic fascia preservation to early continence recovery is unclear. To our knowledge, there is only one report that states the contribution⁵ although raising controversies. Papatsoris and Mandron⁴ reported that anterior suspension of the DVC along with fixation of the anterior fibromuscular stroma could facilitate early continence after laparoscopic radical prostatectomy despite incision of endopelvic fascia.

In this case report, we demonstrate a technique that does not spare the Retzius space, while promoting the division of endopelvic fascia to increase prostate mobility, and clear the lateral aiming point when dissecting the lateral pedicles of the prostate, thereby preserving DVC, the pubovesical ligaments, and pelvic floor musculature. Consequently, our technique reduced technical demands. It needs to ensure that cancers are not concerning for extraprostatic extension particularly at the NVB and apices for this technique to be applicable, and further studies are needed to demonstrate the noninferiority of the oncologic outcome and early continence recovery compared with RS-RARP. However, we believe our technique may be safe, reduce technical demands, and promote early recovery of continence and sexual function after surgery.

Conclusion

In this case report, we present a DVC preserving technique in a transperitoneal-anterior-antegrade approach with the division of the endopelvic fascia during RARP, and we believe our technique may be safe, reduce technical demands, and facilitate early recovery of continence and sexual function after surgery.

Disclosure Statement

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Supplementary Material

Supplementary Video S1

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Abbreviations Used

DVC = dorsal vein complex

MRI = magnetic resonance imaging

NVB = neurovascular bundle

PSA = prostate-specific antigen

RARP = robot-assisted radical prostatectomy

RS-RARP = Retzius-sparing robot-assisted radical prostatectomy

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