

Research article

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## Laparoscopic radical prostatectomy: feasibility and benefits of applying pure extraperitoneal laparoscopic approach with preservation of the Retzius' space - Hood technique

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### Abstract

**Introduction:** In prostate cancer treatment, complete removal of the prostate gland through surgery is essential. Despite the primary goal being the complete excision of the tumor, preserving the patient's quality of life is equally important. The "hood" technique, as described by Tewari et al, is based on the theory of preserving structures within the Retzius' space, ensuring the conservation of structures after prostatectomy. This aids in controlling early postoperative urinary continence and ensures oncological outcome. This study aims to evaluate the feasibility and assess the initial outcomes of the first 9 cases underwent extra peritoneal laparoscopic radical prostatectomy using the "hood" technique at Binh Dan Hospital.

**Method:** A case series of nine cases diagnosed with prostate cancer from 01/2022 - 12/2023, clinical stage I to II according to the 8th AJCC/UICC staging system, were evaluated through clinical examination, imaging tests, biochemical tests, and pathological examination. Radical prostatectomy was performed using the "hood" technique via extraperitoneal laparoscopic surgery by one same surgeon. Study variables including cancer stage, pre - and post - operative serum PSA levels, pre - and post - operative TNM staging, Gleason score, intraoperative blood loss, surgical duration, time to catheter removal, time to urinary control, pre - and post-operative erectile function assessed by IIEF-5, and length of stay.

**Results:** Average age is 68.3 (60 - 79) (median 68.0), average preoperative PSA 21.0 (8.0 - 38.5) ng/mL (median 17.8), average postoperative PSA is 0.05 (0.00 - 0.2) ng/mL (median 0.02), average prostate volume is 41.4 (20.5 - 68.1) mL (median 39.4 mL), average operative time is 235.7 (135 - 360) minutes (median 210 minutes), average blood loss is 450 (50 - 800) mL (median 400 mL), average postoperative days is 5.7 (3 - 8) days (median 6), average day of catheter withdrawal is 6.6 (5 - 14) days (median 5 days). Positive surgical margins: 2/9 cases. All of the patients regained urinary continence within 2 months after urinary catheter removal. No complication during perioperative period.

**Conclusion:** Hood technique for extraperitoneal laparoscopic prostatectomy is feasible and helps to achieve the early return of urinary continence.

**Keywords:** Extraperitoneal; Laparoscopic; Hood; Retzius sparing; Prostate cancer; Early urinary continence.

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## 1. INTRODUCTION

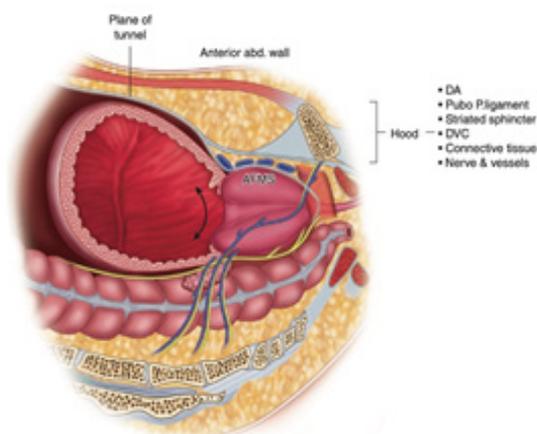
Radical prostatectomy is considered the gold standard in the treatment of localized prostate cancer. Laparoscopic radical prostatectomy is a minimally invasive treatment method widely employed by urologists worldwide. This technique undergoes continuous refinement to become feasible, reproducible, and applicable globally. While the primary goal of prostatectomy is complete tumor excision, preserving the patient's quality of life is equally imperative. Urologists have continuously sought optimal prostatectomy methods to achieve both objectives. The “hood” technique, described by Tewari and colleagues, is based on the theory of preserving structures within the Retzius' space<sup>1</sup>, including the detrusor muscle plate, arcus tendineus, puboprostatic ligaments, endopelvic fascia, and anterior pelvic floor muscles, thus aiding in early postoperative urinary control and ensuring oncological safety.

Regarding the “hooding” concept: Over the past century, A. Massimo Bocchiardi has consistently sought the best methods to preserve structures within the Retzius' space during radical prostatectomy<sup>2</sup>. This approach preserves all components within the Retzius' space by accessing the prostate gland and bladder neck through the pouch of Douglas.

Studies have shown that this method helps patients regain early urinary continence, leading surgeons to highly regard the structures in the Retzius' space during radical prostatectomy<sup>2,3</sup>. However, most surgeons still prefer the anterior approach, believing it offers more flexibility, provides a clearer view inside the bladder (with visible ureteral orifices and the middle lobe of the prostate), allows simultaneous lymph node dissection, preserves neurovascular bundles by accessing the space around the prostate gland and make a cystectomy if necessary, with a direct view without penetrating the pouch of Douglas, where most vascular and neural structures travel to the penis and pelvic region.

To address this issue, Wagaskar and colleagues sought to refine the anterior approach to preserve the Retzius' space while maintaining the advantages of traditional methods. The “hood” technique, inspired by Robert Myers'

work, preserves structures after prostatectomy in a “hood-like” shape, including the detrusor muscle plate, arcus tendineus, puboprostatic ligaments, anterior blood vessels, and some detrusor muscle fibers<sup>4</sup>. This “hood” surrounds and protects the membranous urethral, striated sphincter, and other supporting structures.



**Figure 1.** Anatomy of the prostate region (DA - detrusor apron, PuboP.ligament - puboprostatic ligament; Striated sphincter; DVC – dorsal vein complex; connective tissue; Nerve & vessels; AFMS - anterior fascial muscular sheet)<sup>5</sup>

## 2.OBJECTIVE

Illustrate the technique, assess feasibility, and investigate initial outcomes in 9 cases underwent laparoscopic radical prostatectomy via extraperitoneal approach using the “hood” technique at Binh Dan Hospital.

## 3. METHOD

A case series of nine cases diagnosed with prostate cancer from 01/2022 – 12/2023, clinical stage I to II according to the 8th AJCC/UICC staging system, were evaluated through clinical examination, imaging tests, biochemical tests, and pathological examination. Radical prostatectomy was performed using the “hood” technique via extraperitoneal laparoscopic surgery by one same surgeon. Study variables including cancer stage, pre- and post-operative serum PSA levels, pre- and post-operative TNM staging, Gleason score, intraoperative blood loss, surgical duration, time to catheter removal, time to urinary control, pre- and post-

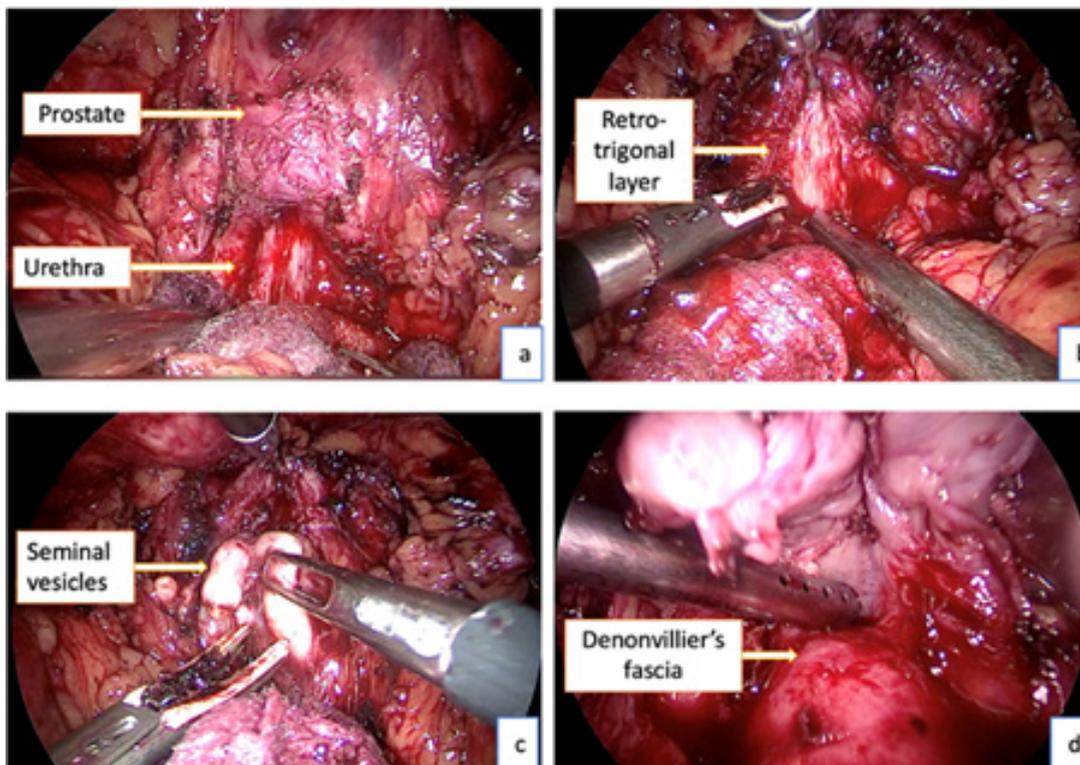
operative erectile function assessed by IIEF-5, and length of stay.

### Technique

1. Blunt and sharp dissection to expose the bladder and anterior prostate without exposing the puboprostatic ligaments.

2. Bladder neck transection involved making an incision and deepening it until the Foley catheter became visible. Confirming the Foley catheter's visibility ensured proper

incision of the anterior bladder neck. The Foley catheter was firmly grasped at the tip and pulled anteriorly. Using the catheter shaft as a guide, the mucosa at the posterior bladder neck was precisely incised. Subsequently, a plane was created behind the posterior bladder neck wall to reveal a consistent fibromuscular layer known as the "retrotrigonal layer" 6 Cutting through this layer exposed the vasa deferentia and seminal vesicles.



**Figure 2.** a. Bladder neck transection. b. Retro-trigonal layer. c. exposing the vasa deferentia and seminal vesicles. d. Follow the plane between Denonvillier fascia and the seminal vesicles

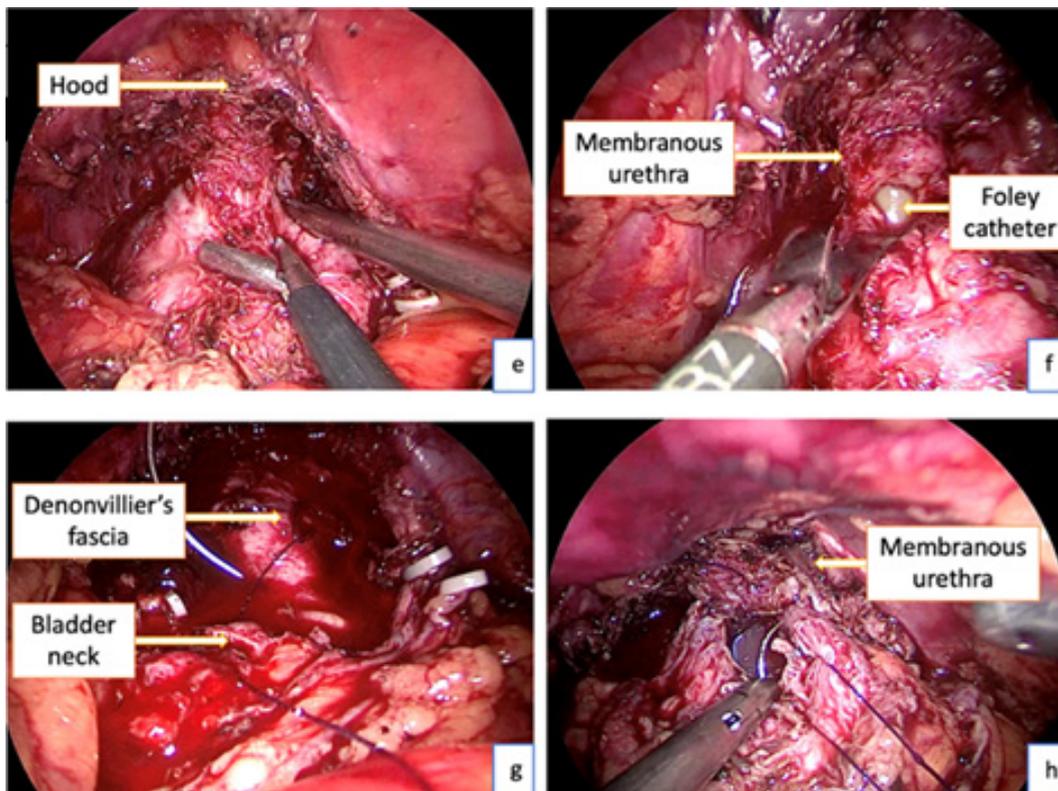
3. Dissection of the vas deferens and seminal vesicles commenced by lifting and individually dissecting the vas deferens using an athermal technique for clipping and cutting the ends. Following this, the cut ends were elevated. Subsequently, a dissection plane was established between the seminal vesicles and the surrounding fascia, referred to as the "median avascular plane." This plane was followed proximally to locate the arteries entering the seminal vesicles, which were then clipped and sharply dissected. Every effort was made to preserve the neurovascular bundles situated laterally to the seminal vesicles. Finally, both the seminal vesicles and vas deferens were pulled upwards.

4. Lateral pedicle control involved establishing a plane between the prostatic capsule and Denonvilliers' fascia through sharp and blunt dissection, extending distally towards the apex and laterally on both sides to access the lateral attachments where the perforating arteries penetrate the prostatic capsule. These attachments were sharply cut, and a plane was created between the capsule and the inner aspect of the pedicular vessels

5. Circumferential apical dissection involved anteriorly lifting the prostate towards the pubic symphysis. Employing blunt dissection with monopolar scissors and retracting the apex from the urethra allowed us to achieve 1-2

mm of additional ventral membranous urethral length before transection. The prostate was then retracted to one side, and anterolateral dissection

was carried out with the aim of preserving the urethral sphincter. This sequence of actions was repeated on the contralateral side.



**Figure 3.** e. Apical dissection f. Membranous urethral transection g. Posterior reconstruction. h. Urethro-vesical anastomosis

7. Formation of the “hood” and urethral transection involved creating a plane between the detrusor apron and the anterior fibromuscular layer of the prostate. This plane was carefully traced until reaching the prostatic apex. Employing blunt dissection, we then liberated the dorsal membranous urethral length. Under direct visualization, the anterior urethra was precisely incised, and the prostate was subsequently released.

8. Complete anatomical reconstruction and anastomosis. Initially, a “mattress” for anastomosis was created using V-lock sutures as part of the posterior reconstruction process. This mattress incorporated the Denonvilliers’ musculofascial plate and the posterior bladder neck. Subsequently, a two-layer reconstruction of the bladder neck was carried out using V-lock sutures. A watertight and tension-free urethro-vesical anastomosis was achieved using barbed sutures. Furthermore, the arcus

tendineus was sutured to partial thickness bites of the detrusor muscle, contributing to the stabilization and positioning of the vesico-urethral junction.

#### 4. RESULTS

- Average age is 68.3 (60-79) (median 68.0)
- Average pre-operative PSA 21.0 (8.0- 38.5) ng/mL (median 17.8)
- Average post-operative PSA is 0.05 (0.00 - 0.2) ng/mL (median 0.02)
- 9/9 patients had pre-operative TNM stage II
- 4/9 patients up-staged to stage III after surgery.
- Average Gleason score is 6.85 (6-8).
- Average prostate volume is 50.4 (20.5- 68.1) mL (median 39.4 mL)
- Average operative time is 235.7 (135-360) minutes (median 210 minutes)
- Average blood loss is 450 (50-800) mL (median 400 mL)

- Average postoperative days is 5.7 (3-8) days (median 6)
- Average day of catheter withdrawal is 6.6 (5-14) days (median 5 days)
- Positive surgical margins: 2/9 cases (2 cases were up-staged to stage III after surgery, confirmed by pathologists)
- No significant decreases in IIEFF-5 score post operation.
- Right after urinary catheter removal, all patients needed 1-2 pads per day. Three patients were pad free on the first post-operative week. Five out of nine patients were completely continent after 4 weeks. Within 2 months after urinary catheter removal, all of the patients regained urinary continence.
- No complication during perioperative period.

## 5. DISCUSSION

### 5.1. Feasibility

Globally, the “hood” technique is predominantly applied through robot-assisted laparoscopic surgery due to its flexible maneuvers and ease of suturing 7. Based on our experience with nine cases of laparoscopic radical prostatectomy conducted at Binh Dan Hospital, we find the application of the “hood” technique in pure laparoscopic surgery to be entirely feasible. In this study, there are no complication during the postoperative period. The blunt dissection on both sides of the prostate, following a defined plane, can be easily accomplished using Ligasure or laparoscopic kelly heads. During the procedure, we refrained from suturing the dorsal vein complex (DVC) as this approach does not involve contact with the DVC.

### 5.2. Short post-operative duration

Due to the extraperitoneal approach, most cases recovered bowel function very early and were discharged early. Two cases were discharged on postoperative day 3.

### 5.3. Ensure the negative surgical margin

In our study cases, 2 out of 9 cases were noted to have residual tumor on the cut surface. In these two cases, the pre-operation MRI also could not access the capsular invasion of the tumor and were upstaged to stage III after surgery, confirmed by pathologists, and

both had the tumor on the posterior side of the prostate.. We chose cases which had no tumor on the anterior side of the prostate, but what we did not expect was the cancer was already in stage III, which is advised against using “hood” technique. In the study by Wagaskar and colleagues, 9 out of 263 cases applied the “hood” technique had positive surgical margins 5. Previous studies have shown that the positive surgical margin (PSM) rate in cases undergoing minimally invasive surgery is higher than open surgery, especially in cases with postoperative pathology belonging to the pT3 group. However, authors argue that surgeons performing minimally invasive surgery in high-volume centers tend to have more experience, thus reducing the PSM rate 8. This technique preserves structures in the Retzius’ space, so some authors advise against applying this technique to cases of tumor mass involving the anterior region as seen with MRI or biopsy 5,7. One case postoperative pathology results noted invasion of the seminal vesicles (while pre-operative MRI did not detect it).

### 5.4. Early urinary continence

Patients were considered continent if they do not require pads within 24 hours 5. 5 out of 9 cases were continent after catheter removal for 4 weeks, which is quite similar to Wagaskar et al’s study (83%) 5. At 2 months post-surgery, all 9 cases were continent, did not require pads, and reported being highly satisfied.

## 6. CONCLUSIONS

Hood technique for extraperitoneal laparoscopic prostatectomy is feasible and helps to achieve the early return of urinary continence

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