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Brief Correspondence

Robot Partial Prostatectomy for Anterior Cancer: Long-term Functional and Oncological Outcomes at 7 Years

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Abstract

Partial prostatectomy has been described as an alternative to focal ablation therapy for the management of localized low- to intermediate-risk prostate cancer. This report aims to describe the long-term outcomes in a series of 28 men (2000–2022) who underwent robotic-assisted anterior partial prostatectomy (APP) for anteriorly located tumors entirely or partially within the anterior fibromuscular stroma. The median follow-up is 7 yr (interquartile range [IQR]: 4.2–8). The median prostate-specific antigen (PSA) before APP was 9.6 (6–11). Continence remained uninterrupted in 92% of patients. Erectile function without drug remained uninterrupted in 69%. The median nadir PSA after APP was 0.36 ng/ml (IQR: 0.25–0.60). Cancer recurrence at biopsies at the margins of the primary cancer resected area in case of a PSA elevation was observed in eight patients and led to salvage completion robotic radical prostatectomy at a median time of 3.25 yr (IQR: 2.4–6). Freedom from post-APP cancer recurrence at 7 yr was 62.7% (35.0–81.3%). Pre-APP tumor volume at magnetic resonance imaging (MRI) and volume of grade 4/5 were predictive of recurrence. Freedom from biochemical recurrence after completion radical prostatectomy at 7 yr was 94.7% (68.1–99.3%). All 28 patients are alive. No one had systemic treatment or metastases. These results confirm our initial report of robotic APP with good functional results and acceptable oncological results. The use of the inclusion criteria of pre-APP tumor volume at MRI <3 cc may decrease the risk of recurrence.

Patient summary: In this report, we looked at outcomes for infrequent cases of anterior prostate cancer treated with anterior partial prostatectomy, an uncommon surgical procedure as an alternative to in situ focal ablation therapy, to better preserve functional outcomes as compared with whole gland therapy. We found that functional outcomes of uninterrupted continence and erectile function were good. Out of 28 patients, eight had recurrence in the remaining prostate and were treated with a second surgical procedure, radical prostatectomy, which was feasible. We conclude that this new technique is feasible with good functional results and acceptable oncological results, which can be shared with the patients.

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To reduce the risk of post-treatment incontinence and impotence, several options are described: (1) partial gland ablation by various energies [1–3], and (2) surgical techniques for prostatic dissection *sensu strictu* such as omission of the endopelvic fascia dissection, bladder neck preservation, incremental nerve sparing, and preservation of the puboprostatic ligaments and dorsal venous complex [4]. Recently, techniques for partial prostatectomy have been described [5–8].

In our initial report of 17 patients (2000–2015) who underwent robotic anterior partial prostatectomy (APP) for isolated anterior cancers, we found that the technique was safe and feasible with good functional and oncological outcomes [5,6]. Sood et al. [7] reported a series of 90 cases with midterm follow-up treated by precision robotic partial prostatectomy, which was safe and feasible, with removal of all but a thin rim of tissue overlying the neurovascular bundle on the contralateral side of the dominant lesion. A technique for partial prostate gland excision through a transvesical approach using the da Vinci SP surgical system has also been described [8]. Herein, we report long-term functional and oncological outcomes of our extended series of 28 men, including 11 additional men who underwent APP (2016–2022).

The inclusion and exclusion criteria, surgical technique, and methods of follow-up remained the same during the entire study period (2000–2022; [Supplementary Figs. 1–3](#)) [5,6]. Written informed consent was obtained from all study participants. All patients underwent prostate-specific antigen (PSA) monitoring at 3 and 6 mo and then 6 monthly. For-cause magnetic resonance imaging (MRI) and biopsies were indicated in case of a suspicious PSA rise. Robotic completion nerve-sparing radical prostatectomy (RP) was performed in case of cancer recurrence, as described previously [5,6]. Preoperative clinical, pathological, and biochemical preoperative data for the 28 patients included are shown in [Table 1](#). No patient was lost to follow-up.

Overall, no intraoperative complications were identified during APP or salvage robotic-assisted RP. Perioperative complications were Clavien-Dindo grade II and IIIb ([Supplementary Table 1](#)).

Continence remained uninterrupted (no pads) in 92% of patients. Erectile function remained uninterrupted (5-item International Index of Erectile Function score ≥ 15) in 13 out of 19 (69%) patients potent preoperatively, and five more patients reported sexual activity with phosphodiesterase-5 inhibitors ([Supplementary Table 3](#)). Of the eight patients who underwent salvage RP, three had persistent urinary incontinence at 1 yr and underwent urinary sphincter placement. Potency was maintained in two out of five patients who were potent after the APP. Lateral and inter-prostatorectal dissection was not judged as difficult at the time of salvage completion RP. However, we encountered difficulty to well identify the anterior aspect of the prostatourethral junction at the apex due to the previous excision of the anterior fibromuscular stroma (AFMS), which may have resulted, in addition to the fact that we removed the previous urethral anastomosis area, in high rates of incontinence.

Table 1 – Preoperative clinical, pathological, and biochemical preoperative data of the 28 patients included for anterior partial prostatectomy

<i>Clinical</i>	
Age (yr), mean (IQR)	64.5 (60–67)
Preoperative PSA (ng/ml), median (IQR)	9.6 (6–11)
PSA <10 ng/ml	15
PSA 10–15 ng/ml	11
PSA >15 ng/ml	2
<i>Biopsies</i>	
Number of cases with previous negative biopsy series (%)	19 (68)
Number of cases with cancer at 12– posterior systematic biopsies (%)	9 (32)
Max CCL at 12– posterior systematic biopsies (mm), median (IQR)	1 (1–2)
Max CCL at targeted biopsies (mm), median (IQR)	8 (5.7–9)
GG 1	13
GG 2	14
GG 3	1
Clinical stage T1c (%)	100
AS criteria (GG 1 MCCL <7 mm and negative MRI)	1
<i>MRI</i>	
Prostate volume (cm ³), median (IQR)	59 (42–68)
Cancer volume (cm ³), median (IQR)	2.3 (1.2–4.3)
Tumor location midline AFMS	19
Tumor location midline TZ/AFMS	4
Tumor location lateral TZ and AFMS	4
No visible lesion	1 ^a
AFMS = anterior fibromuscular stroma; AS = active surveillance; CCL = cancer core length; GG = grade group; IQR = interquartile range; MCCL = maximum cancer core length; MRI = magnetic resonance imaging; PSA = prostate-specific antigen; TZ = transition zone.	
^a MRI was not suspicious for case #4 and cancer volume could not be calculated.	

The median nadir PSA was 0.36 ng/ml (interquartile range [IQR]: 0.25–0.60). PSA variations from the nadir value with time are shown in [Supplementary Figure 4](#). Post-APP oncological outcomes along with PSA, MRI, biopsy, and salvage treatment results are shown in [Supplementary Table 2](#). Prompted by rising PSA, cancer recurrence was diagnosed by biopsies at the margins of the primary cancer resected area in eight cases. Of the remaining 20 patients, 17 had stable PSA and three had a PSA rise with a velocity of <0.10 ng/ml/yr. In these three cases, MRI showed residual benign prostatic hyperplasia at the prostate base as the most likely cause of this PSA rise and biopsies were negative. At 7-yr follow-up, 20/28 (71%) patients were free from any cancer recurrence and had not undergone any additional treatment. Freedom from post-APP cancer recurrence was 62.7% (35.0–81.3%; [Fig. 1A](#)).

All eight patients who had recurrence underwent salvage completion RP at a median time of 3.25 yr (IQR: 2.4–6). Biochemical recurrence with rising PSA >0.20 ng/ml occurred in two of eight patients, and all had local recurrence only in the prostatic bed at the bladder neck at MRI. These two patients had salvage radiation therapy and complete response with undetectable PSA. Freedom from biochemical recurrence after completion RP at 7 yr was 94.7% (68.1–99.3; [Fig. 1B](#)). All 28 patients are alive, and none had systemic treatment or metastatic disease.

A univariate analysis showed that the pre-APP tumor volume at MRI ($p = 0.019$) and the volume of grade 4/5 ($p = 0.034$) were predictive of recurrence ([Supplementary](#)

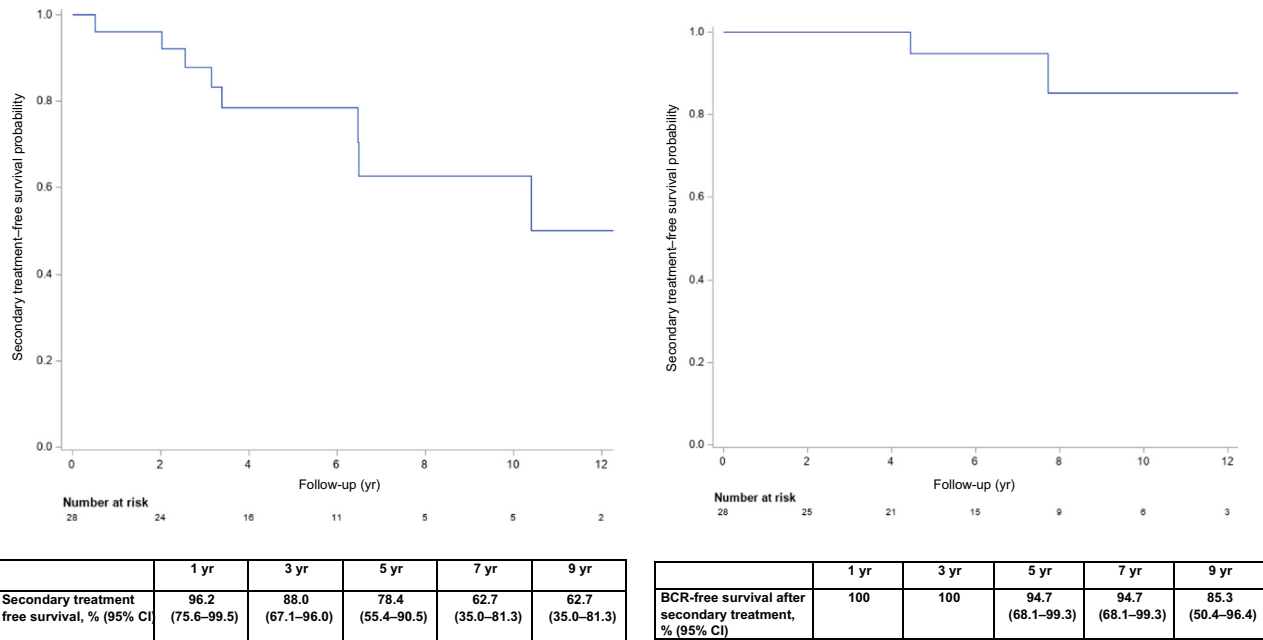


Fig. 1 – Kaplan-Meier analysis of freedom from (A) post-partial prostatectomy prostate cancer recurrence ($n = 8/28$)^a and (B) biochemical recurrence after secondary treatment by completion radical prostatectomy ($n = 2/8$). ^aOne out of the eight patients had clinically insignificant cancer recurrence. All eight cases with recurrences had completion radical prostatectomy. BCR = biochemical recurrence; CI = confidence interval.

Table 4). The median cancer volume at pre-APP MRI for the group of eight cases with recurrence was 4.65 cc (IQR: 3.5–5.4; range: 2.3–10) versus 1.71 cc (IQR: 0.8–2.35; range: 0.2–4.6) for the 20 cases with no recurrence ($p = 0.017$). Considering a pre-APP MRI threshold cancer volume of <3 cc, seven of eight cases who had prostate cancer (PCa) recurrence were above this threshold versus five of 20 patients without PCa recurrence. Cancer volumes at the APP specimen for these two subgroups were 6.14 cc (IQR: 5–6.1; range: 4.6–15.1) and 3.8 cc (IQR: 2.1–6.2; range: 0.2–9), respectively. Of 12/28 (36%) cases who had positive margins, four (33%) recurred—two anteriorly and two posterolaterally.

Our APP technique demonstrated good (no interruption) functional results and freedom from recurrence of 62.7% (35.0–81.3%) at 7 yr in a series of 28 cases with a median cancer volume of 4.7 cc (2.5–6.7). No patient had systemic therapy, metastatic recurrence, or mortality. Patients who recurred underwent robotic completion salvage RP with poor functional results for continence, since three of eight patients had persistent incontinence. Patients should be informed of these results at the time of initial consent. Ablative therapies such as cryotherapy or irreversible electroporation should be considered a less morbid alternative to surgical partial gland ablation for the cases at intermediate risk, provided that these can reach the AFMS with safe margins and lead to good functional results. Active surveillance would currently be considered in six cases of our series with low cancer volumes, but visible at MRI (<1 cc), and grade group 1.

Cancer volume at MRI was associated with the risk of recurrence, which suggests modifying our inclusion criteria to a threshold maximum cancer volume of 3 cc. Neither the PSA value at baseline nor the prostate gland volume was associated with recurrence, and should not be used as selec-

tion criteria provided the cancer is localized at imaging and at least 5 mm anterior to the posterior aspect of the enlarged transition zone lobes. Anteriorly located tumors entirely or partially located within the AFMS are rare [9]. These are in contact with the preprostatic fat and associated with pT3a disease (or an anterior positive margin if preprostatic fat is removed) in 39%. These adverse pathology results would likely have occurred irrespective of whether the patient underwent partial prostatectomy or RP. The biological significance is uncertain since only five of 11 cases with an anterior positive margin recurred. We recommend the use of intraoperative frozen section at the bladder neck and remaining peripheral zone when performing APP; however, there was a false-negative rate of 44% in one series [8].

Author contributions: Arnauld Villers had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.euros.2023.07.001>.

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