

The lateroposterior approach—Gaston for robot-assisted radical prostatectomy: the Las Palmas approach

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Abstract

Objectives: To evaluate perioperative, pathological, and functional outcomes of radical prostatectomy using a lateroposterior approach with intrafascial neurovascular-bundle dissection and bladder neck preservation.

Methods: We conducted a retrospective, single-center study of patients who underwent robot-assisted radical prostatectomy using a standardized lateroposterior approach between 2023–2026. The technique incorporated a posterior approach to the seminal vesicles followed by intrafascial, tension-minimizing, and energy-minimizing dissection of the neurovascular bundles, with preservation of the bladder neck and pubovesical complex whenever oncologically appropriate. Preoperative, operative, pathological, complication, urinary-continence, and erectile-function data were collected. Functional outcomes were assessed at 1, 3, 6, 12, and 24 months.

Results: A total of 138 patients were included. Median age was 65 years (IQR 60–71), preoperative prostate-specific antigen was 6.79 ng/mL (IQR 5.02–10.6), and prostate volume was 43 mL (IQR 33–62). Median total operative, console, and docking times were 160 (IQR 120–236), 120 (IQR 81–195), and 16 minutes (IQR 13–21), respectively. Complications were documented in 27/138 patients (19.5%). Positive surgical margins occurred in 60/121 patients (49.6%), and higher preoperative PSA was independently associated with margin positivity (aOR 2.07, 95%CI 1.11–4.19). Continence increased from 54.5% at 1 month to 83.9% at 12 months. Erectile function increased from 39.7% at 1 month to 70.2% at 6 months. Operative time decreased over time, and complications numerically declined over time.

Conclusion: Robot-assisted lateroposterior radical prostatectomy was technically feasible and associated with progressive functional recovery among evaluable patients. The substantial positive-margin rate emphasizes the need for oncologically selective intrafascial dissection, standardized outcome assessment, and prospective comparative evaluation.

Keywords: Prostate cancer, robot-assisted radical prostatectomy, lateroposterior approach, pubovesical complex, urinary continence, erectile function

Introduction

Prostate cancer is the most frequently diagnosed malignancy among men, accounting for 28.3% of new cancer diagnoses in men in 2024 [1]. Radical prostatectomy is an established treatment for appropriately selected patients with localized or selected locally advanced disease [2]. Alongside cancer control, urinary continence and erectile

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function are important outcomes of surgery [3]. Their preservation depends in part on the surgical handling of the neurovascular bundles, bladder neck, urethra, and pelvic support structures [4]. Nerve-sparing dissection may improve erectile function and facilitate earlier continence, although outcomes also depend on patient characteristics, baseline function, tumor location, and the extent and plane of dissection [2, 5, 6].

The lateroposterior approach examined in this study builds on a pubovesical complex-sparing robot-assisted technique designed to preserve the endopelvic fascia, dorsal vascular complex, detrusor apron, bladder neck, and native pubic attachments of the bladder [7]. The same group subsequently described an intrafascial technique based on tension-free and energy-minimizing dissection of the neurovascular bundles [8]. Dissection begins laterally at the prostatovesical junction and advances posteriorly along the prostate, allowing progressive intrafascial release of the neurovascular bundles. The technique seeks to limit traction and thermal energy near neural tissue while preserving the pubovesical complex when oncologically appropriate [8]. Its defining feature is this lateral-to-posterior sequence combined with selective preservation of anterior support structures.

Retzius-sparing robot-assisted radical prostatectomy provides related but technically distinct evidence on anatomy-preserving surgery. Randomized trials have shown faster early continence recovery compared with conventional anterior surgery [9, 10]. A systematic review suggests that this advantage may diminish by 12 months and identifies concerns about positive surgical margins in some patients, without a consistent erectile-function benefit [11].

These findings cannot establish the outcomes of the lateroposterior technique, for which clinical evidence remains limited. Here, we aimed to describe the perioperative, pathological, and documented functional outcomes of a consecutive, single-center series of patients undergoing robot-assisted radical prostatectomy using a lateroposterior, pubovesical complex-preserving approach. We also examined outcomes across chronological case periods, with particular attention to positive surgical margins, complications, postoperative continence, and erectile function.

Materials and methods

Study design and setting

We conducted a retrospective, single-center case series of patients who underwent robot-assisted radical prostatectomy using the lateroposterior approach–Gaston (LPA-G) at the Department of Urology, University Hospital San Roque, Las Palmas de Gran Canaria, between January 2023 and January 2026. Potentially eligible procedures were identified from operative logs and robotic surgery registries. Preoperative and perioperative characteristics, postoperative events, pathological findings, and functional assessments were extracted from patient records. Data were locked for this analysis on January 31, 2026. This

study is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations. The Institutional Review Board approved all study proceedings under approval number DG-DECS-UPO-CT-4078. All information was deidentified before analysis and handled in accordance with applicable institutional and national data-protection requirements.

Study population

We included adult patients with histologically confirmed prostate adenocarcinoma who underwent robot-assisted radical prostatectomy using the lateroposterior approach–Gaston during the study period.

Surgical candidacy and the planned extent of nerve sparing were determined through multidisciplinary clinical assessment based on patient age, comorbidities, life expectancy, preoperative functional status, clinical stage, prostate-specific antigen (PSA), biopsy grade group, and preoperative imaging. Exclusion criteria were salvage prostatectomy, metastatic disease at the time of surgery, procedures converted to another surgical approach, incomplete operative records, or lack of pathological information. The final cohort comprised 138 consecutive patients who underwent radical prostatectomy between January 2023 and January 2026.

Preoperative assessment

Preoperative evaluation included age, history of previous pelvic or prostatic surgery, serum PSA, biopsy Gleason score and International Society of Urological Pathology (ISUP) grade group, and prostate magnetic resonance imaging findings, including the highest Prostate Imaging Reporting and Data System (PI-RADS) score. Baseline lower urinary tract symptoms were evaluated using the International Prostate Symptom Score when available. Clinical staging studies, including computed tomography, bone scintigraphy, and prostate-specific membrane antigen positron-emission tomography, were performed selectively according to the patient's clinical characteristics and risk category.

Surgical technique

All procedures were performed by surgeons from the Department of Urology using the lateroposterior approach–Gaston (LPA-G) with the HUGO™ RAS technology. The patient was placed in the Trendelenburg position at 30° with a split-leg configuration to allow advancement of the camera robotic arm. Four robotic 8-mm trocars were placed after insufflation at 12 mmHg. Two additional laparoscopic ports, 12 mm and 5 mm, were used for the assistant.

Docking was performed as follows. Arm 1 was positioned at an angle of 110° with a tilt of +15°. Arm 2 was positioned at an angle of 150° with a tilt of –30°, corresponding to the surgeon's left hand. Arm 3, for the endoscope, was positioned at an angle of 180° with a tilt of –45° between the patient's legs. Arm 4 was positioned at an angle of 210° with a tilt of –30° (Figure 1).

After access to the pelvis, the procedure started by upward traction using the prograsp instrument in the midline, between the bladder fatty tissue and the anterior rectal plane. The peritoneum was incised toward the vas deferens, which was identified and transected. Dissection then continued laterally on each side to accomplish seminal vesicle dissection, and both vas deferens were divided. Once this step was completed, dissection continued laterally at the prostatovesical junction, following the classic Gaston lateral approach, grasping the bladder–prostate junction and rotating it toward the right side. An avascular plane was developed between the prostate and bladder and extended posteriorly toward the posterior prostatic fascia. The overall anatomical concept was based on intrafascial, tension-free, and energy-minimizing dissection of the neurovascular bundles, together with preservation of the pubovesical complex and bladder neck. The neurovascular bundle was progressively released from the base and lateral surface of the prostate. Small vessels entering the prostatic capsule were identified and controlled selectively with 5-mm metallic clips, while lateral traction, peeling of the neurovascular tissue, and the avoidance of thermal energy near the bundles were applied. Surrounding prostatic anatomy, including the endopelvic fascia, bladder neck, and pubovesical ligaments, was preserved. The extent of bilateral nerve sparing was recorded in all cases, although the nerve-sparing level was not further specified. Apical dissection was performed with particular attention to max-

imizing membranous urethral length and avoiding thermal or traction injury to adjacent neurovascular structures. After prostate removal, a running barbed-suture vesicourethral anastomosis was performed and tested for leakage with saline. Pelvic lymph-node dissection was performed when clinically indicated according to preoperative risk assessment.

Perioperative variables

Operative variables included preparation time, anesthesia time, robotic docking time, console time, undocking and instrument-extraction time, total operative time, and turnover time between procedures. All time intervals were expressed in minutes.

Pathological evaluation

Prostatectomy specimens were assessed by the Pathology Department according to institutional protocols. Biopsy and prostatectomy Gleason scores were recorded as the primary and secondary architectural patterns. ISUP grade groups were defined as follows: grade group 1, Gleason score $3 + 3 = 6$; grade group 2, $3 + 4 = 7$; grade group 3, $4 + 3 = 7$; grade group 4, Gleason score 8 ($4 + 4$, $3 + 5$, or $5 + 3$); and grade group 5, Gleason score 9–10. Biopsy-to-prostatectomy grade-group change was classified as upgrading, no change, or downgrading. Pathological T and N codes were extracted from the available pathology data. A positive surgical margin was defined as tumor at

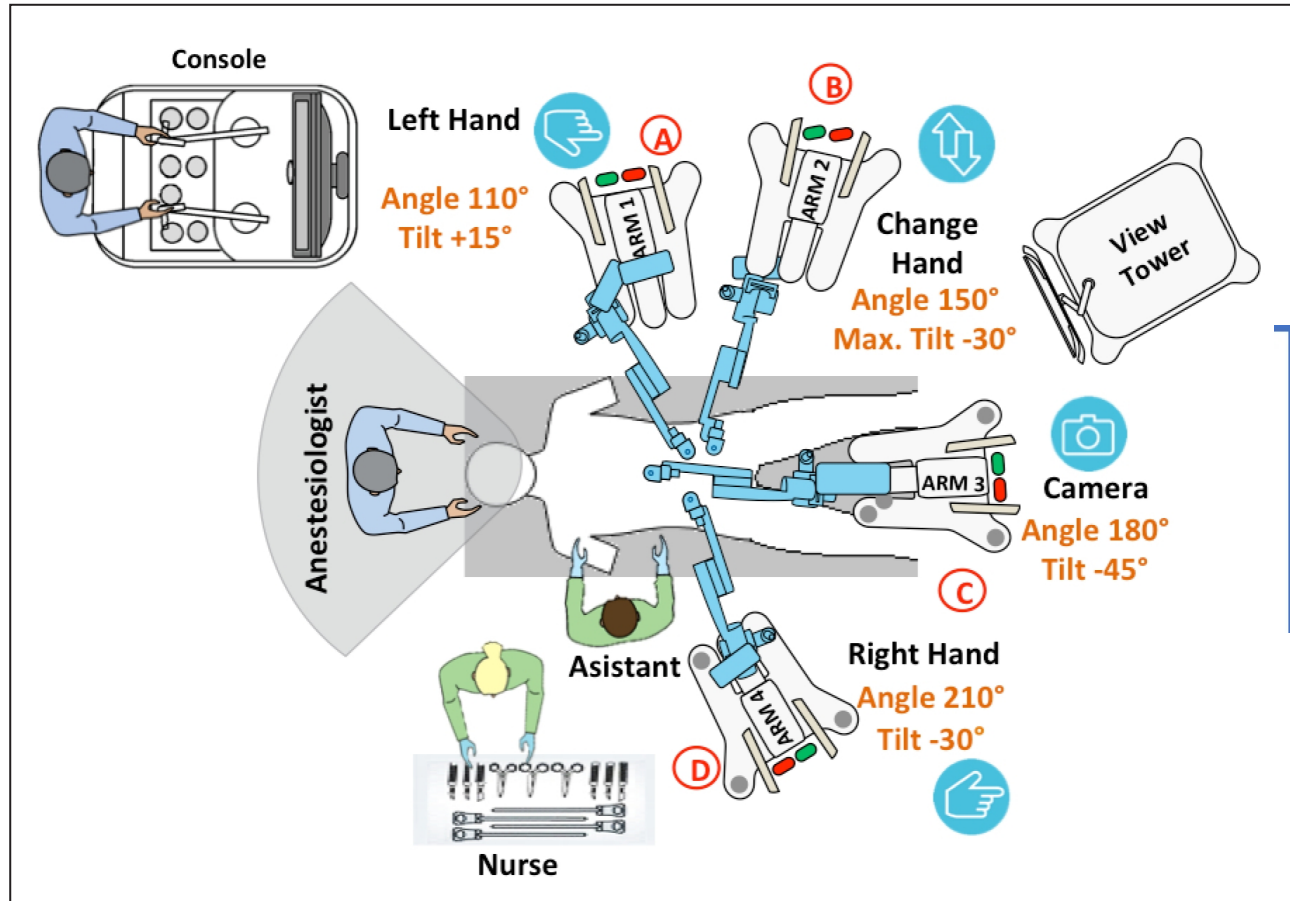


Figure 1. Operating room configuration and docking of the Hugo™ RAS.

an inked specimen surface. For patients with a positive surgical margin, anatomical sites were coded from the narrative pathology descriptions as apical, anterior or anterolateral, posterior or posterolateral, lateral, basal, or an explicitly described extraprostatic-extension region. More than one site could be recorded for a patient, so site categories were not mutually exclusive. Descriptions without an identifiable anatomical site were classified as unspecified. Margin lengths stated in centimeters were converted to millimeters. When several exact lengths were reported for one patient, the largest measured focus was used for the descriptive length summary.

Functional outcomes

The principal functional outcome was postoperative urinary continence. Continence was evaluated at 1, 3, 6, 12, and 24 months after surgery. The primary functional endpoint was continence at 1 month. Patients who had not yet reached a particular follow-up landmark at the data cutoff were classified as not eligible for that assessment. Patients who had reached the landmark but lacked documented functional information were classified as missing.

Erectile function was evaluated at the same postoperative landmarks using the documented presence of erections, erectile-function grade, and use of erectile-dysfunction treatment. When available, postoperative erectile-function recovery was assessed separately in patients with preserved preoperative erectile function and according to the extent of nerve sparing. Recovery with and without pharmacological assistance was reported separately. For each postoperative landmark, we identified patients who had reached that landmark by the data-lock date. Among those eligible patients, we distinguished assessments documented within 24 months from missing assessments. Patients who had not reached a landmark were not counted as lost to follow-up.

Statistical analysis

Continuous variables were summarized using the median and interquartile range (IQR), and categorical variables were presented as frequencies and percentages. For variables with missing information, percentages were calculated using the number of patients with available data as the denominator and are reported as n/N (%). No imputation was performed for missing data. To explore changes across institutional experience, procedures were ordered chronologically and divided into three equal periods of 46 cases each. Total operative time was compared among the three periods using the Kruskal–Walli's rank-sum test. Complication and positive surgical-margin rates were summarized separately for each chronological period. Because of the limited number of events and incomplete operative-time documentation, chronological analyses were considered exploratory.

Agreement between biopsy and prostatectomy ISUP grade groups was described by classifying paired observations as upgraded, unchanged, or downgraded. A transition matrix was used to display changes across individual grade groups. Pathological outcomes, including positive surgical

margins, lymphovascular invasion, perineural invasion, cribriform architecture, and intraductal carcinoma, were analyzed using available-case denominators. Postoperative continence and erectile-function outcomes were evaluated at 1, 3, 6, 12, and 24 months. At each landmark, the number of patients achieving the outcome was divided by the number with an evaluable assessment. Exact binomial 95% confidence intervals were calculated for the proportions displayed graphically. Exploratory multivariable logistic-regression analyses were performed to identify factors associated with positive surgical margins and 1-month continence. The positive surgical-margin model included log-transformed preoperative PSA, biopsy ISUP grade group, prostate volume, and chronological case number. The 1-month continence model included age, log-transformed preoperative PSA, prostate volume, and chronological case number. PSA was natural-log transformed because of its right-skewed distribution. Both models used complete-case analysis. Associations are reported as adjusted odds ratios (aORs) with 95% confidence intervals. All tests were two-sided, and a p -value < 0.05 was considered statistically significant. Analyses were performed using R software version 6.4.1.

Results

Baseline characteristics and perioperative outcomes

A total of 138 patients underwent radical prostatectomy using a lateroposterior approach between January 2023 and January 2026. Baseline demographic, clinical, and perioperative characteristics are summarized in Table 1.

The median age at surgery was 65 years (IQR 60–71; $n = 137$), and the median preoperative prostate-specific antigen level was 6.79 ng/mL (IQR 5.02–10.6; $n = 135$). Median prostate volume was 43 mL (IQR 33–62; $n = 113$). Biopsy ISUP grade-group information was available for 134 patients. ISUP grade groups 1, 2, 3, 4, and 5 were identified in 23 (17.2%), 40 (29.9%), 34 (25.4%), 26 (19.4%), and 11 patients (8.2%), respectively. The most frequent biopsy Gleason score was 3 + 4, observed in 43 patients (32.1%), followed by 4 + 3 in 31 (23.1%) and 4 + 4 in 26 (19.4%). Preoperative magnetic resonance imaging findings were available for 126 patients; PI-RADS 4 and 5 lesions were identified in 39 (31.0%) and 47 patients (37.3%), respectively. Complete operative-time information was available for 77 patients. The median total surgical time was 160 minutes (IQR 120–236), and the median console time was 120 minutes (IQR 81–195). Median docking time was 16 minutes (IQR 13–21), while median anesthesia time was 184.5 minutes (IQR 144.5–258.2).

Pathological analysis

Pathological ISUP grade group was available for 125 patients. ISUP grade groups 1, 2, 3, 4, and 5 were reported in 31 (24.8%), 50 (40.0%), 26 (20.8%), 13 (10.4%), and 5 patients (4.0%), respectively. Paired biopsy and prostatectomy ISUP grade groups were available for 122 pa-

Table 1. Baseline demographic and preoperative clinical characteristics.

Characteristic	N = 138 ¹
Age, years	65 (60, 71)
Previous surgery	67/129 (52%)
Preoperative PSA, ng/mL	7 (5, 11)
Biopsy ISUP grade group	
1	23/134 (17%)
2	40/134 (30%)
3	34/134 (25%)
4	26/134 (19%)
5	11/134 (8.2%)
Biopsy Gleason score	
3+3	23/134 (17%)
3+4	40/134 (30%)
4+3	34/134 (25%)
4+4	26/134 (19%)
4+5	7/134 (5.2%)
5+5	4/134 (2.9%)
Highest PI-RADS score	
1	1/126 (0.8%)
2	25/126 (20%)
3	14/126 (11%)
4	39/126 (31%)
5	47/126 (37%)
Prostate volume (mL)	43 (33, 62)

Notes: ¹Median (Q1, Q3); *n* (%). Continuous variables are presented as median (first quartile [Q1], third quartile [Q3]), and categorical variables as *n*/*N* (%), where *N* represents the number of patients with available data for the corresponding variable. PSA, prostate-specific antigen; ISUP, International Society of Urological Pathology; PI-RADS, Prostate Imaging Reporting and Data System.

tients. Downgrading at final pathological evaluation was observed in 61 patients (50.0%), while the grade group remained unchanged in 37 (30.3%) and was upgraded in 24 (19.7%).

Surgical-margin status was evaluable in 121 patients, of whom 60 had a positive margin (49.6%). Margin location descriptors were available for 58 of these 60 patients. Posterior or posterolateral involvement was present in 28/58 patients (48.3%), apical involvement in 20/58 (34.4%), anterior or anterolateral involvement in 12/58 (20.7%), lateral involvement in 11/58 (19.0%), and basal involvement in 4/58 (6.9%). Sites were not mutually exclusive, and six descriptions did not identify a classifiable anatomical site. Twenty-nine positive-margin descriptions included margin measurements; the largest exactly measured focus per patient had a median length of 3.0 mm (IQR 1.0–6.0 mm; range, 0.1–15 mm).

Among 105 patients with both an evaluable surgical-margin result and recorded pT category, positive-margin proportions were 48/101 (47.5%) for pT2, 5/8 for pT3a (62.5%), and 7/12 for pT3b (58.3%). Pathological N categories were available for 117 patients; 44 (37.6%) were coded as having nodal involvement, and 21/44 of those

Table 2. Perioperative and pathological outcomes.

Characteristic	N = 138 ¹
Anesthesia time, min	184.5 (144.5, 258.2)
Docking time, min	16 (13, 21)
Console time, min	120 (81, 195)
Undocking time, min	14.0 (10.0, 17.0)
Total operative time, min	160 (120, 236)
Complications	27/138 (19.5%)
Clavien-Dindo I	16 (11.6%)
Clavien-Dindo II	9 (6.5%)
Clavien-Dindo III	2 (1.4%)
Pathological ISUP grade group	
1	31/125 (25%)
2	50/125 (40%)
3	26/125 (21%)
4	13/125 (10%)
5	5/125 (4.0%)
Pathological Gleason score	
3+3	30/125 (24%)
3+4	49/125 (39%)
4+3	27/125 (22%)
4+4	14/125 (11%)
4+5	3/125 (2.4%)
5+4	2/125 (1.6%)
Biopsy-to-specimen grade change	
Downgraded	61/122 (50%)
Unchanged	37/122 (30%)
Upgraded	24/122 (20%)
Tumor involvement, %	15 (6, 30)
Pathological T category	
pT2	112/132 (84.8%)
pT3a	8/132 (6.1%)
pT3b	12/132 (9.1%)
Pathological N category	
pN0	103/128 (80.5%)
pN1	25/128 (19.5%)
Positive surgical margin	60/121 (50%)
Lymphovascular invasion	13/122 (11%)
Perineural invasion	99/124 (80%)
Cribriform architecture	31/120 (26%)
Intraductal carcinoma	5/118 (4.2%)

Notes: ¹Median (Q1, Q3); *n* (%). Continuous variables are presented as median (first quartile [Q1], third quartile [Q3]), and categorical variables as *n*/*N* (%), where *N* represents the number of patients with available data for the corresponding variable. Operative-time components were available for a subset of the cohort. ISUP, International Society of Urological Pathology.

with nodal involvement had positive margins (47.7%). Finally, among 120 patients with both an evaluable surgical-margin result and ISUP grade, positive margins were identified in 8/31 patients (25.8%) with grade group 1, 23/46 (50.0%) with grade group 2, 18/25 (72.0%) with grade group 3, 5/13 (38.5%) with grade group 4, and 5/5 (100%) with grade group 5.

In an exploratory multivariable logistic-regression analysis of 106 patients with complete data, higher preoperative PSA was associated with increased odds of a positive surgical margin. Each one-unit increase in the natural logarithm of PSA was associated with an adjusted odds ratio of 2.07 (95% CI 1.11–4.19; $P = 0.030$). Biopsy ISUP grade group, prostate volume, and chronological case number were not independently associated with margin status. Among the remaining pathological features, perineural invasion was present in 99 of 124 evaluable specimens (79.8%), cribriform architecture in 31 of 120 (25.8%), lymphovascular invasion in 13 of 122 (10.7%), and intraductal carcinoma in 5 of 118 (4.2%). Pathological findings are summarized in Table 2.

Operative workflow, learning-curve analysis, and complication rates

Procedures were classified chronologically into three equal periods of 46 cases each (Figure 2). Total operative-time data were available for 15, 43, and 19 procedures in the first, second, and third periods, respectively. Median total surgical time increased from 137 minutes (IQR 118–

164) in the first period to 161 minutes (IQR 119–244) in the second and 205 minutes (IQR 132–252) in the third. This increase was not statistically significant ($P = 0.129$). Positive surgical-margin rates showed no consistent chronological trend, occurring in 53.5% (23/43), 44.7% (17/38), and 50.0% (20/40) of evaluable patients, respectively.

Complications classified according to the Clavien-Dindo system occurred in 27 of 138 patients (19.5%) Grade II, and IIIa and IIIb complications occurred in 16 (11.5%), 9 (6.5%), and 2 patients (1.4%), respectively. The most common complication was ileus requiring medical management, observed in 16 patients (11.5%). Nine patients (6.5%) required blood transfusion, one required endoscopic evaluation of the anastomosis with Foley catheter reinsertion, and one required an interventional lymphocele drain. No grade IV or V complications occurred.

Recovery of urinary continence

Continence status was documented in 112 patients at 1 month, 88 at 3 months, 58 at 6 months, 31 at 12 months, and 26 at 24 months; preoperative continence status was unavailable. Among evaluable patients, continence was documented in 61/112 patients at 1 month (54.5%), 58/88 at 3 months (65.9%), 43/58 at 6 months (74.1%), and 26/31 at 12 months (83.9%). At 24 months, 21/26 evaluable patients were continent (80.8%).

In an exploratory logistic-regression analysis of 94 patients with complete outcome and covariate data, age, pre-

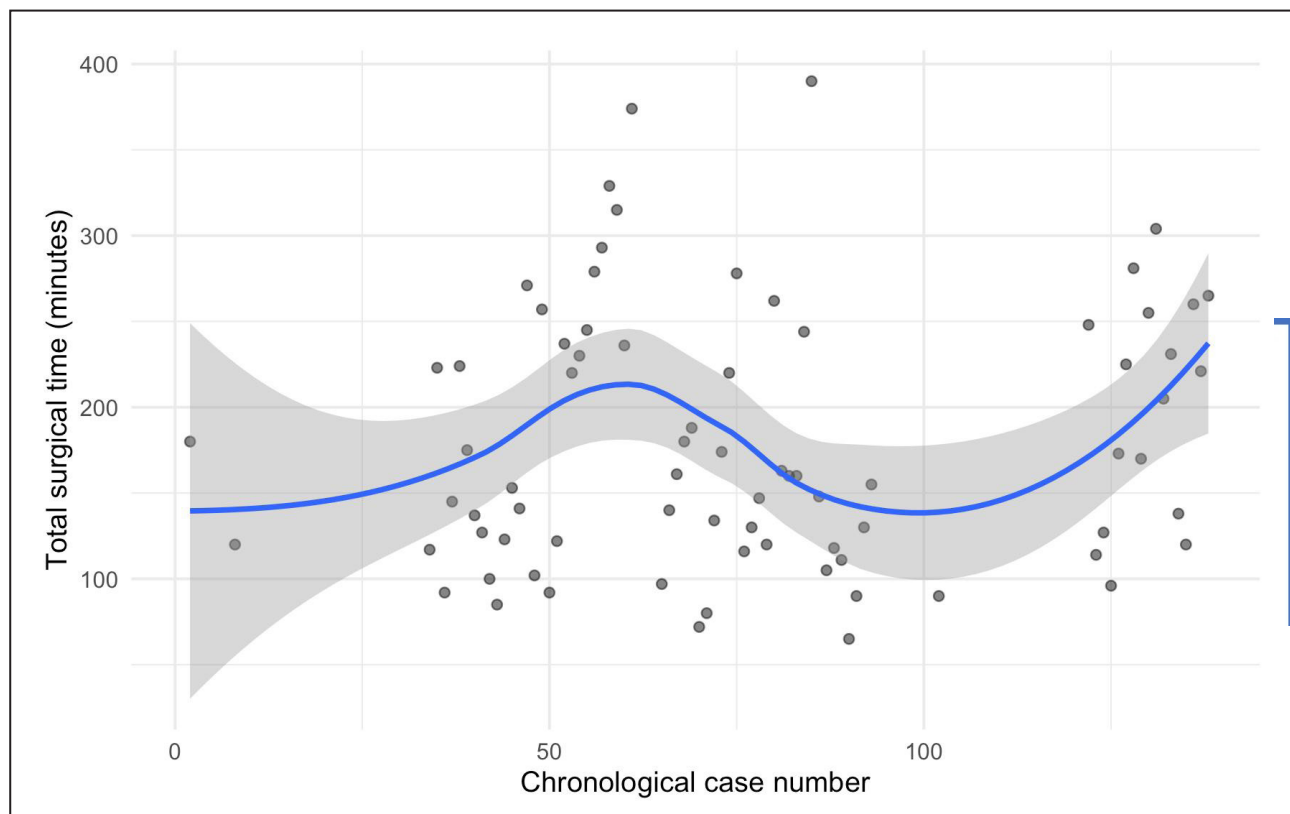


Figure 2. Chronological evolution of total surgical time during the institutional experience. Each point represents an individual procedure with available operative-time data. The blue line represents a locally estimated scatterplot smoothing (LOESS) curve, and the shaded area indicates its 95% confidence interval. Operative-time data were available for 77 of 138 procedures. Because documentation was incomplete and unevenly distributed across the case sequence, the curve should be interpreted as an exploratory representation.

operative PSA, prostate volume, and chronological case number were not significantly associated with 1-month continence. The adjusted odds ratios were 0.97 per additional year of age (95% CI 0.92–1.03; $P = 0.357$), 0.63 per one-unit increase in log-transformed PSA (95% CI 0.32–1.20; $P = 0.165$), 1.00 per unit increase in prostate volume (95% CI 0.98–1.01; $P = 0.701$), and 1.00 per chronological case (95% CI 0.99–1.02; $P = 0.442$). Postoperative urinary-continence outcomes are presented in Figure 3A.

Recovery of erectile function

Erectile-function status was available for 68 patients at 1 month, 57 at 3 months, 47 at 6 months, 25 at 12 months, and 18 at 24 months. Erections were reported by 27/68 evaluable patients at 1 month (39.7%), 32/57 at 3 months (56.1%), and 33/47 at 6 months (70.2%). At 12 and 24 months, erections were documented in 16/25 (64.0%) and 14/18 patients (77.8%), respectively. Erectile-function data completeness decreased from 49.3% of the total cohort at 1 month to 18.1% at 12 months and 13.0% at 24 months. Postoperative erectile-function outcomes are presented in Figure 3B.

Discussion

In this single-center retrospective study, we evaluated the perioperative, pathological, and functional outcomes of 138 patients who underwent radical prostatectomy using the lateroposterior approach–Gaston. Our main findings were the technical feasibility of incorporating posterior dissection into the standard lateral approach, a median total operative time of 160 minutes, and progressive recovery of urinary continence and erectile function during follow-up. However, the positive surgical-margin rate was substantial, operative-time documentation was incom-

plete, and the progressively smaller functional-outcome denominators limit conclusions regarding long-term recovery. Our findings should therefore be interpreted as an institutional assessment of feasibility and outcomes, and not as evidence of superiority over conventional radical prostatectomy.

The technique evaluated in this series was developed to preserve the anatomical structures involved in urinary continence and erectile function. Asimakopoulos *et al.* initially described preservation of the pubovesical complex, including the endopelvic fascia, dorsal vascular complex, detrusor apron, bladder neck, and native pubic attachments [7]. The technique was subsequently refined to incorporate intrafascial, tension-free, and energy-free dissection of the neurovascular bundles [8].

The lateroposterior approach permits early identification of the vas deferens and seminal vesicles through a close posterior dissection, after which dissection continues laterally to allow progressive release of the neurovascular tissue while limiting disruption of the anterior pelvic support structures. This approach is anatomically distinct from posterior-only Retzius-sparing prostatectomy, although both strategies share the objective of reducing damage to structures involved in continence recovery. The median total operative time of 160 minutes and docking time of 16 minutes recorded in our series indicate that the technique can be incorporated into a robotic surgical workflow without excessive procedural duration. Nevertheless, operative-time data were available for only 77 patients and were unevenly distributed across the chronological series. Median total operative time increased from 137 minutes in the first chronological third to 161 and 205 minutes in the second and final thirds, respectively. These differences were not statistically significant, and the data did not demonstrate the conventional reduction in operative time expected during a surgical learning curve. The

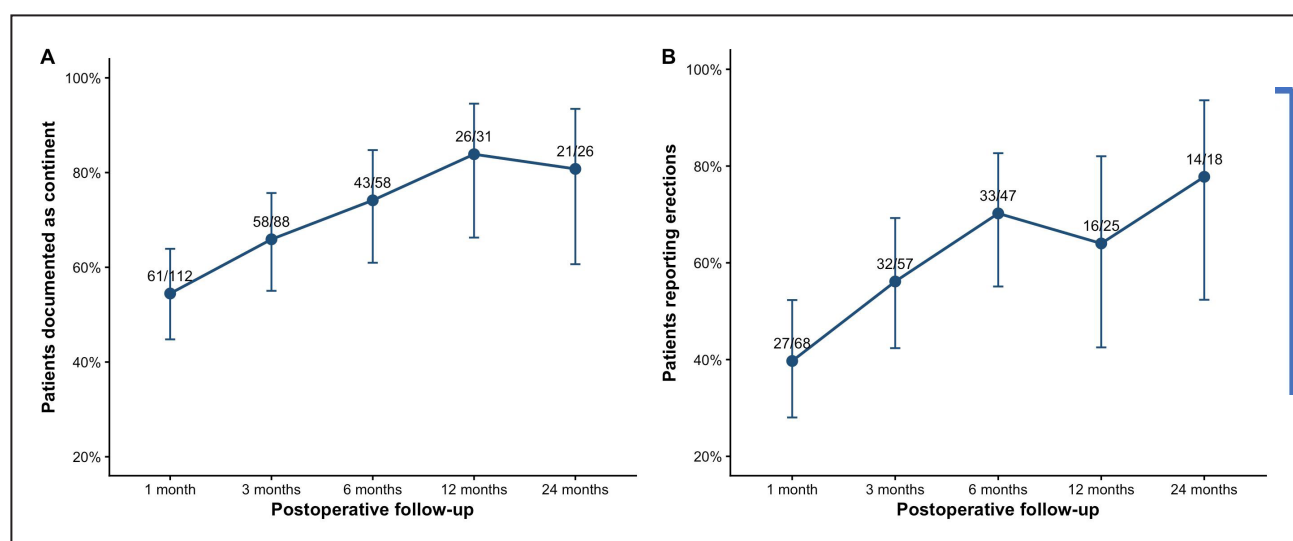


Figure 3. Recovery of urinary continence and erectile function after radical prostatectomy. (A) Proportion of evaluable patients achieving social continence, defined as the use of 0–1 pads per day, at each postoperative landmark. (B) Proportion of evaluable patients reporting erections at each postoperative landmark, irrespective of erectile-dysfunction treatment. Points represent observed proportions, error bars indicate exact 95% binomial confidence intervals, and labels show the number achieving the outcome divided by the number assessed (n/N). Lines connect cross-sectional estimates for visual clarity and do not represent complete paired longitudinal trajectories. Estimates at later follow-up should be interpreted cautiously because of the progressively smaller evaluable denominators.

apparent increase may reflect nonrandom documentation, changes in case complexity, different technical variants, surgeon or team composition, or progressive inclusion of patients with more challenging anatomy or higher-risk disease.

Systematic evaluations of robot-assisted radical prostatectomy have generally demonstrated low intraoperative mortality and major morbidity, although reported complication rates vary according to definitions, surveillance period, patient risk, and institutional experience [12]. Formal review and standardized grading of each event would strengthen the assessment of procedural safety and permit separate analysis of major complications.

Urinary continence improved progressively during the first postoperative year. Documented continence increased from 54.5% at 1 month to 65.9% at 3 months, 74.1% at 6 months, and 83.9% at 12 months. These findings are consistent with the anatomical premise that preservation of the bladder neck, urethral support, endopelvic fascia, and anterior pubovesical attachments may facilitate continence recovery [7, 8]. Current guidelines recognize bladder-neck preservation, maximization of membranous urethral length, and judicious nerve sparing as potentially important contributors to early continence recovery [2].

Randomized studies of other anatomy-preserving approaches provide additional context. Dalela *et al.* reported earlier continence recovery after Retzius-sparing robot-assisted radical prostatectomy than after a conventional anterior approach, with 71% versus 48% of patients continent 1 week after catheter removal [9]. Similarly, Qiu *et al.* found higher immediate continence after posterior surgery and a shorter overall time to recovery during 12 months of follow-up [10]. In the MASTER meta-analysis, Retzius-sparing surgery was associated with improved immediate continence, but the difference narrowed over time and was not significant at 12 months [11]. Although these procedures should not be considered technically equivalent to the lateroposterior approach evaluated here, they support the broader hypothesis that limiting disruption of periprostatic support structures may primarily influence early rather than definitive long-term continence.

Erectile-function recovery showed a similar progressive pattern. Erections were reported by 39.7% of evaluable patients at 1 month, 56.1% at 3 months, and 70.2% at 6 months. Rates at 12 and 24 months were 64.0% and 77.8%, respectively. These findings are compatible with the gradual recovery expected after neurovascular-bundle preservation and with the rationale for minimizing traction and thermal injury [4, 8]. The fascial plane of dissection, nerve-sparing extent, patient age, baseline erectile function, comorbidities, and postoperative rehabilitation can all influence erectile recovery [2, 4, 6]. However, these findings should be interpreted carefully. Only 68 patients had an evaluable assessment at 1 month, decreasing to 25 at 12 months and 18 at 24 months. Moreover, preoperative erectile function, bilateral versus unilateral nerve sparing, use of phosphodiesterase-5 inhibitors, and whether erections were sufficient for penetrative intercourse were not assessed in our study. The lack of distinction between

spontaneous and treatment-assisted erectile function also prevents direct comparison with studies using International Index of Erectile Function thresholds. Our estimates are therefore best regarded as descriptive signals that warrant prospective evaluation with validated patient-reported measures.

Pathological evaluation identified a positive surgical margin in 49.6% of evaluable specimens. This rate is higher than that reported in many contemporary robot-assisted prostatectomy series, in which overall margin rates commonly range from approximately 15% to 30%, although considerably higher rates occur in locally advanced disease and during early surgical experience [13, 14]. In a large multi-institutional series of robot-assisted radical prostatectomy, Patel *et al.* reported an overall positive-margin rate of 15.7%, with a substantial stage-specific difference between pT2 and pT3 disease [14]. Direct comparison with our cohort is not currently possible because the present population included a substantial proportion of intermediate- and high-grade tumors.

The high margin rate may reflect several overlapping factors. More than half of patients with available biopsy data had ISUP grade group 3–5 disease, suggesting a clinically relevant burden of aggressive cancer. In addition, the intrafascial plane places dissection close to the prostatic capsule, creating a potential trade-off between maximal functional preservation and oncological clearance. Comparative evidence suggests that nerve-sparing dissection may increase the risk of ipsilateral or side-specific positive surgical margins, particularly when extracapsular extension is not recognized preoperatively [15, 16]. The MASTER meta-analysis similarly identified a higher positive-margin risk after Retzius-sparing surgery in patients with organ-confined disease, despite an early continence advantage [11]. These observations emphasize that anatomy-preserving dissection must be individualized according to tumor location, magnetic resonance imaging findings, clinical stage, biopsy grade, and the estimated probability of extracapsular extension.

In our exploratory multivariable model, higher preoperative PSA was independently associated with positive surgical margins, whereas biopsy ISUP grade group, prostate volume, and chronological case number were not. A one-unit increase in natural-log-transformed PSA was associated with approximately twice the odds of a positive margin. This finding may reflect the association between increasing PSA and greater tumor burden or non-organ-confined disease. Nevertheless, the model did not include validated pathological stage, tumor laterality, anterior versus posterior tumor location, nerve-sparing extent, or surgeon, and residual confounding is therefore likely. Comparison between biopsy and prostatectomy specimens demonstrated pathological downgrading in 50.0%, no grade-group change in 30.3%, and upgrading in 19.7%.

The upgrading rate is compatible with the recognized limitations of biopsy sampling, but the high frequency of downgrading merits further investigation. Possible explanations include referral-pathology differences, heterogeneous biopsy techniques, treatment or selection effects,

and recording inconsistencies. Central review and calculation of weighted agreement between biopsy and prostatectomy ISUP grade groups would improve interpretation of these findings. Corona *et al.*, described a comparison in between Retzius-Sparing, and Postero Anterior modified approach, with better results for erectile function into the Postero-Anterior, the continence didnt showed any difference in between both techniques. However the lateral approach to the bundles by the anterior approaches has showed better outcomes [17].

This study has several strengths. It represents a large single-center experience with a specific anatomy-preserving approach in a tertiary-care hospital, a setting for which published evidence remains limited. Our analysis included perioperative, pathological, urinary, and sexual outcomes and reported the available denominator for each endpoint. We also examined chronological operative, safety, and oncological outcomes. However, several limitations must be acknowledged. First, the retrospective, uncontrolled design prevents causal attribution of functional outcomes to the lateroposterior approach; without a conventional prostatectomy comparison group, the present study cannot establish superiority in continence, erectile function, complications, or oncological control. Second, missingness was substantial for operative-time and functional variables and increased markedly during longer follow-up. Because landmark-specific eligibility could not be distinguished from missing assessments, these counts cannot be interpreted as loss-to-follow-up rates, and the later functional estimates may be affected by incomplete follow-up and selection of the evaluated patients. Moreover, the number of patients screened and excluded for each exclusion criterion was unavailable, limiting assessment of how the study cohort was assembled. Third, continence and erectile function were not measured consistently with validated patient-reported instruments, and baseline erectile function and nerve-sparing extent were unavailable. Finally, biochemical recurrence, metastasis-free survival, salvage treatment, and other long-term oncological outcomes were not sufficiently mature for analysis.

Conclusions

Robot-assisted radical prostatectomy using a lateroposterior approach, pubovesical complex-preserving approach was feasible within routine practice at a reference center and was associated with progressive recovery of documented urinary continence and erections among evaluable patients. We observed no reduction in operative time or improvement in surgical-margin rates. The substantial positive-margin rate highlights the importance of oncologically selective intrafascial dissection and improved preoperative risk stratification. Prospective comparative studies incorporating standardized nerve-sparing documentation, validated patient-reported outcomes, pathological-stage verification, and longer oncological follow-up are required to determine whether the anatomical preservation offered by this technique produces clinically meaningful benefits

without compromising cancer control.

Declarations

Author contributions: JDP, VECM and GR conceived the study. VECM, JDP, AB, ANM, CAGM, NNP, AVT, and DRE collected the data. VECM, JDP, AB, ANM, CAGM, NNP, AVT, and DRE the clinical and pathological records. VECM and CAGM performed the statistical analysis. VECM, CAGM figures and tables conceived, VECM, GR and CAGM drafted the manuscript. All authors critically revised, reviewed and approved the final version of the manuscript.

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Consent for publication: The Institutional Review Board waived the requirement for individual informed consent because of the retrospective nature of the study.

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