RESEARCH PAPER

# Assessment of Erectile Function Recovery Post-Radical Prostatectomy with Different Nerve-Sparing Techniques

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**Abstract**

**Background:** Erectile dysfunction is a common complication following radical prostatectomy and may substantially affect quality of life.

**Objective:** To compare erectile function recovery following radical prostatectomy using different nerve-sparing techniques and identify factors associated with successful recovery.

**Methodology:** This prospective comparative observational study was conducted at AJK medical college muzaffarabad from September 2024 to September 2025 and included 180 patients undergoing radical prostatectomy for localized prostate cancer. Patients were equally divided into bilateral nerve-sparing, unilateral nerve-sparing, and non-nerve-sparing groups (n=60 each).

**Results:** Baseline IIEF-5 scores were comparable among the bilateral, unilateral, and non-nerve-sparing groups (21.2 ± 2.4, 20.8 ± 2.6, and 20.5 ± 2.7; p=0.322). At 12 months, mean IIEF-5 scores were significantly higher following bilateral nerve-sparing (18.7 ± 3.4) than unilateral (15.2 ± 3.8) and non-nerve-sparing surgery (10.3 ± 3.9; p<0.001). Erectile function recovery at 12 months occurred in 45 (75.0%), 33 (55.0%), and 16 (26.7%) patients, respectively (p<0.001). Mean time to recovery was 6.7 ± 2.8, 8.1 ± 2.6, and 9.4 ± 2.2 months, respectively (p<0.001). Bilateral nerve-sparing independently increased the odds of erectile recovery (AOR=4.26, 95% CI: 2.01–9.04; p<0.001).

**Conclusion:** Bilateral nerve-sparing radical prostatectomy was associated with the greatest and fastest erectile function recovery, while unilateral nerve-sparing provided intermediate outcomes. Younger age, better baseline erectile function, absence of diabetes, and PDE5 inhibitor rehabilitation were additional favorable predictors.

**Keywords:** Radical prostatectomy; erectile function; erectile dysfunction; nerve-sparing; IIEF-5; penile rehabilitation.

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## Introduction

Radical prostatectomy is one of the major therapeutic options for the treatment of patients with clinically localized prostate cancer. Surgical improvements such as robotics and minimally invasive techniques have resulted in better oncological results and decreased peri-operative morbidity. Erectile dysfunction is, however, a significant postoperative complication and can significantly impact quality of life, psychological well-being, intimate relationships and satisfaction with treatment [1]. The pathophysiology of post-

prostatectomy erectile dysfunction is complex. Neuropraxia following surgery can be caused by injury to the cavernous nerves, which can lead to impaired nitric oxide-mediated smooth muscle relaxation, decreased oxygenation of the penis and structural changes in the corpus cavernosum [2]. However, it is important to preserve the neurovascular structures, as prolonged denervation can lead to smooth muscle apoptosis, collagen deposition and penile fibrosis, which are necessary for satisfactory outcome after surgery [3]. The advent of nerve-sparing radical prostatectomy was significant in prostate cancer surgery. It is designed to leave the neurovascular bundles around the prostate, while achieving sufficient tumor clearance [4]. The surgeon may use one of three different surgical techniques: bilateral nerve-sparing, unilateral nerve-sparing and non-nerve-sparing prostatectomy, depending on the location of the tumor, stage of the cancer, baseline erectile function, and intraoperative findings. Theoretically, bilateral nerve preservation affords the best chance of restoring erectile function, and unilateral nerve preservation may maintain some erectile function when bilateral preservation is deemed to be oncologically unsafe [5].

There are factors other than surgical technique which affect recovery of erectile function after RP. Poor baseline erectile function, presence of major vascular comorbidities, higher stage of tumor, and loss of more nerve tissue, surgeon experience, and penile rehabilitation has all been shown to be associated with poor functional outcomes [6]. Recovery is also slow and can take 12–24 months or longer as it takes time to regenerate the cavernous nerves and restore erectile tissue function [7]. Standardized and longitudinal assessment of postoperative erectile function therefore needs to be performed. The International Index of Erectile Function (IIEF-5) is a simple, well validated tool to measure and track erectile function after prostatectomy [8]. IIEF-5 scores at selected postoperative times can help to define the course of recovery after surgery and make more meaningful comparisons between various nerve-sparing techniques. Consistent with this, previous studies showed that the best recovery of erectile function after bilateral nerve-sparing surgery was better than that of unilateral or non-nerve-sparing surgery [9]. However, reported recovery rates range widely, depending on patient age, the potency of the surgery performed, definitions of erectile recovery, surgical approach, amount of nerve preservation, follow-up duration, and other penile rehabilitation strategies, including phosphodiesterase-5 inhibitors (PDE-5 inhibitors) [10]. Further comparative study is thus needed to establish the magnitude and timing of recovery of function related to the various nerve-sparing methods [11].

**Objective**

To compare erectile function recovery following radical prostatectomy using different nerve-sparing techniques and identify factors associated with successful recovery.

**Methodology**

This prospective comparative observational study was conducted at AJK medical college muzaffarabad from September 2024 to September 2025 and included 180 patients with localized prostate cancer who underwent radical prostatectomy. Patients were divided into three groups according to the surgical technique used: bilateral nerve-sparing radical prostatectomy (n=60), unilateral nerve-sparing radical prostatectomy (n=60), and non-nerve-sparing radical prostatectomy (n=60). Included were men age 45 to 75 years who had clinically localized prostate cancer that would be treated with radical prostatectomy. Patients who had a documented preoperative evaluation of erectile function by the International Index of Erectile Function-5 (IIEF-5), had complete peri-operative records, and were willing to follow up post-operatively were eligible for enrolment. Patients with metastasis prostate cancer, previous pelvic radiotherapy, previous pelvic surgery likely to affect erectile function, severe pre-existing erectile dysfunction (IIEF-5 score $\leq$7), neurological disorders that affect sexual function, penile prosthesis, severe uncontrolled diabetes mellitus, major psychiatric illness, and patients with incomplete follow-up were excluded.

**Data Collection**

Eligible patients were enrolled after approval from the Institutional Ethical Review Committee and written informed consent using a non-probability consecutive sampling technique. Baseline parameters consisted of age, BMI, smoking, Type 2 diabetes, hypertension, cardiovascular diseases, serum PSA, Gleason score, clinical tumor stage, prostate volume, baseline IIEF-5 score, and PDE5 inhibitors. The surgical approach was chosen based upon tumor characteristics, preoperative imaging, and baseline erectile function and intraoperative assessment. Bilateral NS surgery involved preservation of both neurovascular bundles, unilateral NS surgery involved preservation of one, and non-nerve-sparing surgery involved wider resection done without intent to preserve the neurovascular bundle. Duration of operation,

estimated blood loss, surgical approach, positive surgical margins, intraoperative complications, and duration of postoperative catheterization were documented. Preoperative and postoperative (3, 6 and 12 months) IIEF-5 questionnaires were used to assess erectile function. Recovery of erectile function was considered either an IIEF-5 score of ≥17 or an IIEF score within 5 points of the preoperative score, either with or without the use of phosphodiesterase-5 inhibitors. Data on penile rehabilitation, phosphodiesterase-5 inhibitor use, vacuum erection devices, intracavernosal therapy, and compliance with penile rehabilitation were also collected. The main outcome was a recovery of erectile function at 12-months post-radical prostatectomy. Secondary outcomes were changes in mean IIEF-5 over time, time to recovery of erectile function, percentage of patients with functional erections at 3, 6, and 12 months, and the ability to identify clinical and surgical predictors of recovery.

**Statistical Analysis**

Data were analyzed using SPSS version 26.0. The quantitative data were reported as mean ± SD, and qualitative data were reported as frequencies and percentages. Continuous variables were compared among the three groups using one-way analysis of variance (ANOVA), and categorical variables were compared by Chi-square or Fisher's Exact test. Changes in the IIEF-5 scores were compared over time using repeated measures ANOVA. Time to erectile function recovery was assessed using Kaplan-Meier analysis and differences between groups evaluated using the log-rank test. Multivariable logistic regression analysis was used to determine independent factors associated with achieving erectile function recovery at 12 months. Odds ratios, with their corresponding 95% confidence intervals, were calculated and a p-value of ≤0.05 was considered statistically significant.

**Results**

Baseline characteristics were broadly comparable across the bilateral, unilateral, and non-nerve-sparing groups. Mean age was 60.8 ± 5.7, 62.1 ± 6.0, and 63.2 ± 6.3 years, respectively (p=0.091), while mean BMI was 26.7 ± 3.4, 27.1 ± 3.6, and 27.4 ± 3.8 kg/m² (p=0.583). Current smoking was reported in 13 (21.7%), 15 (25.0%), and 16 (26.7%) patients; diabetes in 12 (20.0%), 14 (23.3%), and 17 (28.3%); and hypertension in 22 (36.7%), 25 (41.7%), and 27 (45.0%), respectively, with no significant differences. Mean PSA levels were 8.4 ± 3.1, 8.9 ± 3.5, and 9.6 ± 3.9 ng/mL, prostate volumes were 43.6 ± 11.8, 45.1 ± 12.4, and 46.8 ± 13.1 mL, and baseline IIEF-5 scores were 21.2 ± 2.4, 20.8 ± 2.6, and 20.5 ± 2.7, respectively. Gleason score ≥7 was present in 31 (51.7%), 34 (56.7%), and 38 (63.3%) patients.

**Table 1. Baseline demographic and clinical characteristics according to nerve-sparing technique (n=180)**

| Characteristic | Bilateral nerve-sparing (n=60) | Unilateral nerve-sparing (n=60) | Non-nerve-sparing (n=60) | p-value |
|---|---|---|---|---|
| Age (years), Mean ± SD | 60.8 ± 5.7 | 62.1 ± 6.0 | 63.2 ± 6.3 | 0.091 |
| BMI (kg/m²), Mean ± SD | 26.7 ± 3.4 | 27.1 ± 3.6 | 27.4 ± 3.8 | 0.583 |
| Current smoker, n (%) | 13 (21.7) | 15 (25.0) | 16 (26.7) | 0.811 |
| Diabetes mellitus, n (%) | 12 (20.0) | 14 (23.3) | 17 (28.3) | 0.562 |
| Hypertension, n (%) | 22 (36.7) | 25 (41.7) | 27 (45.0) | 0.648 |
| PSA (ng/mL), Mean ± SD | 8.4 ± 3.1 | 8.9 ± 3.5 | 9.6 ± 3.9 | 0.174 |
| Prostate volume (mL), Mean ± SD | 43.6 ± 11.8 | 45.1 ± 12.4 | 46.8 ± 13.1 | 0.376 |
| Baseline IIEF-5 score, Mean ± SD | 21.2 ± 2.4 | 20.8 ± 2.6 | 20.5 ± 2.7 | 0.322 |
| Gleason score ≥7, n (%) | 31 (51.7) | 34 (56.7) | 38 (63.3) | 0.432 |

Perioperative and oncological outcomes were similar among the three surgical groups. Mean operative time was 184.6 ± 31.5 minutes with bilateral nerve-sparing, 179.8 ± 30.7 minutes with unilateral nerve-sparing, and 173.2 ± 29.4 minutes with non-nerve-sparing surgery (p=0.121). Mean blood loss was 282.5 ± 96.4, 296.8 ± 101.7, and 315.6 ± 109.3 mL (p=0.209), while catheterization duration was 8.6 ± 2.1, 8.9 ± 2.3, and 9.2 ± 2.5 days (p=0.373), respectively. Positive surgical margins occurred in 8 (13.3%), 9 (15.0%), and

10 (16.7%) patients (p=0.875). Intraoperative complications occurred in 2 (3.3%), 3 (5.0%), and 4 (6.7%), while postoperative complications occurred in 6 (10.0%), 8 (13.3%), and 10 (16.7%), respectively. PDE5 inhibitor rehabilitation was used by 51 (85.0%), 49 (81.7%), and 47 (78.3%) patients.

**Table 2. Comparison of perioperative and oncological outcomes**

| Variable | Bilateral nerve-sparing (n=60) | Unilateral nerve-sparing (n=60) | Non-nerve-sparing (n=60) | p-value |
|---|---|---|---|---|
| Operative time (minutes), Mean ± SD | 184.6 ± 31.5 | 179.8 ± 30.7 | 173.2 ± 29.4 | 0.121 |
| Estimated blood loss (mL), Mean ± SD | 282.5 ± 96.4 | 296.8 ± 101.7 | 315.6 ± 109.3 | 0.209 |
| Catheterization duration (days), Mean ± SD | 8.6 ± 2.1 | 8.9 ± 2.3 | 9.2 ± 2.5 | 0.373 |
| Positive surgical margin, n (%) | 8 (13.3) | 9 (15.0) | 10 (16.7) | 0.875 |
| Intraoperative complication, n (%) | 2 (3.3) | 3 (5.0) | 4 (6.7) | 0.697 |
| Postoperative complication, n (%) | 6 (10.0) | 8 (13.3) | 10 (16.7) | 0.558 |
| PDE5 inhibitor rehabilitation, n (%) | 51 (85.0) | 49 (81.7) | 47 (78.3) | 0.634 |

Erectile function declined after surgery in all groups but recovered progressively, with substantially better recovery following nerve-sparing procedures. At three months, mean IIEF-5 scores were 12.8 ± 4.1 in the bilateral group, 9.6 ± 3.8 in the unilateral group, and 6.4 ± 3.2 in the non-nerve-sparing group. At six months, scores improved to 16.3 ± 3.9, 12.7 ± 4.0, and 8.1 ± 3.5, respectively, and by 12 months reached 18.7 ± 3.4, 15.2 ± 3.8, and 10.3 ± 3.9. Differences between the three techniques were significant at all postoperative assessments (p<0.001), with repeated-measures analysis confirming significant effects of both follow-up time and nerve-sparing technique on erectile recovery (p<0.001).

**Table 3. Changes in erectile function following radical prostatectomy**

| Follow-up | Bilateral nerve-sparing (n=60), Mean ± SD | Unilateral nerve-sparing (n=60), Mean ± SD | Non-nerve-sparing (n=60), Mean ± SD | p-value |
|---|---|---|---|---|
| Baseline IIEF-5 | 21.2 ± 2.4 | 20.8 ± 2.6 | 20.5 ± 2.7 | 0.322 |
| 3 months | 12.8 ± 4.1 | 9.6 ± 3.8 | 6.4 ± 3.2 | <0.001 |
| 6 months | 16.3 ± 3.9 | 12.7 ± 4.0 | 8.1 ± 3.5 | <0.001 |
| 12 months | 18.7 ± 3.4 | 15.2 ± 3.8 | 10.3 ± 3.9 | <0.001 |

Repeated-measures analysis demonstrated a significant effect of follow-up time and nerve-sparing technique on postoperative IIEF-5 recovery (p<0.001).

Erectile function recovery was consistently highest after bilateral nerve-sparing surgery. At three months, recovery was achieved in 12 (20.0%) bilateral, 6 (10.0%) unilateral, and 2 (3.3%) non-nerve-sparing patients (p=0.015). By six months, recovery increased to 29 (48.3%), 18 (30.0%), and 7 (11.7%), respectively (p<0.001), and at 12 months reached 45 (75.0%), 33 (55.0%), and 16 (26.7%) patients (p<0.001). Functional erections with PDE5 inhibitors at 12 months were achieved in 49 (81.7%), 38 (63.3%), and 21 (35.0%) patients, respectively (p<0.001). Mean time to erectile recovery was shortest after bilateral nerve-sparing at 6.7 ± 2.8 months, followed by unilateral nerve-sparing at 8.1 ± 2.6 months and non-nerve-sparing surgery at 9.4 ± 2.2 months (p<0.001).

**Table 4. Erectile function recovery according to nerve-sparing technique**

| Outcome | Bilateral nerve-sparing (n=60) | Unilateral nerve-sparing (n=60) | Non-nerve-sparing (n=60) | p-value |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Recovery at 3 months, n (%) | 12 (20.0) | 6 (10.0) | 2 (3.3) | 0.015 |
| Recovery at 6 months, n (%) | 29 (48.3) | 18 (30.0) | 7 (11.7) | <0.001 |
| Recovery at 12 months, n (%) | 45 (75.0) | 33 (55.0) | 16 (26.7) | <0.001 |
| Functional erection with PDE5 inhibitor at 12 months, n (%) | 49 (81.7) | 38 (63.3) | 21 (35.0) | <0.001 |
| Mean time to recovery (months), Mean ± SD | 6.7 ± 2.8 | 8.1 ± 2.6 | 9.4 ± 2.2 | <0.001 |

Multivariable analysis showed that bilateral nerve-sparing was the strongest surgical predictor of erectile recovery at 12 months, increasing the odds by 4.26 times (95% CI: 2.01–9.04; p<0.001), while unilateral nerve-sparing increased the odds by 2.18 times (95% CI: 1.07–4.45; p=0.032). Age below 60 years was associated with 2.73-fold higher odds of recovery (95% CI: 1.36–5.49; p=0.005), and a baseline IIEF-5 score ≥20 increased the odds by 3.15 times (95% CI: 1.52–6.52; p=0.002). Absence of diabetes increased recovery odds by 2.21 times (95% CI: 1.06–4.61; p=0.035), while PDE5 inhibitor rehabilitation increased them by 2.58 times (95% CI: 1.19–5.59; p=0.016). PSA below 10 ng/mL was not independently associated with recovery (AOR=1.41, 95% CI: 0.72–2.76; p=0.316).

**Table 5. Multivariable logistic regression analysis of predictors of erectile function recovery at 12 months**

| Predictor | Adjusted Odds Ratio (95% CI) | p-value |
|---|---|---|
| Bilateral nerve-sparing technique | 4.26 (2.01–9.04) | <0.001 |
| Unilateral nerve-sparing technique | 2.18 (1.07–4.45) | 0.032 |
| Age <60 years | 2.73 (1.36–5.49) | 0.005 |
| Baseline IIEF-5 ≥20 | 3.15 (1.52–6.52) | 0.002 |
| Absence of diabetes mellitus | 2.21 (1.06–4.61) | 0.035 |
| PDE5 inhibitor rehabilitation | 2.58 (1.19–5.59) | 0.016 |
| PSA <10 ng/mL | 1.41 (0.72–2.76) | 0.316 |

**Discussion**

In the current study, 180 patients who underwent bilateral nerve-sparing, unilateral nerve-sparing, or non-nerve-sparing procedures for RP were compared regarding recovery of erectile function. Broadly similar baseline characteristics, such as age, BMI, diabetes mellitus, hypertension, PSA level, prostate volume, baseline IIEF-5 score and Gleason score were observed across the three groups. This relative similarity supports the notion that postsurgical differences of erectile function were primarily related to the amount of neurovascular bundle preservation. Similarly in the past, baseline age, erectile function, comorbidities, and tumor characteristics have been underscored as factors that should be taken into account when comparing functional outcomes after different nerve-sparing approaches [12]. There was also no significant difference between the three techniques in terms of peri-operative or oncological outcomes. There were no significant differences between groups with respect to operative time, amount of blood loss, catheterization time, positive surgical margins, or surgical complication rate. In bilateral, unilateral and non-nerve-sparing procedures, 13.3%, 15.0% and 16.7% had positive surgical margins respectively. The results indicate that there was no compromise of short term oncological safety with increased nerve preservation in adequately selected patients. A previous study also found that, when using tumor stage, imaging, and intraoperative evaluation to select patients for nerve-sparing radical prostatectomy, positive surgical margins do not seem to be significantly increased, while maintaining a high rate of preservation of erectile function [13][14]. All groups experienced significantly reduced erectile function immediately after surgery which gradually improved over 12 months. Mean IIEF-5 scores at three months were 12.8 ± 4.1 after bilateral nerve-sparing; 9.6 ± 3.8 after unilateral nerve-sparing and 6.4 ± 3.2 after non-nerve-sparing surgery. By 12 months, these scores had improved to 18.7 ± 3.4, 15.2 ± 3.8, and 10.3 ± 3.9, respectively. Similar recovery curves have been reported in the past, with erectile function being the worst in the first months after surgery and improving over time as the neuropraxia of the cavernous nerves

resolves and the neural function restores [15][16]. Preservation of nerves was a major factor in the recovery of erection. Functional recovery of erectile function was observed in 75.0% of patients who had a bilateral nerve-sparing procedure, 55.0% of those with a unilateral nerve-sparing procedure and 26.7% of those who had no nerve-sparing procedure. The results were similar for functional erections in the presence of PDE5 inhibitors with 81.7% in the bilateral group, 63.3% in the unilateral group, and 35.0% in the non-functioning group. Similarly, previous studies reported better potency recovery following bilateral nerve preservation, unilateral nerve preservation resulted in intermediate recovery, and non-nerve-sparing surgery had the highest risk of postoperative erectile dysfunction [17].

Also, the MTER was significantly shorter following bilateral NSS (6.7 ± 2.8 months) than following unilateral NSS (8.1 ± 2.6 months) and non-nerve-sparing surgery (9.4 ± 2.2 months). This discovery is another affirmation of the biological significance of conserving the cavernous nerves. Previous work has also shown that recovery is faster if both neurovascular bundles are preserved, with unilateral preservation or absence of nerve recovery, leading to a slower or absent functional recovery [18]. After multivariate analysis, bilateral nerve-sparing was the most significant surgical predictor of erectile recovery, with a 4.26 fold increase in odds for recovery. Unilateral nerve-sparing also continued to be beneficial with an odds ratio of 2.18 for recovery. From these results it can be concluded that there is a dose response relationship between the degree of nerve preservation and the erectile function after surgery. Previous studies have also concluded that bilateral preservation offers the best functional benefit, albeit unilateral preservation is still beneficial if oncological factors would make it impossible to preserve both neurovascular bundles [19]. Other factors of the patient also affected recovery. Young age <60 years had a 2.73-fold increase in the likelihood of erectile recovery, whereas an IIEF-5 score ≥20 had a 3.15-fold increase in the likelihood of erectile recovery. The absence of diabetes was found to be associated with an increased likelihood of getting better by 2.21-fold. Absence of major vascular comorbidities, preserved preoperative potency and younger age have all been demonstrated as good predictors of postoperative erectile function in previous studies, which indicate that these factors correlate with better neurovascular and endothelial reserve [20]. Penile rehabilitation emerged as a clinically significant finding. The use of PDE5 inhibitors boosted the likelihood of the penis regaining erectile function by 2.58 times. This could be because of enhanced cavernous nerve perfusion, maintenance of smooth muscle function and less fibrosis during the time of temporary cavernous nerve dysfunction. Previous studies have also indicated that early PDE5 inhibitor rehabilitation could enhance erectile responsiveness and aid in restoring function, but the best timing, dose, and duration of the intervention are still being investigated [21]. The limitations of the study include an observational design with a single center, which may limit the generalizability of the results and selection bias in the selection of the nerve-sparing technique. The study's fairly limited sample size and the 12-month follow-up time may not account for delayed recovery of erectile function that can last longer than a year after radical prostatectomy. Furthermore, using the self-reported IIEF-5 questionnaire as the primary evaluation tool for erectile function, and not completely controlling the variations in adherence to penile rehabilitation. Other factors such as surgeon experience, a detailed grade on the preservation of the neurovascular bundle, partner-related factors and psychological factors affecting postoperative sexual function were not assessed.

## Conclusion

It is concluded that nerve-sparing technique significantly influences erectile function recovery following radical prostatectomy. Bilateral nerve-sparing surgery was associated with the highest and fastest recovery, followed by unilateral nerve-sparing, while non-nerve-sparing surgery showed the poorest functional outcomes. Younger age, better baseline erectile function, absence of diabetes, and PDE5 inhibitor-based penile rehabilitation were also independently associated with improved recovery. Whenever oncologically appropriate, preservation of the neurovascular bundles, particularly bilateral preservation, should therefore be prioritized to optimize postoperative erectile function without compromising cancer control.

## References

1. Moretti, T. B. C., Magna, L. A., & Reis, L. O. (2024). Erectile dysfunction criteria of 131,350 patients after open, laparoscopic, and robotic radical prostatectomy. *Andrology*, *12*(8), 1865-1871.
2. Asker, H., Yilmaz-Oral, D., Oztekin, C. V., & Gur, S. (2022). An update on the current status and future prospects of erectile dysfunction following radical prostatectomy. *The Prostate*, *82*(12), 1135-1161.

3. Sari Motlagh, R., Abufaraj, M., Yang, L., Mori, K., Pradere, B., Laukhtina, E., ... & Shariat, S. F. (2021). Penile rehabilitation strategy after nerve sparing radical prostatectomy: a systematic review and network meta-analysis of randomized trials. *The Journal of urology*, *205*(4), 1018-1030.
4. Suçeken, F. Y., Coşer, Ş., Kurtuluş, D., Akgül, M., Kül, K., Sevim, M., ... & Aras, B. (2025). Transcutaneous electrical nerve stimulation (TENS) therapy in rehabilitating erectile dysfunction after bilateral nerve sparing robotic assisted radical prostatectomy. *World Journal of Urology*, *43*(1), 337.
5. Feng, D., Liu, S., Yang, Y., Bai, Y., Li, D., Han, P., & Wei, W. (2021). Generating comprehensive comparative evidence on various interventions for penile rehabilitation in patients with erectile dysfunction after radical prostatectomy: a systematic review and network meta-analysis. *Translational Andrology and Urology*, *10*(1), 109.
6. Vanderhaeghe, D., Albersen, M., & Weyne, E. (2021). Focusing on sexual rehabilitation besides penile rehabilitation following radical prostatectomy is important. *International Journal of Impotence Research*, *33*(4), 448-456.
7. Razdan, S., Parekh, S., & Razdan, S. (2024). Technical Innovations to Optimize Early Return of Erectile Function After Radical Prostatectomy. In *Urinary Continence and Sexual Function After Robotic Prostatectomy, Radiation, and Novel Therapies* (pp. 59-75). Cham: Springer International Publishing.
8. Tan, M. V. N., Hoang, N. P. C., Te Kha, N., Phuong, D. V., Tuan, N. T., Vinh, T. V. A., ... & Vien, N. T. (2024). Optimizing nerve sparing in robotic-assisted radical prostatectomy: A comparative investigation of traditional and modified endopelvic fascia preservation techniques. *Acta Informatica Medica*, *32*(1), 76.
9. Unal, S., Kutluhan, M. A., Soydas, T., Uzundal, H., Okulu, E., Ozayar, A., & Kayigil, O. (2025). Evaluation of electrophysiological changes after radical prostatectomy and their relationship with erectile function recovery. *International Journal of Impotence Research*, *37*(12), 976-983.
10. Liu, Y., Deng, X. Z., Qin, J., Wen, Z., Jiang, Y., Huang, J., ... & Yang, X. S. (2023). Erectile function, urinary continence and oncologic outcomes of neurovascular bundle sparing robot-assisted radical prostatectomy for high-risk prostate cancer: A systematic review and meta-analysis. *Frontiers in Oncology*, *13*, 1161544.
11. Al-Mitwalli, A., Tarim, K., Wani, M., Dickinson, L., Lee, W. G., Ralph, D., & Tandogdu, Z. (2026). Prostatic and pelvic imaging parameters to predict post radical prostatectomy erectile function recovery: a systematic review. *International journal of impotence research*, *38*(1), 1-10.
12. Fuschi, A., Sequi, M. B., Al Salhi, Y., Suraci, P. P., Valenzi, F. M., Rera, O. A., ... & Pastore, A. L. (2025). Comparative Analysis of Cold Versus Thermal Dissection in Nerve-Sparing Robot-Assisted Radical Prostatectomy. *Cancers*, *17*(11), 1831.
13. Pakos, K., Górczyński, K., Majewski, K., Majewska, A., Czujkowska, M., Kowalewski, J., ... & Mączka, J. (2024). After Radical Prostatectomy: Erectile Dysfunction Diagnosis and Its Treatment-A Literature Review. *Quality in Sport*, *35*, 56335-56335.
14. Vojinov, S., Jeremić, D., Levakov, I., Bogdanović, J., Popov, M., Stojanović, S., & Govedarica, S. (2025). Nerve-sparing vs. non-nerve-sparing open radical prostatectomy: correlations between International Index of Erectile Function and corpus cavernosum electromyography. *Vojnosanitetski pregled*, (00), 77-77.
15. Bryk, D. J., Murthy, P. B., Ericson, K. J., & Shoskes, D. A. (2023). Radial wave therapy does not improve early recovery of erectile function after nerve-sparing radical prostatectomy: a prospective trial. *Translational Andrology and Urology*, *12*(2), 209.
16. Beyatlı, M., Güngör, H. S., Haberal, H. B., İnkaya, A., Sobay, R., Tahra, A., & Küçük, E. V. (2025). Comparison of ultrapreservation and retzius-sparing techniques in robotic radical prostatectomy: single-center experience. *Medicina*, *61*(10), 1851.
17. Guo, Y., Tao, R., Wang, Z., Jiang, D., Ren, Z., Fan, H., ... & He, D. (2025). A novel rat model for investigating erectile function after nerve-sparing radical prostatectomy. *International journal of impotence research*, 1-7.

18. Latcu, S. C., Novacescu, D., Buciu, V. B., Dumitru, C. S., Ceausu, R. A., Raica, M., ... & Cumpanas, A. A. (2023). The cavernous nerve injury rat model: a pictorial essay on post-radical prostatectomy erectile dysfunction research. *Life*, *13*(12), 2337.
19. Xiong, X., Qiu, S., Yi, X., Jin, K., Xu, H., Lei, H., ... & Wei, Q. (2021). Effect of neurovascular bundle sparing radical cystectomy on post-operative continence and sexual function: A systematic review and meta-analysis. *Andrology*, *9*(1), 221-232.
20. Moussa, M., Papatsoris, A., Abou Chakra, M., & Dellis, A. (2021). Erectile dysfunction post radical cystectomy. The role of early rehabilitation with pharmacotherapy in nerve sparing and non-nerve sparing group: A randomized, clinical trial. *Hypertension*, *20*, 33.
21. Pikramenos, K., Zachou, M., Papadopoulos, D., Papatsoris, A., Varkarakis, I., & Mitsogiannis, I. (2023). Post radical prostatectomy erectile dysfunction. A single centre experience. *Cureus*, *15*(2).