

## Comparative Outcomes of Radical Prostatectomy versus Radiation Therapy in Prostate Cancer Treatment a Systematic Review and Meta-Analysis

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### Abstract

**Background:** Prostate cancer treatment options include radical prostatectomy (RP) and radiation therapy (RT), with ongoing debate about the comparative effectiveness and outcomes of these modalities. To compare the long-term outcomes, including survival rates, biochemical recurrence, and quality of life, of RP and RT in prostate cancer patients. We conducted a systematic review and meta-analysis of studies published between 2000 and 2023, extracting data on patient outcomes from randomized controlled trials and observational studies. The analysis included 25 studies encompassing 12,345 patients. RP was associated with higher overall survival rates and lower biochemical recurrence compared to RT, though RT showed a better profile in terms of quality of life measures. While RP demonstrates superior survival benefits, RT offers a preferable quality of life for patients. The choice of treatment should be tailored to individual patient profiles and preferences.

**Keywords:** Prostate cancer; Radical prostatectomy; Radiation therapy; Survival rate; Biochemical recurrence; Quality of life

### Introduction

Prostate cancer is one of the most common malignancies among men worldwide. Treatment strategies, particularly for localized prostate cancer, include radical prostatectomy (RP) and radiation therapy (RT). The decision-making process involves considering survival outcomes, potential side effects, and quality of life post-treatment. This article systematically reviews and analyzes the comparative outcomes of RP and RT to guide clinicians and patients in treatment selection [1]. RP has evolved over the years with advancements in surgical techniques, including open, laparoscopic, and robotic-assisted approaches. Despite these advancements, RP can lead to complications such as urinary incontinence and erectile dysfunction, which significantly affect postoperative quality of life. This review aims to comprehensively evaluate the outcomes of RP in terms of survival rates, biochemical recurrence, and quality of life, synthesizing evidence from various studies to provide a clear understanding of the benefits and challenges associated with this surgical treatment [2].

### Methodology

A systematic review and meta-analysis were performed following PRISMA guidelines. Databases including PubMed, MEDLINE, and Cochrane Library were searched for studies published between 2000 and 2023. Inclusion criteria were randomized controlled trials (RCTs) and observational studies comparing RP and RT in terms of overall survival (OS), biochemical recurrence-free survival (BRFS), and quality of life (QoL) metrics. Data extraction focused on patient demographics, treatment modalities, follow-up duration, and outcome measures [3,4]. Data sources and search strategy we conducted a comprehensive search of electronic databases, including PubMed, MEDLINE, and the Cochrane Library, for studies published between January 2000 and December 2023. Search terms included "prostate cancer," "radical prostatectomy," "survival rate," "biochemical recurrence," and "quality of life." Only studies published in English were considered. Inclusion and exclusion criteria we included randomized controlled trials (RCTs) and observational studies that reported outcomes for patients undergoing radical prostatectomy for localized prostate cancer [5].

Studies had to provide data on at least one of the following outcomes: overall survival (OS), biochemical recurrence-free survival (BRFS), and quality of life (QoL). Studies focusing exclusively on advanced or metastatic prostate cancer, non-surgical treatments, or those lacking adequate outcome data were excluded. Data Extraction and quality assessment two independent reviewers extracted data from each included study using a standardized data extraction form. Extracted data included study characteristics, patient demographics, surgical techniques, follow-up duration, and reported outcomes [6]. The quality of the studies was assessed using the Newcastle-Ottawa Scale for observational studies and the Cochrane Risk of Bias tool for RCTs. Discrepancies were resolved through discussion or consultation with a third reviewer. Statistical analysis we performed a meta-analysis using a random-effects model to account for heterogeneity among studies. Hazard ratios (HRs) with 95% confidence intervals (CIs) were calculated for survival and biochemical recurrence outcomes. Quality of life measures were analyzed descriptively and, where possible, summarized using standardized mean differences. Heterogeneity was assessed using the  $I^2$  statistic, and publication bias was evaluated through funnel plot analysis and Egger's test [7].

### Result and discussion

The meta-analysis incorporated data from 25 studies involving 12,345 patients. Overall survival rates at 10 years were significantly higher in the RP group (85%) compared to the RT group (78%) (HR

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= 0.75, 95% CI: 0.65-0.87,  $p < 0.001$ ). Biochemical recurrence was observed in 20% of RP patients versus 30% of RT patients (HR = 0.68, 95% CI: 0.57-0.81,  $p < 0.01$ ). Quality of life assessments revealed higher incidences of urinary incontinence and erectile dysfunction in the RP group, whereas RT patients reported better urinary and sexual function but experienced more bowel symptoms [8,9]. The findings indicate that RP offers a survival advantage over RT but at the cost of greater functional impairment. The superior BRFs in the RP cohort suggests a more effective eradication of localized disease. However, the QoL advantages of RT, especially regarding urinary and sexual functions, highlight the importance of patient-centered care in treatment decisions. Individual patient factors such as age, comorbidities, and personal preferences should guide the therapeutic approach [10].

### Conclusion

This comprehensive analysis underscores the nuanced decision-making required in prostate cancer treatment. While RP provides superior survival outcomes, RT offers a better quality of life, emphasizing the need for personalized treatment plans. Future research should focus on refining patient selection criteria and developing strategies to mitigate the adverse effects associated with both treatment modalities.

### Acknowledgement

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### Conflict of Interest

None

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