

Evaluation of Oncological Outcomes from a single Surgeon in relation to Open Radical Prostatectomy and Robotic Assisted Radical Prostatectomy

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Abstract

Introduction: Prostate cancer represents a major global and national health burden, accounting for over 397,000 deaths worldwide in 2022¹ and is the most common cancer diagnosed in men in Ireland, with approximately 4,000 new cases annually². Radical prostatectomy remains a cornerstone of curative treatment. While open radical prostatectomy (ORP) was the standard approach, robotic-assisted radical prostatectomy (RARP) has been widely adopted, with comparable oncological outcomes^{3,4}. Outcomes are surgeon-dependent, and learning-curve effects complicate interpretation of multi-surgeon datasets^{5,6}. Irish data directly comparing ORP and RARP at a single-surgeon level remain limited. This study compares oncological outcomes between ORP and RARP in a single-surgeon cohort.

Objectives: To compare oncological outcomes of ORP and RARP performed by a single surgeon while evaluating temporal trends and adjusting for relevant baseline variables in positive surgical margin and post-operative PSA detectability.

Methods: Study Design and Setting- This was a retrospective single-surgeon cohort study conducted at Cork University Hospital. Participants- Between 2017 and 2024, 428 consecutive men underwent radical prostatectomy performed by a surgeon trained in both ORP and RARP. No patients were excluded from the cohort. Of these, 63 patients (14.7%) underwent ORP and 365 patients (85.3%) underwent RARP. Interventions- Radical prostatectomy was performed using either an ORP or RARP surgical approach. Outcome Measures- The primary oncological outcomes were surgical margin status (positive vs negative) and post-operative prostate-specific antigen (PSA) detectability, defined as <0.1 ng/mL versus ≥ 0.1 ng/mL at first post-operative follow-up. Secondary analyses assessed pathological stage, temporal trends across the study period, and multivariable adjustment for relevant confounding factors.

Results: Age (ORP: 58.5 ± 6.0 years vs RARP: 59.4 ± 6.3 years, $p = 0.321$) and pathological stage distribution (pT2 vs pT3, $p = 0.867$) did not differ between groups, while year of surgery differed significantly ($p < 0.001$). Positive surgical margins declined from 15/62 (24.2%) in the ORP cohort with available margin data to 28/225 (12.4%) in late RARP ($p = 0.016$), with the greatest improvement observed in pT2 tumours 8/33 (24.2%) vs 13/122 (10.7%), $p = 0.046$. Margin rates in pT3 tumours were similar across eras 7/29 (24.1%) vs 15/103 (14.6%), $p = 0.163$. Detectable post-operative PSA (≥ 0.1 ng/mL) increased from 2/63 (3.2%) in ORP to 34/233 (14.6%) in late RARP ($p < 0.001$). On multivariable analysis, no variable independently predicted margin positivity, while tumour stage (aOR 3.55, 95% CI 1.72–7.33, $p < 0.001$) and year of surgery (aOR 1.25, 95% CI 1.03–1.53, $p = 0.027$) independently predicted PSA detectability. Sensitivity analysis using a PSA threshold of ≥ 0.2 ng/mL attenuated the observed difference in PSA detectability.

Conclusions: RARP achieved oncological outcomes equivalent to ORP, with improving surgical margin rates over time. Post-operative PSA detectability was driven by tumour stage and evolving PSA assay sensitivity rather than surgical approach. Long-term survival and functional outcomes require further evaluation within the Irish context.