

Prior Radiation Therapy for Pelvic Malignancy Increases Complications Following Total Hip Arthroplasty

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INTRODUCTION: External radiation therapy (XRT) and other innovations in cancer treatment have led to increasing survivorship in patients with pelvic malignancy. As the number of patients undergoing total hip arthroplasty (THA) continues to rise, the number of patients with prior XRT is also likely to increase. XRT has known biologic and clinical effects on bone health and architecture, and prior literature has demonstrated concerns for increased aseptic loosening and revision rates following THA in smaller case series. To our knowledge, there have not been any large database studies looking at the effects of pelvic XRT on THA outcomes. The purpose of this study was to evaluate the short (90-day) and long term (>2 years) complication rates following THA in patients with a history of pelvic malignancy and XRT.

METHODS:

Patients were retrospectively identified using a national insurance claims database utilizing CPT and ICD-9/ICD-10 codes. Subjects who underwent THA for osteoarthritis were included if they had at least 2-year follow-up and were stratified into three cohorts: 1) prior pelvic malignancy diagnosis (prostate, cervical, uterine, ovarian, or rectal) and XRT (XRT), 2) prior malignancy diagnosis but no XRT (No XRT), and 3) no prior malignancy diagnosis nor XRT (Control). Demographic characteristics and comorbidities were collected. Univariate and multivariate analyses were conducted to evaluate for an association between prior XRT and the incidence of 90-day and 2-year complication rates, periprosthetic joint infection (PJI), implant loosening, and all cause revisions using chi-square, student t-tests, and logistic regression analyses where appropriate.

RESULTS:

In total, 615,406 patients underwent primary THA and met inclusion criteria. Of which, 596,152 patients were in the Control, 2,250 patients were in the XRT cohort, and 17,004 patients were in the No XRT cohort. Subjects with prior XRT and malignancy diagnosis had higher rates of all cause revisions and aseptic loosening after 2-years when compared to both the control group and No XRT group, which remained significant even after multivariate adjustment (p < 0.001, Table 1 and Table 2). The average time after THA for revision for aseptic loosening was 3.35 ± 1.10 years for XRT subjects, 3.62 ± 1.30 years for No XRT subjects, and 4.35 ± 1.93 years for Control subjects. XRT subjects also had higher rates of 90-day medical complications including deep vein thrombosis, sepsis, and cerebrovascular accident (p < 0.001, Table 1 and Table 2) than both groups.

DISCUSSION AND CONCLUSION:

A history of prior XRT for pelvic malignancy was associated with significantly increased rates of all cause revisions and aseptic loosening as well as 90-day medical complications. With an increasing number of patients undergoing primary THA after prior XRT for pelvic malignancy, surgeons need to be aware of these outcomes and counsel patients regarding their higher risk of complications. Additional studies are needed to determine if certain surgical techniques or fixation strategies mitigate these risks.

Table 1: Multivariate analysis of post 2-year surgical outcomes and 90-day medical complications for XRT versus Control cohorts.

Outcome	Odds Ratio	95% Confidence Interval	P-Value
90-Day Medical Complications			
Renal Failure	1.89	1.74-2.04	<0.001
Anemia	1.42	1.35-1.50	<0.001
Atrial Fibrillation	2.24	2.14-2.34	<0.001
Other Arrhythmia	2.70	2.55-2.86	<0.001
Deep Vein Thrombosis	1.61	1.47-1.76	<0.001
Heart Failure	1.76	1.63-1.91	<0.001
Pulmonary Embolism	1.57	1.38-1.78	<0.001
Pneumonia	2.28	2.09-2.50	<0.001
Respiratory Complications	3.70	3.31-4.14	<0.001
Sepsis	1.76	1.56-1.98	<0.001
Stroke	1.41	1.22-1.63	<0.001
Urinary Tract Infection	2.36	2.23-2.50	<0.001
Post 2-Year Surgical Complications			
All Cause Revision	2.25	2.02-2.51	<0.001
Aseptic Loosening	4.49	3.83-5.26	<0.001

Table 2: Multivariate analysis of post 2-year surgical outcomes and 90-day medical complications for XRT versus No XRT cohorts.

Outcome	Odds Ratio	95% Confidence Interval	P-Value
90-Day Medical Complications			
Renal Failure	2.14	1.98-2.32	<0.001
Day Anemia	1.29	1.22-1.36	<0.001
Atrial Fibrillation	2.58	2.48-2.70	<0.001
Other Arrhythmia	3.08	2.91-3.25	<0.001
Blood Transfusion	1.67	1.56-1.78	<0.001
Deep Vein Thrombosis	1.69	1.55-1.84	<0.001
Pulmonary Embolism	1.57	1.39-1.78	<0.001
Pneumonia	2.33	2.14-2.53	<0.001
Sepsis	1.98	1.77-2.22	<0.001
Stroke	1.41	1.23-1.63	<0.001
Urinary Tract Infection	1.73	1.64-1.83	<0.001
Post 2-Year Surgical Complications			
All Cause Revision	2.29	2.05-2.55	<0.001
Aseptic Loosening	4.58	3.93-5.34	<0.001