Long-Term Complications Of Total Knee Arthroplasty In Patients With Prior Radiation Therapy: A 10-Year Analysis

Jacob D. Kodra[1], Ankit Choudhury[1], Scott Fong[2], Meena Bedi[3], David M. King[1]
[1]Department of Orthopaedic Surgery, Medical College of Wisconsin, Milwaukee, WI; [2]Case Western Reserve University, Cleveland, OH;
[3]Department of Radiation Oncology, Medical College of Wisconsin, Milwaukee, WI
jkodra@mcw.edu

Disclosures: Jacob D. Kodra (N), Ankit Choudhury (N), Scott Fong (N), Meena Bedi (N), David M. King (N)

INTROUCTION: Radiation therapy (RT) has been shown to increase the risk of various postoperative complications following total knee arthroplasty (TKA). While the impact of previous RT has been highlighted up to a year after TKA, more long-term complications remain underexplored. The purpose of this study was to assess the short- to long-term odds of developing medical and surgical complications following total knee arthroplasty (TKA) in patients with a history of RT or a concurrent history of RT and cancer.

METHODS: A retrospective cohort study was performed using the TriNetX database to identify patients who underwent primary TKA (CPT 27445, 27447) from 2000 to 2015. Patients with prior RT were identified using ICD-10-CM Z51.0 (encounter for antineoplastic RT), Z92.3 (personal history of irradiation), and CPT 101843 (radiation oncology treatment). Following propensity score matching, two pairs of cohorts were constructed: 1) TKA patients with/without RT; 2) TKA patients with a history of cancer treated with/without RT. For analyses comparing cancer patients, cohorts were matched for cancer type and treatment modalities, including chemotherapy, surgical resection, and immunotherapy. Continuous variables were compared using independent-samples t-test; categorical variables were compared using chi-square or Fisher's exact tests, as appropriate. Odds of medical and surgical adverse events in each cohort pair were calculated at 30 days, 90 days, 1 year, 5 years, and 10 years postoperatively. Odds ratios (OR) with 95% confidence intervals (CI) were calculated using logistic regression. Statistical significance was set at a P-value < 0.05.

RESULTS SECTION: A total of 12,280 propensity-matched patients (5,658 males, 6622 females) were analyzed, including 1,614 patients in the RT versus no RT cohort pair, and 10,666 patients in the cancer with RT versus cancer without RT cohort pair. RT patients had higher odds prosthetic joint infection (PJI) at 90 days (OR: 2.03, 95% CI: 1.01-4.09, P = 0.043), 1 year (OR: 2.17, 95% CI: 1.19-3.97, P = 0.01), and 10 years after TKA (OR: 1.53, 95% CI: 1.10-2.32, P = 0.047). Patients with a history of RT also faced greater odds of developing deep vein thrombosis (DVT) and anemia across all timepoints (all P < 0.05). Furthermore, RT patients had higher odds of mid- to long-term medical complications, including anemia (5yr, 10yr), DVT (5yr, 10yr), pulmonary embolism (5yr, 10yr), and urinary tract infection (5yr, 10yr) (all P < 0.05). Compared to cancer patients without RT, cancer patients with RT were not at an increased odds to suffer from any medical or surgical complications up to 10 years after TKA.

DISCUSSION: TKA patients with a history of RT experienced increased odds of PJI at 90 days, 1 year, and 10 years postoperatively. RT patients also faced consistently greater odds of DVT and anemia, with the greatest burden of medical complications observed 5 to 10 years after arthroplasty. However, cancer patients with a history of RT were not at an increased risk for any postoperative complications compared to patients with a history of cancer alone. The inherent systemic impact of malignancy itself is likely the primary driver of adverse events following TKA in cancer patients with a concomitant history of RT. Limitations included retrospective design, potential coding inaccuracies, and limited data regarding RT dose, location, and timing.

SIGNIFICANCE/CLINICAL RELEVANCE Recognition of the long-term risks associated with prior RT is essential to optimizing perioperative management in TKA. In cancer patients, necessary oncologic treatment should be prioritized, as most complications after TKA appear driven by malignancy rather than a history of RT.

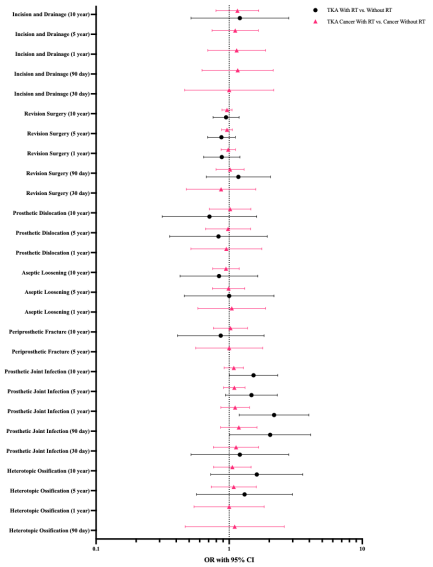

Figure 1. Forest plot demonstrating odds ratios (OR) with 95% confidence intervals (CI) for postoperative surgical complications following total knee arthroplasty (TKA) across cancer and radiation therapy (RT) cohorts.

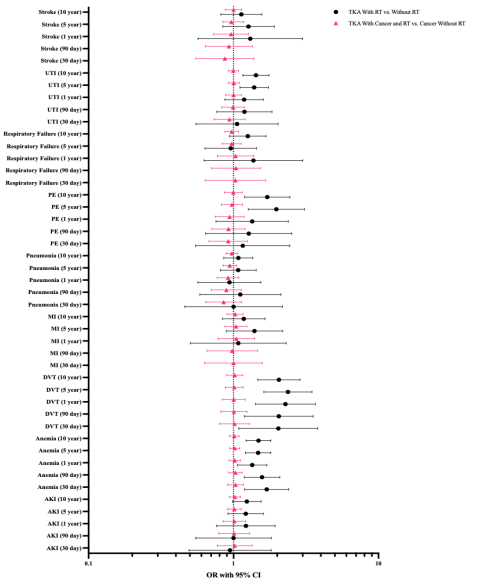

Figure 2. Forest plot demonstrating odds ratios (OR) with 95% confidence intervals (CI) for postoperative medical complications following total knee arthroplasty (TKA) across cancer and radiation therapy (RT) cohorts.