

Open Access

Abstract

Published 03/06/2024

Copyright

© Copyright 2024

Almeida et al. This is an open access abstract distributed under the terms of the Creative Commons Attribution License CC-BY 4.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Distributed under

Creative Commons CC-BY 4.0

Impact of Pre-Operative Neoadjuvant Radiation Therapy on 30-Day Morbidity and Mortality in Patients with Pathologic Hip Fracture

Neil Almeida ¹, George Thomas ², Tyler Schrand ³, Rohil Shekher ⁴, Victor Goulenko ⁵, Abigail Pepin ⁶, Simon Fung-kee-Fung ⁷, Anurag K. Singh ⁴

1. Radiation Oncology, Roswell Park Comprehensive Cancer Center, Buffalo, USA 2. Department of Orthopedic Surgery, University of Minnesota, Minneapolis, USA 3. Department of Chemistry, Bowling Green State University, Bowling Green, USA 4. Radiation Medicine, Roswell Park Comprehensive Cancer Center, Buffalo, USA 5. Division of Gamma Knife Radiosurgery, Roswell Park Comprehensive Cancer Center, Buffalo, USA 6. Radiation Oncology, University of Pennsylvania Abramson Cancer Center, Philadelphia, USA 7. Radiation Oncology, Roswell Park Comprehensive Cancer Institute, Buffalo, USA

Corresponding author: Neil Almeida, neil.almeida@roswellpark.org

Categories: Medical Physics, Radiation Oncology

Keywords: pathologic hip fracture

How to cite this abstract

Almeida N, Thomas G, Schrand T, et al. (March 06, 2024) Impact of Pre-Operative Neoadjuvant Radiation Therapy on 30-Day Morbidity and Mortality in Patients with Pathologic Hip Fracture. Cureus 16(3): a1129

Abstract

Objectives:

Surgical interventions for advanced metastatic osseous lesions of the proximal femur include hemiarthroplasty (HA) or total hip arthroplasty (THA). Neoadjuvant radiation is often utilized for high risk bone metastases. Pathologic fractures are a known serious complication of treatment of neoadjuvant radiation. This combination approach involving surgical intervention and neoadjuvant radiation therapy (NRT) has complications including avascular necrosis of bone, decreased wound healing and pathological fractures. We sought to assess the impact of NRT on 30-day postoperative morbidity and mortality in patients who had underwent total hip arthroplasty or hemiarthroplasty for pathological fracture of the hip.

Methods:

All statistics were performed using SAS version 9.4 (SAS Institute Inc., Cary, NC). We analyzed data from patients with pathologic fractures of the hip who underwent neoadjuvant radiation therapy using the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) 2005–2011 datasets (ICD: 733.14 & 733.15). The risk factor of interest was NRT, defined in the ACS-NSQIP database as any radiotherapy preceding the index surgery by 90 days or less; the population of patients with pathological fractures of the hip were compared to the group of patients who had not had undergone neoadjuvant RT. We utilized CPT codes 27130, 27236 and 27125 to identify our patient population of interest. The demographic, treatment, operation characteristics and complication statuses were summarized by neoadjuvant radiation status (yes/no). The mean, median, standard deviation and range were reported for continuous variables; with comparisons made using Mann-U Whitney test. For categorical variables, the frequencies and relative frequencies were reported and compared using Fisher's exact test. P-values were provided. Multivariate logistic regression modeling neoadjuvant radiation status as the outcome, with age and sex as the predictor variables (both were statistically significant in the sample summary) was used to generate propensity scores. Firth's method was used, and the predicted probabilities were outputted. Then for each complication variable, logistic regression models were fit with complication as the outcome, and neoadjuvant radiation and the predicted probability as the predictors. Odds ratios (with 95% confidence intervals) and p-values for neoadjuvant radiation were reported for each complication separately. The odds ratios reflect either increasing or decreasing odds of complication in the neoadjuvant radiation 'yes' group, compared to the referent 'no' group, after adjusting for propensity score.

Results:

A total of 283 patients were assessed. Of these patients, 264 had no NRT, compared to 19 patients had undergone NRT; mean age of 64.95 years for patients who had undergone NRT (73.9 years for no NRT, $P = 0.031$). The cohort consisted of 36% men and 64% women in this study, with 12 (63.2%) and 7 (36.8%), men and women respectively having NRT ($P = 0.014$). Regarding ethnicity, a total of 72.8% were white individuals, 6.4% African Americans, 0.7% Asians, 0.4% American Indians, and 19.8% of individuals did not report ethnicity. After propensity adjusted multivariate analysis, patients with pathological hip fractures who had undergone neoadjuvant radiation had significantly higher chance of having pneumonia than patients who had not undergone NRT ($P = 0.0120$, odds ratio 8.641). NRT did not have any difference on 30 day mortality or return to OR between the two comparison groups.

Conclusion(s):

Pathological fractures can lead to significant pain level, neurological dysfunction and impact an individual's everyday activities of daily living. Management of pathological fracture pertaining to the hip has historically been surgical fixation to address tumor control and restore function. Multiple studies have demonstrated that utilizing radiation therapy with surgical interventions has improved patient's overall survival and decreased locoregional failure. We have compared patients with pathological hip fractures undergoing NRT utilizing a propensity adjusted analysis and demonstrated a multitude of complications and patient demographics for radiation oncologists and surgeons to be cognizant of in this patient population.