

Outcomes of local control procedures in peri-articular bone sarcomas of the knee – a report from the Childhood Cancer Survivor Study

Duncan C Ramsey MD MPH – Oregon Health and Science University; Portland, OR

Erik Geiger – University of Miami; Miami, FL

Pam Goodman MS – Fred Hutchinson Cancer Center; Seattle, WA

Wendy M. Leisenring ScD – Fred Hutchinson Cancer Center; Seattle, WA

Danielle Cameron MD MPH – Boston Children's Hospital; Boston, MA

Kevin Krull PhD – St. Jude's Children's Research Hospital; Memphis, TN

Andrew J Murphy MD – St. Jude's Children's Research Hospital; Memphis, TN

Kevin Raskin MD – Massachusetts General Hospital/Brigham; Boston, MA

Kiri Ness PhD – St. Jude's Children's Research Hospital; Memphis, TN

Kevin Oeffinger MD – Duke University Medical Center; Durham, NC

Rebecca Howell MD – MD Anderson Cancer Center; Houston, TX

Steven Dubois MD – Boston Children's Hospital; Boston, MA

Eric Chow MD MPH – Fred Hutchinson Cancer Center; Seattle, WA

Yutaka Yasui PhD – St. Jude's Children's Research Hospital; Memphis, TN

Gregory T Armstrong MD MSCE – St. Jude's Children's Research Hospital; Memphis, TN

Brent Weil MD – Boston Children's Hospital, Dana-Farber Cancer Institute; Boston, MA

Christopher Weldon MD PhD – Boston Children's Hospital, Dana-Farber Cancer Institute; Boston, MA

Background

Short- and long-term outcomes after local control of pediatric lower extremity sarcomas are difficult to ascertain with large sample sizes. Utilizing the Childhood Cancer Survivor Study (CCSS) data we sought to ascertain, for pediatric patients with peri-articular bone sarcomas about the knee, 1) the long-term functional and psychological outcomes of surgical management and 2) the frequency of and indications for unplanned reoperations after local control, including subsequent amputation.

Methods

Data regarding tumor location, local control procedure (LCP), and unplanned secondary surgeries were collected. Follow-up surveys collected survivors' SF-36 mental and physical component scores (MCS and PCS) as measures of quality of life and the Brief Symptom Inventory (BSI) for psychological well-being. Physical activity information was similarly self-reported, and unplanned surgical procedures within five years of diagnosis were abstracted from operative reports. Multivariable linear and proportional hazards regression models were used to compare outcomes among procedure groups while adjusting for confounding variables.

Results

272 patients (189 distal femur, 92 proximal tibia tumors) underwent above-knee amputation (AKA) (19%), rotationplasty (5%), or limb salvage with endoprosthetic (44%), allograft (26%), or allograft-prosthesis composite (APC) (6%) reconstruction. At 35.5 years mean follow-up, PCS for AKA and endoprosthesis were >5 points (the minimal clinically important difference, [MCID]) below the population mean, with rotationplasty 5 points above ($p=0.045$). All LCPs had MCSs similar to the population mean ($p>0.05$). The GSI differed among groups ($p=0.044$); rotationplasty had the best score.

Unplanned reoperations varied significantly (Figure); AKA and rotationplasty underwent the fewest. The proportion of unplanned amputations within five years of diagnosis were 0% (rotationplasty), 4.3% (allograft), 9.2% (endoprosthesis), and 17.6% (APC). Undergoing more reoperations was associated with lower odds of being physically active at most recent follow up. Patients with secondary (versus initial) amputations did not differ by PCS, MCS, GSI, or physical activity.

Conclusions

In this long-term study of pediatric sarcoma LCP outcomes, MCS was similar among groups and the population mean, though PCS varied significantly. Variations in unplanned reoperations, including amputation, impacted activity

levels. It strongly validates the option of rotationplasty when possible and decided upon through shared decision-making.

Figure: The proportion of patients from each local control procedure who underwent specific numbers of subsequent unplanned surgeries.

