Title

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Journal

Clinical Orthopaedics and Related Research®, 473(3)

ISSN

0009-921X

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Publication Date

2015-03-01

DOI

10.1007/s11999-014-3655-1

Peer reviewed

Clin Orthop Relat Res
2015 Mar;473(3):812-9.
doi: 10.1007/s11999-014-3655-1.

What are the functional outcomes of endoprosthestic reconstructions after tumor resection?

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- PMID: 24777730
- PMCID: PMC4317426
- DOI: 10.1007/s11999-014-3655-1

Abstract

Background: The majority of published functional outcome data for tumor megaprostheses comes in the form of subjective functional outcome scores. Sparse objective data exist demonstrating functional results, activity levels, and efficiency of gait after endoprosthetic reconstruction in patients treated for orthopaedic tumors. Patients embarking on massive surgical operations, often in the setting of debilitating medical therapies, face mortality and a myriad of unknowns. Objective functional outcomes provide patients with reasonable expectations and a means to envision life after treatment. Objective outcomes also provide a means for surgeons to compare techniques, rehabilitation protocols, and implants.

Questions/purposes: We asked the following questions: (1) What is the efficiency of gait (ie, oxygen consumption) at final recovery from endoprosthetic reconstruction for oncologic resections? (2) What is the knee strength after lower extremity endoprosthetic reconstruction as compared with the contralateral limb? (3) How active are patients with tumor megaprostheses at home and in the community?

Methods: Sixty-nine patients with endoprosthetic reconstructions for primary lower extremity bone sarcoma met inclusion criteria and were invited by mailing to undergo oxygen cost study and strength testing. Twenty-four patients (seven proximal femoral replacements, nine distal femoral replacements, and eight proximal tibia replacements) underwent evaluation in the gait laboratory at a mean of 13.2 years after their reconstruction. All patients were then asked to wear step activity monitors at home and in the community for 7 consecutive days.

Results: Median O2 consumption (in mL/kg/m) among the endoprothesis groups was not different from the control patients with the numbers available (proximal femoral replacement 0.17, distal femoral replacement 0.16, proximal tibia replacement 0.18, control 0.15, p = 0.21). With the numbers available, there was no difference in walking speed as compared with the control group (proximal femoral replacement 1.20 m/s, distal femoral replacement 1.27 m/s, proximal tibia replacement 1.12 m/s, control 1.27 m/s, p = 0.08). Patients with proximal tibia replacements had reduced knee extension and flexion strength compared with patients in other reconstruction groups (84% reduction in extension versus those with proximal femoral replacements, 35%, and distal femoral replacement, 53%, p = 0.001, and 43% reduction in flexion versus proximal femoral replacement, 11%, distal femoral replacement, 2%, p = 0.006). With the numbers available, mean strides per day were not different among the reconstruction groups (proximal femoral replacement = 4709 strides/day [3094-6696], distal femoral replacement = 2854 [2461-6015], and proximal tibia replacement = 4411 [3093-6215], p = 0.53).

Conclusions: Although knee strength was reduced in patients with proximal tibia replacements compared with femoral reconstructions, all groups had an efficient gait and were active at home and in the community at a mean of 13.2 years after surgery. Despite the magnitude of these surgeries, these patients are similarly active as patients after standard total hip arthroplasty. These findings provide objective data from which patients undergoing tumor megaprosthesis reconstructions of the lower extremity can reasonably base expectations of efficient gait and active lifestyles outside of the hospital

setting. These data may provide hope and long-term goals for patients facing the uncertainty of chemotherapy and surgical treatment.

Level of evidence: Level III, therapeutic study. See Instructions for Authors for a complete description of levels of evidence.

Figures

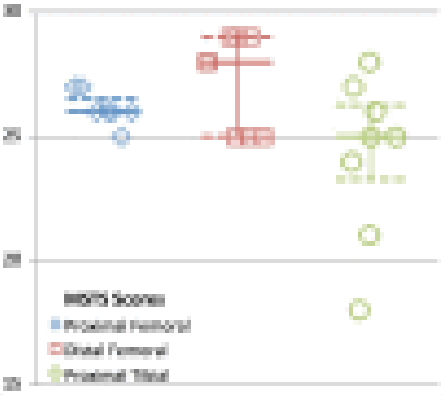

Fig. 1

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Graph demonstrating MSTS scores for…

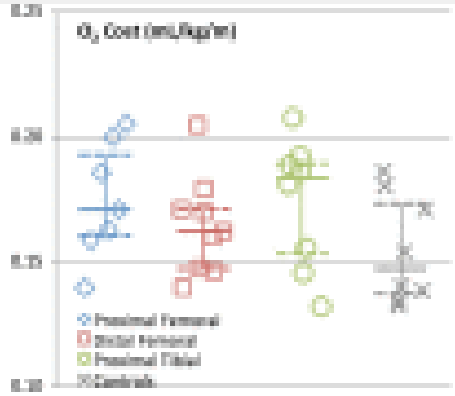

Fig. 2

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Graph demonstrating oxygen consumption for…

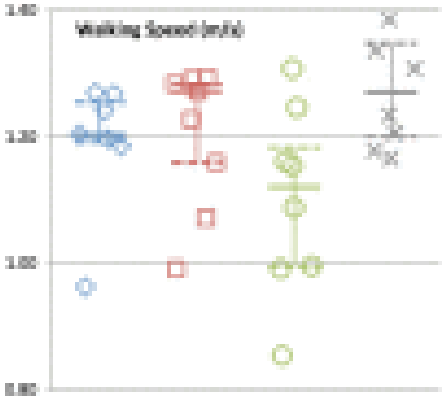

Fig. 3

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Graph demonstrating gait velocity for…

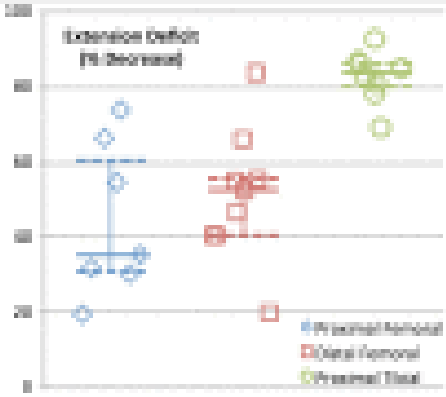

Fig. 4

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Graph demonstrating strength deficit of…

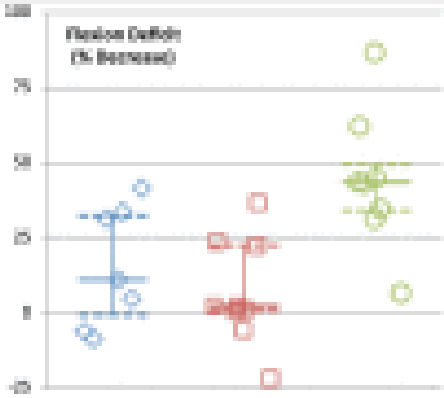

Fig. 5

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Graph demonstrating strength deficit of…

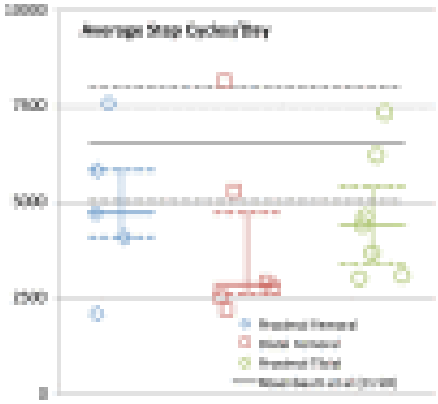

Fig. 6

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Graph demonstrating average strides per…