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CORR Insights®: Which Sport Activity Levels Are Achieved in Patients After Resection and Endoprosthetic Reconstruction for a Proximal Femur Bone Sarcoma?

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Where Are We Now?

Limb-salvage surgery has been the gold standard for the surgical management of malignant

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bone tumors for almost three decades. During this time, the assessment of patient function using validated outcome measures has turned into an important area of knowledge and research. As the prognosis and life expectancy of patients with malignant bone tumors have substantially improved, researchers have collected an increasingly large bulk of retrospective data on implant durability, physical function and biomechanics, and quality of life. In turn, a patient's perception of his or her disability has progressively become more important to the orthopaedic surgeon. Clinicians and researchers need effective outcomes tools in order to fairly compare the results of different reconstructive methods, to provide patients with the most accurate information about what

to expect, and to identify and prioritize areas of research. To date, no definitive consensus has been reached in the orthopaedic oncology community regarding the objective measurement of functional outcome following limb-salvage surgery for bone and soft tissue sarcomas, as surgeons continue to use a variety of methods to score function [1, 2, 4, 5]. However, long-term followup data on patient function suggests that a return to some measure of sports activity is possible for a considerable proportion of patients after lower extremity limb salvage. In any case, some patients seem to choose to engage in sport—sometimes even more intensively than surgeons might recommend—when segmental prostheses or bulk allografts have been implanted, which may be vulnerable to loosening or fracture if overused. But information on sports participation and its impact on implant longevity remains largely unknown, and at best, empirical.

Hobusch and colleagues recognized the lack of knowledge on limb salvage

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and sports and focused their attention on activity levels achieved by patients following tumor excision and endoprosthesis reconstruction of the proximal femur for bone sarcoma. They found that approximately 80% of patients were able to return to some level of low-impact sport activity.

Where Do We Need To Go?

Even though there are no data on this topic, I suspect the two most relevant factors determining the level of postoperative function a patient might achieve are the patient's preoperative function and attitude, and the postoperative recommendations of the physician's team. A patient who enjoys sedentary or contemplative hobbies such as reading, painting, or computers, is unlikely to change his or her lifestyle and engage in sport following a major orthopaedic operation. And the surgeon's recommendation almost certainly influences the choices many patients make after surgery. However, at this point, these recommendations are based on "common sense" and "clinical judgment" rather than scientific evidence. Something more robust in terms of actual data certainly would help. While we know patients with major reconstructions can perform low-impact activities, we do not know (apart from small studies like

that of Hobusch et al.) how often patients can—or should—try to engage in more intense sporting activities.

This question is of great relevance as return to "normal" life and full reinsertion into society is an extremely important component of the mission against cancer. As we encourage patients on this path to a healthy lifestyle possibly including sport, a better understanding of their needs and a more precise assessment of their potential function would maximize the chances of promoting long and successful lives.

How Do We Get There?

Understanding the ideal level of function limb-salvage patients may achieve following major skeletal reconstructions remains a formidable challenge. Adequate biomechanical models need to be identified in the lab to test tumor implants beyond routine nonsport daily activities. This certainly involves appropriate reproduction of torque stresses. While this may be relatively straightforward for cemented implants, it would be considerably more difficult for cementless fixation, as viable bone-implant interface is necessary to reproduce in vivo circumstances. Implantable sensor technology [3] is available today and may be considered for tumor implants, for which

there are no data at this time. Scientific societies remain instrumental for collaborative projects aimed at collecting data prospectively by well-designed trials, which might also consider randomizing different postoperative physical therapy regimens to investigate functional outcomes.

Ultimately, improved function for tumor patients following limb-salvage surgery may require a combined multidisciplinary effort involving experts in different fields, including surgery, physical therapy, biomechanics, engineering and manufacturers.

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