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CORR Insights®: What Sports Activity Levels Are Achieved in Patients With Modular Tumor Endoprostheses of Osteosarcoma About the Knee?

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Where Are We Now?

The current study by Hobusch et al. presented 27 sports-minded patients with osteosarcoma who had undergone successful

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limb salvage of the knee. Surgeons used modular knee endoprostheses (25 patients with fixed hinges, two patients with rotating hinges) to reconstruct the knees. The authors charted the sporting activities that the patients resumed after surgery compared to their prediagnosis sporting abilities. This retrospective study was done via chart review and telephone interview, and results were presented at an average followup time of 11.2 years.

The results of the study found that two patients (7.4%) returned to high-impact sporting activities (soccer, jogging) and approximately more than one-third performed intermediate-impact activities (alpine skiing, fitness training) postsurgery. However, this study also poses a number of questions: Is there a risk to the limb and prosthesis in achieving some of these sporting activities? Is a rotating

platform hinge knee more conducive to attempts at sporting activities than these fixed hinges or just more parts to wear and fail with excessive activity?

The ultimate goal in tumor surgery for osteosarcoma of the knee is to save a life. The secondary goal is to save the limb. If those two goals are achieved, the final goal is to help the patient resume his or her routine daily living activities in ways that might be more advantageous than patients treated with the surgical alternative to these reconstructions, which is an above-knee-amputation. While there are inherent (and, to my eye, important) differences in how the extensor mechanism can be handled in distal femoral reconstructions compared to proximal tibial reconstructions, the authors did not find any sport-related functional differences, and as such, the distal femur (16 patients) and proximal tibia (11 patients) reconstructions were reported together. The authors specifically mentioned a 51% revision rate, but did not attribute this to sports activities. Revisions were performed for soft tissue failure in eight patients, aseptic loosening of the press fit

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stem in three patients, and polywear and bushing failure in seven patients.

In a previously published study, Haddes et al. [1] analyzed 59 patients with a mean followup time of 4.7 years. The authors found worn bearings in 20% of their patient group and periprosthetic fractures in 6% of the patient population. Schwartz et al. [3] reported on 254 patients with distal femoral replacements. The authors found revisions for breakage in only one of the 85 contemporary modular rotating hinges. This study showed the one casted (not forged) Morse taper failure, as well as failure of the rotating hinge mechanism necessitating replacement of the bushing and/or axial in 22 patients (11.8%). In a different study, Schwartz and colleagues [4] reviewed 52 proximal tibia hinge reconstructions and identified a fatigue fracture femoral condyle at 13.5 years and one periprosthetic tibial fracture. Patients had failure of the bushings, axle, tibial bearing or polyethylene in 12 cases (23.1%, mean time 8.9 years, range 2.5–17.1 years).

Papalia et al. [2] performed a literature review to determine which sporting activities surgeons allowed their patients with knee arthroplasty to participate in. According to results of the literature review of 22 articles, recommendations were for low-impact activities. This underlies the biggest controversy that the paper by Hobusch et al. points to. And, as of this moment, the answers remain elusive.

Where Do We Need To Go?

Most orthopaedic tumor and adult reconstruction surgeons recommend substantial, permanent limits on their patients, restricting moderate to extreme activities. The surgeons hope these restrictions reduce late complications as described in previous studies. Hobusch et al. seem to question the logic of recommending that these patients avoid high-impact sports. They found that allowing patients to take part in sporting activities without enforced restrictions had no association with the 51% of patients who came to reoperation in their series (eight patients with soft tissue failure, three patients with loosening, and seven with bushing and polyethylene wear). In fact, the authors suggested that the sporting activities potentially led to a better feeling of well-being for these patients. We need to discover whether the restrictions placed on this patient population are practical, or should surgeons scale back their limitations on sports and activities?

How Do We Get There?

This paper presents a unique group of patients with limb salvage who were athletically predisposed, and who were eager to resume some of their prior athletic endeavors. A majority of the

patients achieved various levels of success for a period of years after surgery. Hobusch et al. set the patient-expectations-in-achievement bar quite high, perhaps to the chagrin of other tumor and adult reconstructive surgeons who restrict routine total joint patients of even moderate athletic endeavors, particularly among those with large endoprosthetic reconstructions.

A simple review of the attitudes of reconstructive and tumor surgeons correlated on the basis of years in practice may help in a more uniform counsel of these patients as to sporting activity. This could be done through specialty societies. Manufacturers have registries detailing breakage and wear issues. Although most companies do not share this information, having access could lend to a wealth of information. This series attributed no complications, revisions, or implant failures in fixed-hinged endoprostheses with press fit stems of the knee. This may have been because there were so few of them in the series; allowing such patients to return to sport strikes me as risky. Are the currently used rotating platform knee hinges more conducive to sporting activities compared to fixed hinges or just another part to wear mechanically? Does it matter whether the stem is bony-ingrowth or are there more problems with sport activities and cemented stems? Does the end-bony ingrowth

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“Compress®” favor the potential of intermediate to high-impact sports or does the small junctional area of ingrowth lead to stress concentration? Possible use of instrumented implants with telemeters and force gauges in the implants may provide some answers as to the amount of increased force with various sporting activities. A simple reporting of complications to the Musculoskeletal Tumor Society and The Knee Society through an electronic registry would outline the problems that may occur with increased activities. This would not provide a denominator, but would

clearly outline that there is breakage, periprosthetic fractures, and polyethylene wear revisions in this surgical population, especially with moderate to high-impact activity.

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