CORR Insights™: High Infection Rate Outcomes in Long-bone Tumor Surgery with Endoprosthetic Reconstruction in Adults: A Systematic Review

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Where Are We Now?

Prosthetic infection is the bane of limb preservation surgery and sadly is not a major focus of research. Infection rates in double-digit percentages are reported routinely, in distinction to the microscopically low rates reported for conventional reconstructive surgery. The well-recognized reasons are legion: possible immune compromise of patients with cancer, malnutrition, large bone and soft tissue defects, long operative time, frequent red blood cell and platelet transfusions, neutropenia from postoperative chemotherapy, and frequent bacteremia from the use of indwelling central venous catheters, among others. Lack of accurate data plagues the field. For example, *Consumer*

Reports [2] and the Leapfrog Group have highlighted that major academic medical centers including the 2012–2013 *US News and World Report* [5] number one ranked cancer center (University of Texas MD Anderson Cancer Center, Houston, Texas, USA) and orthopaedic hospital (Hospital for Special Surgery, New York, NY, USA) do not report standards such as infection rates of central venous catheters. There is an increasing need for data and research from many expert centers if the orthopaedic oncology field is to solve this critical patient-safety issue and work toward our goal of long-term limb preservation with durable implants. Tantalizing reports of how infection may be associated with better cancer control must not divert us from our fiduciary responsibility to solve this pox on our field [4]. The large numbers of variables confound statistical analysis and defy attempts to control the contributing clinical factors. The situation calls for basic and clinical research on the topic.

This CORR Insights™ is a commentary on the article “High Infection Rate Outcomes in Long-bone Tumor Surgery with Endoprosthetic Reconstruction in Adults: A Systematic Review” by Racano and colleagues available at DOI [10.1007/s11999-013-2842-9](https://doi.org/10.1007/s11999-013-2842-9). The author certifies that he, or a member of his or her immediate family, has no funding or commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc) that might pose a conflict of interest in connection with the submitted article. The author is the President of the Musculoskeletal Tumor Society, the sponsor of the Parity clinical trial referred to in this commentary, and a coauthor of an article referenced that describes the methodology for developing that trial.

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Where Do We Need to Go?

Racano et al. have rigorously defined the rate of prosthetic infection through their comprehensive review of the literature, emphasizing the magnitude of the problem and giving us a proper historical comparison as we strive to improve results [6]. Their study is limited by its retrospective nature, incomplete reporting of publications, and restriction of the analysis to adults in a field that treats predominantly children and young adults. Related questions should be answered, such as the rate of infection in patients who received antibiotic-containing cement for prosthetic fixation. Even retrospective data on this topic would be welcome. Prospective cooperation by existing specialty groups such as the Musculoskeletal Tumor Society and the Children’s Oncology Group should be done

to give us high-quality modern data and build on the study by Racano et al. [6]. This would provide the descriptive foundation that is needed for therapeutic intervention trials.

How Do We Get There?

A multifaceted approach of basic and clinical research is required to improve. Fundamental scientific knowledge in bacteriology and tribology is lacking. For example, the role of persistence organisms in the development and treatment of late or chronic infections must be explored. Other issues such as how large prosthetic surfaces and modular components with fretting at taper junctions affect the rates of deep infection warrant basic research effort. Translational work to develop infection-resistant prostheses such as silver- [3] or iodine-coated [8] prostheses, or targeted application of antibiotics on the implants [7] are exciting new strategies. Creative solutions such as these deserve prioritization by specialty groups and funding agencies. In the meantime, clinical practice should be optimized to prevent infection; for example, defining the appropriate use of prophylactic antibiotics. A randomized multicenter trial sponsored by the Musculoskeletal Tumor Society and the Orthopaedic Research and Education Foundation is underway to answer these seemingly simple, but nagging questions [2]. Progress will be made against the scourge of these mostly iatrogenic infections only if a sufficient number of surgeons rise to the challenge and enter their patients in clinical investigations. Our professional integrity and patient safety depend on it.

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