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CORR Insights

CORR Insights®: Outcomes of a Modular Intercalary Endoprosthesis as Treatment for Segmental Defects of the Femur, Tibia, and Humerus

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Where Are We Now?

Intercalary endoprosthesis is considered a viable option for the reconstruction of segmental defects after tumors, especially in the humerus, tibia, and femur, and represents a viable alternative to intercalary allograft reconstruction. Intercalary endoprosthetic replacement with cement—in contrast to intercalary allografting—is advantageous because it allows immediate weight bearing, which would seemingly be beneficial for patients with metastatic disease and limited life expectancy.

Allograft and autograft reconstruction are mainly used to treat patients with primary malignant bone and soft-tissue tumors that present with segmental defects. Once integrated, allograft and autograft reconstruction permit full weight bearing and perhaps fewer long-term complications. Previously published studies reported the nononcological failure rate of these reconstructions as ranging from 14% to 50% at mid-term followup [1, 2, 4–6].

Currently, there is little evidence suggesting which type of reconstruction is suitable for which type of patient and disease. Although from a clinical point of view it seems justified to apply cemented intercalary endoprosthetic replacement in patients with metastatic disease and limited life span, it is unclear whether uncemented intercalary endoprosthetic replacement plays a role in patients with primary malignant tumors who have a high probability of survival. I am concerned that aseptic loosening of cemented intercalary endoprostheses will be a common mode of failure, especially during the longer-term and in lower-extremity reconstructions. The device analyzed in the current paper experienced a high frequency of complications at relatively short-term followup. The study also calls into question the use of cementless fixation with this device, as all of the aseptic failures in this series occurred in uncemented stems.

This CORR Insights® *is a commentary on the article* "Outcomes of a Modular Intercalary Endoprosthesis as Treatment for Segmental Defects of the Femur, Tibia, and Humerus" *by Benevenia and colleagues available at:* DOI: 10.1007/s11999-015-4588-z.

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Where Do We Need To Go?

Benevenia and colleagues found that the highest nononcological complication rate occurred in the femur largely due to structural failure of this device. This is important, as structural failure was also demonstrated in another study [6] using the same device with a similar high risk of complications in the femur, more specifically, in the proximal of the two stems. This raises the question whether intercalary endoprosthetic replacement for segmental defects is a viable option in the lower extremity, especially in the femur. Is it possible that the high risk of complications in this series may be caused by the device itself? Making a direct comparison to other reports is difficult due to the small series size, different followup periods, and the many available prosthesis designs.

How Do We Get There?

The small number of patients with different diseases and observation periods limit the likelihood that single-center studies can deliver reliable, generalizable findings in terms of the modes of failure of this approach. Multicenter prospective trials would be an option to resolve this problem. However, these trials likely will call for a large number of centers or a prolonged recruitment time to gain information, as there are so many variables to consider. Even if we could get these types of studies off the ground, they would still lack a direct comparison to biological reconstruction with autografts, allografts, or alternative methods in patients with metastatic disease, such as intermedullary stabilization and irradiation.

An alternative for direct comparison of techniques with inhomogeneous followup periods could be the calculation of revisions per 100 observed component years, introduced in orthopaedics by the Australian Joint Arthroplasty Registry [3]. This approach may facilitate comparisons across smaller trials, although it will not resolve the problem that the confidence intervals on the survivorship estimates in such small trials are likely to be broad; the solution, therefore, lies in larger multicenter collaborative efforts.

References

1. Abudu A, Carter SR, Grimer RJ. The outcome and functional results of diaphyseal endoprostheses after tumour excision. *J Bone Joint Surg Br.* 1996;78:652–657.
2. Ahlmann ER, Menendez LR. Intercalary endoprosthetic reconstruction for diaphyseal bone tumours. *J Bone Joint Surg Br.* 2006;88:1487–1491.
3. Australian Orthopaedic Association. Hip and knee arthroplasty annual report. Available at: https://aoanjrr.dmac.adelaide.edu.au/documents/10180/42844/Annual%20Report%202010?version=1.1&t=1349406187793. Accessed October 30, 2015.
4. Damron TA, Leerapun T, Hugate RR, Shives TC, Sim FH. Does the second-generation intercalary humeral spacer improve on the first? *Clin Orthop Relat Res.* 2008;466:1309–1317.
5. McGrath A, Sewell MD, Hanna SA, Pollock RC, Skinner JA, Cannon SR, Briggs TW. Custom endoprosthetic reconstruction for malignant bone disease in the humeral diaphysis. *Acta Orthop Belg.* 2011;77:171–179.
6. Ruggieri P, Mavrogenis AF, Bianchi G, Sakellariou VI, Mercuri M, Papagelopoulos PJ. Outcome of the intramedullary diaphyseal segmental defect fixation system for bone tumours. *J Surg Oncol.* 2011;104:83–90.