

# ROUNDUP<sup>360</sup>

## Oncology

### Infection in megaprosthesis

■ Limb salvage in tumour surgery continues to throw up excellent functional results, assuming the patient and surgeon manage to avoid the not insignificant risk of complications such as infection. The orthopaedic surgical oncology group in **Bologna (Italy)** continue to shed light on outcomes including the incidence and consequences of infection.<sup>1</sup> In one of few significantly large studies on infection following tumour surgery, the surgical oncology team were able to report their results of nearly 1200 patients who had undergone limb salvage using megaendoprosthesis. This retrospective registry-based study reports an impressive mean of nine years of follow-up. The investigators report an overall infection rate of 8.6%, and, in common with other types of prosthesis, staphylococcal infection predominates, with the majority of reported infections (47%) being caused by *Staphylococcus epidermidis*. In common with other similar series, overall survival (including definitive management of infection) was 88% at ten years. Infections were treated in a similar manner to those in primary arthroplasty and resolved completely with a combination of debridement and one- or two-stage revision in combination with targeted antimicrobial therapy. However, where things are dramatically different is with respect to success rates. Just 75% of patients were successfully treated with surgical revision of their infection. This is another paper

showing the dramatically higher rate of infection seen in endoprostheses performed for tumour compared with ordinary joint arthroplasty, and the consequences of that infection, with 21% resulting in amputation.

### Impressive results for mid femoral reconstruction

■ While local excision and limb salvage in combination with chemotherapy is now the standard treatment for bone tumours, the precise reconstructive strategy, allograft or prosthetic is still very much the topic of debate. Over recent years intercalary reconstruction with epiphyseal sparing has become a standard treatment, with the logic that it may avoid some of the complications of large osteoarticular allografts (often requiring immunosuppression and running the risk of infection, osteonecrosis and rejection) or endoprosthesis (with a high infection rate and by definition a limited longevity), with the advantage of maintaining normal joint function. Investigators in **Buenos Aires (Argentina)** set out to establish, given the scarce reports of longer-term outcomes, how their own patients who had undergone local excision with joint preservation and intercalary grafting had fared.<sup>2</sup> Their retrospective series concerns the outcomes of 35 patients all presenting with osteosarcoma of the knee over a 17-year period. The review team were able to report a mean of nine years' follow-up and, unusually, a minimum of five years. The surgical team used fairly tight indications for the intercalary approach

and although they included patients with metastasis, all patients included had to have a clinical and imaging response to neoadjuvant chemotherapy and a 1 cm residual epiphysis after a 10 mm resection margin had been achieved. Consequently, only 16% (n = 35/223) of the patients they treated in the study period were felt suitable for an intercalary approach. While the overall 'intention-to-treat' figures look good, with a patient survival of 86% at ten years and a limb survival rate in surviving patients of 97% at ten years, many patients suffered complications necessitating removal of the allograft. Over half the patients (54%) suffered a complication requiring further surgery including two local recurrences, two infections, 11 fractures and three non-unions. Of those requiring further surgery, around half required removal of the allograft. When looking at all causes of failure, over half had failed at ten years. To really assess the value of this technique we could do with the authors reporting their other patients as a matched series of endoprostheses and/or allograft reconstructions!

### Revered teaching or old myth? Femoral neck protection in metastatic disease

■ On the surface it seems logical. Stabilise the whole bone if there are metastases – 'belt and braces', as the saying goes. This teaching has made the cephalomedullary nail the weapon of choice for most surgeons undertaking surgical stabilisation

of pathologic fractures or prophylactic nailing of the diseased femur. Surgeons in the Anderson Cancer Center in **Texas (USA)** don't necessarily agree.<sup>3</sup> Worried that cephalomedullary nailing carries with it additional surgical time, increased radiation risks and implant costs, they ask the question: do we really need to protect the neck? They decided to establish if there was any evidence that femoral neck metastases do appear in their own series of prophylactic nailings. This retrospective registry study draws on the outcomes of 145 nailings performed in 141 patients recorded in the authors' institutional orthopaedic oncology registry. The procedures were performed over a period of ten years for a variety of diagnoses including metastatic disease, myeloma or lymphoma. On average, radiographs were available for review at just over a year's follow-up and mean survival from procedure was 16 months, with nearly 90% of patients having died at a median survival of nine months. Surprisingly, the authors did not detect any new metastasis at the time of final radiographic follow-up, although given the very poor prognoses of this cohort and incomplete radiographic follow-up this is an understandable failing. The authors argue that although they performed cephalomedullary nailing in their series of patients, this was probably unnecessary as there were no new metastases. This is not an unreasonable conclusion to reach, to our minds, if there were truly the

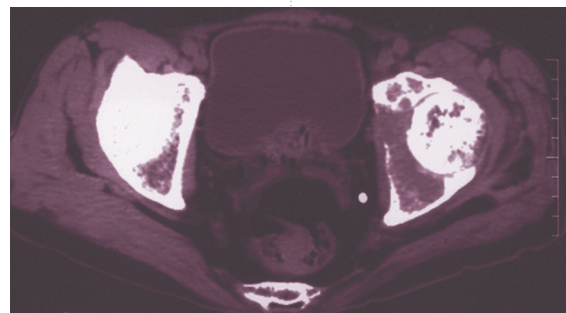
described drawbacks of cephalomedullary nailing. In our experience here at 360, lag screw placement does not require meaningfully increased radiation exposure and can be achieved usually with the minimum of fuss. In these frail end-of-life patients who are prone to fall even if there are no visible metastases on plain films, we still feel protection from neck of femur fracture is wise.

### Megaprosthesis about the knee

■ In the second paper from those industrious chaps in **Bologna (Italy)** there is a very similar story with relation to outcomes to their previous paper.<sup>4</sup> In this report, again concerning megaprosthesis, the study team examine the outcomes of 247 modular rotating hinge knee prostheses. Reasoning that although commonly used, there is little in the way of long-term follow-up data for the modular knee megaprosthesis, with variable outcomes being reported. Their study reports the outcomes of a modular knee reconstruction system (Global Modular Reconstruction System) used to treat tumours in the distal femur (187 cases) and proximal tibia (60 patients) followed up for a mean of four years. In terms of functional outcomes, the results are extremely promising, with a mean MSTS score of 84. Survivorship of the implant was a slightly disappointing 70% at four years and just 58% at eight years. Disease-free survival was achieved in 143 patients (with 26 previously having had surgery for relapse). Again this megaprosthesis seems to be severely limited by infection, with 16% failing due to infection at five years. Although the authors point out that the outcomes for these prostheses are comparable with other similar systems, infection continues to be a worry and in patients who are locally and systemically immunosuppressed, this is unlikely to improve any time soon.

### Malignant transformation in multiple hereditary exostoses

■ In an unusual 'survey'-based study, researchers from **New York (USA)** set out to undertake a large epidemiological study of multiple hereditary exostoses (MHE).<sup>5</sup> The research team aimed to establish the demographics, surgical patterns and malignant transformation rates across the world. They designed an anonymous online survey and canvassed respondents using patient support groups and social media. Using this method they were able to collate data on 779 respondents with a slight female predominance. Patient-reported diagnosis occurred on average at five years of age and



there was around a 3% malignant transformation rate occurring at an average age of 29 years. The most common sites of malignant change from benign exostoses included the pelvis and scapula. While there is no completely new information in this study, it does corroborate previous smaller studies. We were most interested in the use of social media and online networks to collate large amounts of demographic data which simply would not have been possible just a few years ago.

### Fracture of intercalary bone allograft

■ One of the difficulties with large allograft when used in either oncology, infection, hip or knee revision is that incorporation rates are slow, and often segmental bone grafts will heal at both ends but fail to adequately remodel to the stresses and strains of daily living. Consequently, late fracture can present a very signifi-

cant problem. There is little in the literature supporting surgeons in decision-making following fracture of intercalary grafts. The oncological team in **Buenos Aires (Argentina)** have undertaken a long-term follow-up of allografts performed over a 20-year period to establish the natural history.<sup>6</sup> They included all patients treated with allograft alone and excluded those with composite reconstructions. The authors were able to include the results of 135 patients, all reconstructed with segmental intercalary bone allografts of the lower extremities (98 femurs and 37 tibias). The long-term (mean follow-up 101 months) fracture incidence in this series was 14% (16 femurs and three

tibias). If an initial attempt at open reduction internal fixation with bone grafting was made, it was only successful in the tibia; all attempts failed in the femur. All the femoral fractures were ultimately treated with resection of the original allograft and reconstructed with a second intercalary allograft. However, as perhaps would be expected, the fracture frequency for this second intercalary allograft (31%) was higher than for the primary surgery group (16%). While the authors conclude that femoral intercalary graft fractures should be treated with resection and repeat allograft reconstruction, we do wonder here at 360 if, given the high refracture rate, an alternative method of reconstruction such as a vascularised fibular graft or prosthesis would be suitable.

### Comorbidity and outcomes in sarcoma

■ An interesting study from **Seoul**

(**South Korea**) caught our eye here at 360 this month, investigating the effects of comorbidity as an independent prognostic factor in outcomes following treatment for soft-tissue sarcoma (STS).<sup>7</sup> The authors started with the previously validated Charlson Comorbidity score and used this as a starting point in their retrospective prognostic study. The study included 349 patients who had undergone surgery for high-grade localised sarcoma of an extremity. Of these, just 12% (n = 43) had a Charlson score-recognised comorbidity. The authors undertook an analysis of local recurrence-free survival and disease-specific survival between the two groups and were able to establish that although comorbidities were associated with older age, high grade and large local tumour size, it was still an independent predictor of poor outcomes even when undertaking an adjusted analysis for confounding factors.

### A worrying turn? Use of denosumab for giant cell tumour of bone

■ And finally we would point readers' attention to two case reports concerning patients receiving denosumab for giant cell tumour (GCT) of bone. The first, from **Buenos Aires (Argentina)** reports the case of a 20-year-old woman with a recurrent benign GCT of bone which was treated (as has become standard initial treatment) with denosumab.<sup>8</sup> Worryingly, in this case the patient had a bone sarcoma develop while still receiving denosumab treatment. The second case concerns cessation of denosumab therapy, with researchers in **California (USA)** reporting a case of rapid recurrence of a GCT of the distal radius in a 24-year-old woman following the cessation of long-term denosumab therapy.<sup>9</sup> Currently, there are no guidelines on how long denosumab therapy should be continued in the treatment of GCT of bone or for the follow-up of this treatment. As this drug is still relatively new, the long-term efficacy and side effects are also

unknown. Although a revolution in GCT treatment and supported by large randomised studies, denosumab patients should be as carefully followed up as any cancer patient.

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