ROUNDUP360

Oncology

Infection still a problem in endoprosthetic reconstruction

Despite the success of endoprostheses in achieving limb salvage, the very high incidence of infection is an ongoing cause of major concern. Researchers in **Victoria (Australia)** aimed to establish what the implications for patients are of endoprosthetic infection in one of the only long-term follow-up series with an emphasis on endoprosthetic infection. The research team were able to perform a long-term cohort study over a 15-year period (January 1996 to December 2010) in a single institution. They were able to report on the outcomes of 121 patients to a median of 34 months. Startlingly, the authors report that 28% of patients report some form of infection-related sequelae which, while in line with other published series, does underline the magnitude of the problem. Of these, bacteraemia was seen in 19 patients (16%) and deep infection in 17 (14%). The nature of endoprosthetic surgery is that revision is difficult and, unusually in this series, the majority of patients with acute or haematogenous infection were managed with a strategy of debridement and retention of the prosthesis in addition to biofilm-active antibiotics. Later, more chronic infections underwent radical debridement, lavage and exchange of the prosthesis. The authors were able to report an overall success rate of around 75% with this strategy, meaning that just 7.5% went on to develop recalcitrant infection which was untreatable with revision surgery.[1] The strategy employed here of prosthesis retention, serial debridement and targeted antibiotic therapy has been as successful as prosthesis exchange, certainly a strategy to consider given the lower morbidity associated with prosthesis retention.

Massive allografts not as successful as we perhaps think

Massive allografting is an attractive option in limb reconstruction, especially in tumour surgery where a successful allograft is more resistant to infection and failure than the aforementioned endoprosthesis. While there are plenty of technique reports and small case-controlled series, little is known about the longer-term outcomes, incidence of infection, optimum indications or indeed how long it actually takes patients to reach a fully weight-bearing status in a large series. Researchers from **Nijmegen (The Netherlands)** conducted a nationwide study across all of the centres of orthopaedic oncology in the Netherlands. The study included all patients receiving an intercalary allograft reconstruction following a diagnosis of primary bone tumour over a 20-year period. This represents the first 'national level' picture of allograft reconstruction over an extended period of time. Despite the inclusive nature of the paper, just 87 patients with a minimum follow-up of 24 months (median 84 months) were included in the analysis, with the majority of patients (over 90%) presenting with femoral or tibial tumours. Complication rates were relatively high, with 76% of patients experiencing a complication and 79% requiring a re-operation. Serious complications including nonunion (40%), fracture (26%) and infection (14%) were relatively common, with it taking on average nine months for full weight bearing. Of the 87 grafts, 15 resulted in failure, giving an overall eventual success rate of 83%. All failures were outside of the tibia. The failure rate was dependent on reconstruction site, patient age, allograft length, nail-only fixation, and non-bridging osteosynthesis, while adjuvant chemoradiotherapy did not influence the chances of failure.[2] These results from a nationwide survey show the significant complications that can arise with allografts, even when used in the diaphysis. The prolonged time to full weight-bearing (nine months) is a cause for concern, especially if patients have a poor prognosis, with considerable disability during this time.

Curopsy for ABCs?

Aneurysmal bone cysts (ABCs) are a common benign expansile bone lesion that can be tricky to treat. Despite their benign nature, there is an incidence of recurrence and fracture. Efforts to provide a low morbidity treatment have focused on aggressive curettage with the addition of adjuvant treatments such as grafting, sclerotherapy or methacrylate cement. Researchers in **Birmingham (UK)** noticed that some ABCs healed after biopsy alone, and hypothesised that more extensive treatment with a novel biopsy technique, "curopsy" (a "curative biopsy"; percutaneous limited curettage at the time of biopsy), obtaining lining membrane from various quadrants, may lead to consolidation and healing. Following the introduction of their novel technique, the surgical team devised a study to establish if curopsy results in comparable likelihood of healing with more aggressive techniques, what the likelihood of recurrence was, and if the two approaches differ in terms of likelihood of recurrence. Their study included 221 patients with a diagnosis of primary ABC identified through their oncology database. A total of 190 patients were suitable for inclusion in the study (102 (54%) curopsy; 88 (46%) treated with curettage). Follow-up was until healing of the lesion (occurring at a mean of 9.6 weeks).[3] Curopsy was successful in 81% of cases (n = 83/102) with no additional interventions required and spontaneous resolution of the lesion. There was a slightly better success rate of 90% in the curettage group (n = 79/88). Local recurrences in both groups were treated successfully in all bar one case. Interestingly, although marginally less successful in terms of cure rates, the curopsy group went on to lesion resolution in significantly quicker time, shaving around a fortnight off the healing time (9.6 vs 11.4 weeks) at the cost of a higher local recurrence and additional treatment rate (18.6% vs 10.2%). It does seem that

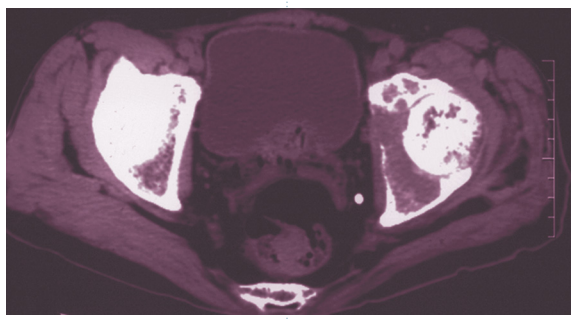
there is little bad to say about the "curopsy" technique. It's a simple procedure that can be performed at the time of the needle biopsy and will be successful more than 80% of the time. We feel there is a lot to commend this treatment modality.

Lengthening prosthesis: days are numbered

■ Bone malignancy in the immature skeleton can be extremely challenging to treat. Skeletally immature patients suffering malignancies may be treated with expandable endoprostheses of various different varieties including the use of a prosthesis which allows for limb lengthening without further invasive procedures. The Repiphysis system (Wright Medical Technology) is an expandable endoprosthesis device suitable for treatment of distal femoral malignancies. These prostheses have, however, been associated with high complication rates and unwanted bone loss. Authors in **Chicago (USA)** have set out to establish what the actual complication rate and extent of the bone loss problem is with this prosthesis. The authors report a single-surgeon series of 12 skeletally immature patients all treated with the Repiphysis system for distal femoral osteosarcoma (mean age 10.1 years). Of the initial 12 patients, two died from the disease prior to the two-year follow-up appointment. Outcomes were assessed at two years using functional assessment (Musculoskeletal Tumor Society Score), radiological outcomes and complication rates.[4] Within the group of ten patients, there were 37 implant-related complications and 15 required re-operations with an MSTS score of just 67%. Of the initial ten patients, six underwent revision due to severe osteolysis surrounding the prosthesis. The bone loss was marked with not only loss of femoral length, but severe cortical thinning and metadiaphyseal compromise. The authors raised concerns about the ability of the remaining bone stock to support revision surgery and they conclude that "surgeons should recognise the potential for significant bone compromise limiting revision options and consider other options". This is not the only extendable prosthesis of this variety that suffers from these problems, and it seems likely that their common use is no longer indicated except in exceptional circumstances.

New WHO classification in brief

■ The definitive overview of musculoskeletal tumours is the World Health Organization classification of Tumors of Soft Tissue and Bone which thoroughly classifies tumours, and particularly considers the molecular biology and associated surgical and clinical implications. Not updated for over a decade, this is the fourth edition of the WHO classification, and focuses on the histological and genetic typing of all recognised tumours, along with a new ICD-O code. This authoritative work with contributions from 159 authors in 24 countries can be a little difficult to digest, even for the most avid surgical oncologist.[5] In a very '*360*' manner, an edited highlights and commentary on the sarcoma section has been prepared by researchers in **Boston (USA)** and very much provides a 'bird's eye view' of the changes since the last edition and the surgical and clinical implications of the new edition. We would thoroughly recommend this paper to all *360* readers with an interest in surgical oncology.



Proximal tumours and fluid levels: bad news

■ Predicting which tumours are going to respond poorly to currently accepted surgical and chemotherapy regimens is key in deciding which patients may benefit from newer or more aggressive treatments. Signs of ongoing primary tumour growth during neo-adjuvant treatment are generally accepted to be bad news. This chemoresistance is associated with poor survival and low 'kill rates' on histology. Sadly, this is a sign that becomes apparent during treatment as there are currently no known predictors for chemoresistance. Investigators in **Seoul (South Korea)** have set out to change this and designed a study to investigate which factors, if any, were associated with primary tumour growth during neo-adjuvant chemotherapy. Secondarily, they aimed to also establish what factors at presentation were also related to survival, and then combine these into a risk model. Using osteosarcoma as a model, the research team studied a cohort of 567 patients, all with stage IIB osteosarcoma. The study team collated data on a range of demographic factors, tumour factors (location, radiographic features, MRI findings, pathology) and treatment factors (chemoresponse and volume change and tumour margins). They utilised logistic regression modelling to identify risk factors associated with survival. The study team identified two significant novel independent risk factors (and their relative risks (RR)) associated with survival: proximal tumour location (RR 2.41) and fluid-fluid level on initial MRI (RR 5.56). Other less surprising risk factors were a large initial tumour volume (RR 1.58) which also independently predicted reduced event-free survival. When considering factors associated with treatment, poor prognosis was indicated by tumour growth after neo-adjuvant chemotherapy, (RR 3.88) inadequate margins (RR 2.42), and poor histologic response (RR 1.43).[6] The novel finding that some characteristic patterns pre-treatment (such as fluid levels) and tumour location may be predictive of response to treatment if independently verified could be used to guide treatment in those at high risk of poor response to more traditional treatments.

Infection predictable in orthopaedic oncology

■ Infection is the bane of any orthopaedic surgeon's life, but none more so than the orthopaedic oncologist. With immunocompromised patients, the difficulties of chemo- and radiotherapy and often large endoprostheses or bulk allografts, this patient group is more susceptible than any other to infection. While surgeons take every precaution, it is helpful to know which patients are more susceptible to infection than others as this can be taken into account both in the consent process and in the decision making process when weighing up different operative options. Researchers in **Aachen (Germany)** designed a prognostic study with the primary end point of infection in over 1500 patients who had undergone orthopaedic oncology procedures. The research team conducted a retrospective review of 1521 patients, all of whom had undergone orthopaedic oncology procedures. The study team recorded data including demographic details, comorbidities, diagnosis and surgical data. They then conducted a stepwise univariate, then multivariate, analysis to identify predictors of infection in this study cohort. Interestingly, there were some highly significant results, with eight covariates found to be predictive of subsequent

infection. The factors predictive were: BMI (OR 1.03), previous procedures (OR 1.19), pre-existing implants (OR 1.94), distant infection (OR 4.13), malignant disease (OR 1.46), hip joint involvement (OR 1.16) and duration of operation (OR 1.16).[7] While the majority of these factors are not modifiable, they do confer an impression of risk. The paper does highlight the rather obvious conclusions that surgery should be delayed if there are signs of distant infection, and that cutting the duration of operation reduces the risks of infection.

Psychosocial support key in oncological outcomes

■ It is well recognised that outcomes in the majority of surgical disciplines are not just dependent on the surgeon, surgery and surgical setting, but that patient factors have perhaps an even more important role to play. In most branches of surgery, subjective and patient-reported outcomes are profoundly affected by the social support network and this is thought to be even more acute in oncological surgery. Researchers in **Nashville (USA)** set out to establish if the hypothesised survival advantage associated with the important psychosocial spousal support had a genuine effect on survival in orthopaedic oncology. The researchers utilised the SEER database and identified a total of 7384 patients who were aged over 20 years and had a diagnosis of soft-tissue sarcoma. Survival outcomes were stratified by marital status and a multivariable regression model was used to analyse the impact of marital status on survival while adjusting for other potential confounding factors. The dataset revealed that single patients were indeed more likely to die from soft-tissue sarcoma than married patients, and that they did so more rapidly. Single patients also presented with higher grade tumours more frequently and received on average less radiotherapy and surgery than their married counterparts.[8] This poorer survival associated with being single does not in fact seem to be a myth. It appears from these data that single patients are more likely to present later with a higher grade tumour and then engage less effectively with health care, receiving less treatment than their married peers. This issue could be potentially effectively dealt with at presentation which is likely to improve outcomes for single patients undergoing treatment for a soft-tissue sarcoma.

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