

ROUNDUP³⁶⁰

Oncology

Complex humeral reconstruction options equivalent

x-ref Shoulder & Elbow

■ There are a huge range of reconstructive options available to the musculoskeletal tumour surgeon treating malignancy of the proximal humerus. However, there is little consensus as to which option is best following resection, in terms of functional outcomes, survival or complications. Researchers in **Boston (USA)** set out to review the current state of play in an attempt to cast some light on what has otherwise been a bit of a murky subject.¹ The review team sought to review any apparent differences between reconstruction options for the proximal humerus after tumour resection. The review was set up to examine functional outcomes (as measured by the Musculoskeletal Tumor Society (MSTS) score), surgical success (determined by construct longevity) and complication. A comprehensive search of online indices including Medline, EMBASE and Cochrane was carried out to identify studies reporting outcomes following tumour excision for the proximal humerus undertaken with any reconstructive technique. The authors included only studies with more than 80% follow-up at two years. They were able to identify 29 predominantly small studies reporting the outcomes of 693 patients. Studies were, for the most part, level IV evidence (retrospective case series (76%),

with the remainder being level III. The studies reported a variety of reconstructive methods including prostheses (n = 17), osteoarticular allografts (n = 10) and allograft-prosthesis composites (n = 11). The studies were highly heterogeneous, with little or no control and as such the review authors undertook a narrative report of their results. The functional scores reported across the board were mediocre, with similar functional scores in prosthetic reconstruction (61% to 77%, n = 141 patients), osteoarticular allografts (50% to 78%, n = 84 patients) and allograft-prosthesis composite (57% to 91%, n = 141 patients). There was a similar picture in terms of complication rates and survival between the groups, although there was a notably higher fracture rate in the osteoarticular allograft group than in the others. Certainly there does not seem to be a 'state of the art' treatment for reconstruction following proximal humeral resection. The authors of this study conclude that further collaboration and randomised controlled trials are necessary to establish the superiority of any particular treatment. There is, however, a different conclusion that could be reached. Given the similarity of reported results (which are, for the most part, far from excellent), the current treatments are all roughly equivalent. Development of new technologies (particularly inverse shoulder prosthesis) may be a better way to concentrate energies.

Not everything better via the arthroscope!

x-ref Knee

■ The general push towards less invasive surgery in all subspecialties has led to many operations moving towards an arthroscopic (or laparoscopic/endoscopic) approach. While patients and doctors have moved, almost wholesale, towards this approach, there is very little objective evidence to support either a less invasive or an open approach. In difficult-to-treat conditions such as pigmented villonodular synovitis (PVNS), the potential advantages of a minimally invasive approach include potentially lower morbidity but at the cost of recurrence rates. Researchers in **Leiden (The Netherlands)** set out to establish which of the two treatment modalities are most successful for PVNS in a comparative case series.² Given the relative rarity of the condition, the research team were only able to report the outcomes of 30 patients over a 21-year period, of whom 15 had been treated primarily at their centre and 15 of whom were tertiary referrals for recurrent disease. Their study was designed to assess knee functional outcomes (range of movement, Knee Injury and Osteoarthritis Outcome Score (KOOS)), tumour-specific outcomes (Musculoskeletal Tumor Society (MSTS) score, the Toronto Extremity Salvage Score (TESS)), quality of life (SF-36) and complication and recurrence rates. Patients were followed-up to a minimum of two years (mean 5.3 years) and the outcomes of all patients were known.

Recurrence rates were markedly different between patients treated with open (n = 4/14) and arthroscopic (n = 15/16) treatments initially. In the open group local control was achieved in 93% with an additional procedure. The majority of patients in the arthroscopic debridement group underwent further arthroscopic debridement (mean 1.8, (1 to 8)) with all eventually requiring an open synovectomy. With definitive open synovectomy, local control was achieved in 53% after an initial procedure and 80% with the addition of a second operation. Functional outcomes with all measures were significantly poorer in the initial arthroscopy group, including range of motion (114° vs 127°), KOOS (48 vs 71) and SF-36 (62 vs 80). Remarkably (and presumably due to the added morbidity associated with revision surgery), the open synovectomy wins hands down. In terms of eventual rates of control, requirement for further procedures and eventual outcomes, it appears that for patients with PVNS at least, the message of this paper is step away from the arthroscope.

Obesity and sarcoma

x-ref Research

■ Just as the volume of our patients is growing in musculoskeletal tumour surgery, so is the research interest in the potential sequelae of obesity often looked at in terms of outcomes and complications. For almost any condition treated surgically, there is the potential for obesity to have an independent effect on outcomes. There has been little investigation

into the potential complications associated with obesity in patients with musculoskeletal tumours. Researchers in **Nashville (USA)** set out to assess if obesity had an independent effect on survival (both recurrence and death) or complications after surgical treatment for soft-tissue sarcomas of all varieties.³ Patients were retrospectively recruited into the study from a prospective database with all patients included over a seven-year period. The study population included just short of 400 patients (154 obese and 243 non-obese). Follow-up was achieved to around four years in both groups. Outcomes assessed included local control, distant metastatic spread, and overall survival. Statistical analysis was stratified by BMI, and a multivariate model was used to identify predictors of survival. The authors of this study found that overwhelmingly those obese patients had survival outcomes and wound complication rates that were comparable with their non-obese counterparts. There were, however, some differences between the two groups, with obese patients having a higher proportion of low grade tumours (31% vs 20%) and higher rates of smoking and diabetes. The multivariate analysis confirmed that even allowing for these differences in tumour characteristics, obesity was not an independent risk factor for survival.

Frozen autograft a long-term success

■ Biological reconstruction with sterilised (either irradiated or frozen) autograft following tumour excision is now an accepted concept. Authors in **Kanazawa (Japan)** reported their initial experience with a liquid nitrogen freeze technique back in 1999. This update of their previously promising report includes a whopping 72 patients at a mean of around two years' follow-up.⁴ The surgeons used their previously described technique of surgical excision and use of liquid nitrogen for allograft reconstruction and report a longer follow-up of surviving patients (36 patients at 101 months). A

mixture of reconstruction techniques is reported in the surviving patients with 16 osteoarticular grafts, 13 intercalary grafts and a composite graft with prosthesis in seven patients. The majority of patients had good (19.4%) or excellent (72.2%) results and, crucially, there were no cases of tumour recurrence within the grafts following initial surgery. The majority of the grafts survived to five (86.1%) and ten years (80.6%). There was, however, a difference in success rates between the operative strategies, with seven of 16 osteoarticular grafts (44%) failing due to fracture or infection, but all the composite and intercalary grafts survived. The authors make the reasonable conclu-

sion that “long-term outcomes of frozen autografting, particularly using composite and intercalary grafts, are satisfactory and thus represent a good method of treatment for patients with a sarcoma of bone or soft tissue”.

En-bloc resection and metastatic disease

■ The use of prognostic scores is exceedingly helpful in any clinical situation where there is a risk benefit analysis to be undertaken, such as in the treatment of bony metastasis. The decision whether or not to operate on isolated bony metastasis is fraught with difficulty, with some patients wishing to avoid surgery unless it will improve either quality or quantity of life. Surgeons in **Tampere (Finland)** have attempted to shed some light on this difficult decision by evaluating potential factors and their impact to yield prognostic information in four tumours

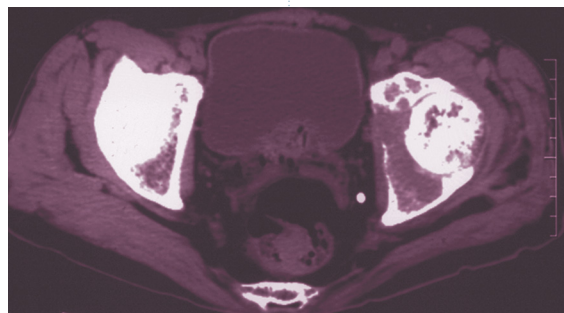
commonly metastasising to bone.⁵ The authors used data collected as part of the Scandinavian Sarcoma Group (SSG) metastasis registry to collate details surrounding 672 cases of operated non-spinal metastasis in cases of breast, prostate, lung, and kidney cancer. The authors used a Cox regression multivariate analysis to identify statistically independent prognostic factors and Kaplan-Meier analysis to estimate survivals. Of all the potential covariates screened, the most significant prognostic value was associated with the presence of organ metastases, overall health status, and disease load. Renal metastasis was found to be a bit of a special case where a fourfold longer

survival was associated with en-bloc resection as opposed to intralesional treatments. As would be expected, the use of pre-operative radiotherapy increased complication and re-operation rates due to focal localised tissue damage. This well conducted and meticulous paper sheds some light on the likely outcomes of en-bloc resections and gives some evidence on which to base the often difficult treatment decisions associated with metastatic disease.

Positive margins in soft-tissue injuries

■ Sometimes the most difficult of calls to make in surgical oncology is the sparing of adjacent structures at the cost of leaving a positive resection margin. In an ideal situation, the surgeon achieves a clear resection margin and spares all critical structures, thereby minimising morbidity from surgery while achieving the lowest possible recurrence rate. At

times this is not possible, with the surgeon having to elect to retain critical structures at the potential cost of leaving involved resection margins. Researchers in **Toronto (Canada)**, reasoning that little is known about the implications of such a decision, set out to study the impact of positive resection margins on outcome.⁶ In order to make sense of what is quite a tricky question, the study team used a prospective database to study 169 patients with soft-tissue sarcoma who had positive margins on their histology. The patients themselves were subdivided into groups based on the reason for their positive margin. Patients were divided into those who had a critical structure preserving positive margin, a tumour bed positive margin and those with an unexpected positive margin. Outcomes were assessed using recurrence-free survival and cause-specific survival analysis. As would be intuitively expected, patients who had positive margins did universally poorer than the control groups who did not. However, the magnitude of difference was not the same in each group. Patients with unexpected positive margins had the worst survivals of any patients, with five-year local recurrence-free survival (LRFS) of 63.4% and cause-specific survival (CSS) of 59.2%, respectively. In those patients who had a planned ‘close dissection’ to critical structures, these were both poorer in those with positive margins than those with negative (LRFS 97% vs 85.4% and CSS 80.3% vs 59.4%). In some cases positive margins were achieved by deliberately excising critical structures. This improved the five-year survival to LRFS 91.2% and CSS 63.6%. The authors of this interesting paper conclude that in all cases a microscopically positive surgical resection margin (R1) in the setting of soft-tissue sarcoma is a cause for concern. However, their reported oncological outcomes can to a certain extent be predicted by the cause for a positive margin and that in certain situations preservation of



critical structures at a slight oncological cost could be justified.

Lipomatous tumours explored

■ The lipomatous tumour is often regarded as a 'lesser tumour' and in some centres, at least, they are excised by all and sundry. Researchers in **Milan (Italy)** delved deeply into the notes of 171 patients, all of whom underwent excision of an atypical lipomatous tumour at two different surgical centres, each with differing protocols and surgical approaches.⁷ The study population consisted (as would be expected) of a combination of primary (n = 151, 88%) and secondary tumours, which were treated with two different strategies. At one institution they were excised with a cuff of tissue (marginal resection (MR)) and in the second institution a policy of simple resection (SR) was adopted. Outcomes were assessed using local recurrence-free survival (LRFS) and the authors also reported rates of secondary dedifferentiation and unwanted residual tumour remnants following surgery. Around one in ten suffered local recurrence (n = 16), and although there were no cases of secondary dedifferentiation, residual tumour was found in 46% of these cases. Those factors associated with a poor prognosis included patients undergoing SR type excisions, those with a sclerosing subtype and patients with tumour rupture during

excision. This paper, when taken with the previous one, serves to underline the importance of adequate tumour margins. It does stand to reason that a complete excision is likely to yield a significantly improved outcome. Careful surgical planning and management in a specialist centre where clear excision margins are more likely is supported by this pair of papers.

What happens with recurrence of osteosarcoma

■ With so much focus quite rightly on avoiding recurrence in malignant bone lesions coupled with improved outcomes, very little is known about the outcomes of those patients who suffer a recurrence, as for the majority of research papers it is the failure endpoint. However, it would be useful to understand more fully what happens to those patients who do suffer a recurrence, how they are likely to do, and what are the determinants of their outcomes are. Spotting a bit of a gap in the literature, a team of surgical orthopaedic oncologists from **Kanazawa (Japan)** set out to rectify this situation. The research team focused on reviewing the notes of 45 patients, all of whom had an initial diagnosis of high grade osteosarcoma (without metastasis), underwent surgery and had local recurrence.⁸ This population formed around 10% of the total treatment group (n = 461). Patients were treated at a median age of

18 years and follow-up was to a mean of over three years. The outcomes were assessed and compared with the total population through use of Kaplan-Meier survival and Cox multivariate analyses. The overall survival after recurrence was 30% at five years and 13% at ten years. The predictors of poor outcome included the presence of metastasis and tumour size, while chemotherapy in this patient population did not appear to improve outcomes. There were 45 patients who suffered recurrence, of whom the majority did so in the soft-tissue (n = 35/45). Most worryingly, nearly two thirds of soft-tissue recurrences were not associated with any radiographic changes, suggesting that plain radiography may be ineffective in surveillance for osteosarcoma. This paper highlights the bleak prognosis and poor outcomes associated with recurrent osteosarcoma. Given the nature of recurrent disease, difficulty diagnosing on plain radiography and protracted course of recurrence, for us here at 360 this paper serves to highlight the importance of a long surveillance period and the potential for use of more sophisticated imaging modalities.

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