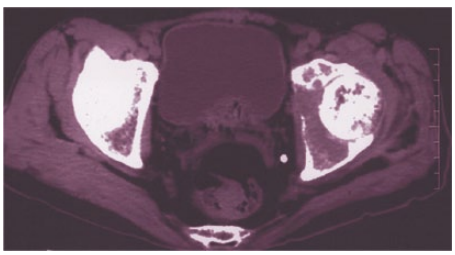
Risk stratification in osteosarcoma and the major vessels

In this study from **Birmingham (UK)**, the team assess the risk of surgery for osteosarcoma based on the presence of nearby major vessels.[1] The group identified 226 patients, each diagnosed with a high-grade osteosarcoma without metastatic disease. They used MRI findings to categorize patients into four groups according to the proximity of the tumour to a major vessel following neoadjuvant chemotherapy. This is an interesting approach to take when investigating prognosis, given that one might expect the proximity to major vasculature to affect both the likelihood of successful resection (i.e. whether limb salvage is possible) and the ability to achieve comprehensive local control. Patients had a mean age of 15 years (4 to 67), and the most prevalent tumour sites were the femur (n = 103) and tibia (n = 66). Dependent on categorization, the limb salvage rates ranged from 0% to 92%; the highest rates had a margin of > 5 mm, and the lowest rates were when the tumour surrounded a major vessel. Similarly, local recurrence following excision was more frequent when the tumour was at closer proximity to a vessel. The authors conclude that the proximity of osteosarcoma to major blood vessels is a poor prognostic factor for local control and survival. Limb-salvage surgery appears to offer similar local control if the tumour attachment to blood vessels is limited to less than half the circumference of the vessel or less than 10 mm of longitudinal attachment. This suggests an interesting concept: local recurrence in tumours attached to (but not surrounding) vessels may not actually impact survival. Considering whether an amputation should be the first option in such cases (in spite of radiological vascular proximity) is debatable, especially since histology showed that normal soft tissues were present between the tumour and major vessels. We at *360* also keep in mind the limitations that come with retrospective studies.

Pelvic Ewing's sarcoma: the acetabulum with modern treatments? X-ref

In another study from **Birmingham (UK)**, the authors investigate the optimal local treatment for pelvic Ewing's sarcoma, which is the most common malignant pelvic bone tumour in children and adolescents.[2] However, Ewing's sarcoma is still a very rare diagnosis, and the study group could only identify a cohort of 35 consecutive patients. In a 30-year period from 1986, they all underwent pelvic lesion resection and subsequent reconstruction, pelvic resections, and acetabular reconstructions after chemotherapy. The authors report an overall five-year survival of 61%, and local recurrence-free survival for the same interval of 72%. In terms of management, in this series at least, preoperative radiotherapy and subsequent surgery yield the best histological response, overall survival, and local recurrence-free survival when compared to surgery alone or with postoperative radiotherapy. Further analysis of surgical options showed that hip transposition had better outcomes than structural reconstructions. These findings led the authors to conclude that acetabular reconstruction with hip transposition resulted in better function in patients with pelvic Ewing's sarcoma, even when combined with preoperative radiotherapy. Thus, they advocate moving away from the mega metal replacements and complex reconstruction options for pelvic tumours.



Survival estimation in Ewing's sarcoma

In our second entry looking at survival in Ewing's sarcoma this month, this study from **Leiden (The Netherlands)** sets out to establish an easy-to-use and clinically relevant prognostic tool to estimate survival for patients presenting with Ewing's sarcoma.[3] The authors describe a retrospective study of 1,314 patients, all of whom had known outcomes following a period of observation. Their treatment, diagnosis, and demographic factors were investigated in order to develop a survival estimation tool. The idea was that to inform patients and treating surgeons, and to aid in earlier decision-making, a simple and easily accessible tool would be advantageous. Having collected appropriate data from this series of patients, the group used multivariate models and Kaplan-Meier analysis to evaluate the correlations between hypothesized prognostic variables, and surgery, with overall survival. Patients were followed for eight years post-treatment in order to determine outcomes. In the first stage of this study, the authors found that the independent prognostic factors for improved survival at diagnosis were age, volume, primary tumour localization, and disease extent. In regard to the surgery, prognostic factors were discovered to be age, volume, disease extent, and histological response. Thus, these were included in the model. The percentage necrosis of tumour post-surgery was further used to sub-classify these groups based on prognosis. This highlights the fact that, during the course of treatment, survival estimations will change as more information becomes available. The authors essentially stratified the patients by risk of death, and these divisions can be refined as more information comes to light. Surgical margins and histological response were assessed by local pathologists, not by a reference pathologist, and differences between centres in analyzing specimens may therefore be present as a study limitation. The retrospective study design, which used data from a prospectively performed trial, resulted in 11% of patients having missing data. The local treatment choice was left to the discretion of the treating multidisciplinary teams, and so may have influenced the results. As such, a prospective validation of this model will be the true test of its efficacy and applicability. We are somewhat behind other branches of cancer surgery when it comes to the management of musculoskeletal tumours. This is not surprising given the rarity of the diagnoses. In other more common neoplasms like breast cancer, the prognostic models are so well developed that adjusted survivals based around different neoadjuvant and adjuvant treatment regimens can be calculated. This makes prognostic tools central to deciding treatments.

Nomograms in primary soft-tissue sarcoma prognostication

In recent years, much has been written about outcome prediction in orthopaedic oncology, in an effort to guide therapy and better inform our patients. While this work has been thorough, this group from **Tokyo (Japan)** have sought to add to the literature further by carrying out an analysis of soft-tissue sarcomas in the Asian population.[4] Using the nationwide Bone and Soft Tissue Tumor Registry, the authors retrospectively identified 2,827 postoperative patients with primary soft-tissue sarcomas. They then developed nomograms predicting local recurrence-free survival, distant metastasis-free survival, and disease-specific survival at two years. The results show that tumour size and grade significantly impacted the outcomes, as did histological diagnosis. Decision curve analysis revealed that the nomograms had

clinical applicability. This nomogram comes with advantages. Unlike prior nomograms, it incorporates nodal metastasis status as a prognostic factor in the predictive models, and can predict three endpoints: major progression events occurring during the clinical course. A word of caution by the authors: radiotherapy is used in Japan only for a small proportion of soft-tissue sarcoma patients who have a higher risk of local relapse. Only 22% of patients in this dataset underwent adjuvant radiotherapy, compared with a much larger proportion in Western countries. Hence, there will be a need to externally validate these nomograms using specific patient populations before they can be recommended for clinical use in other countries, where therapeutic strategies are different. The use of nomograms in this study highlights the strength of the technique. The majority of models we use in prognostication and scoring utilize linear methods, and require a computer for calculation. Nomograms are a great way of easily and rapidly estimating risks without the drawback of linear methods, and without requiring the use of a computer.

Giant cell tumours combined with secondary aneurysmal bone cysts are more likely to develop postoperative recurrence: a retrospective study of 256 cases

Giant cell tumours of bone (GCTBs) in isolation can be difficult to treat; however, when combined with aneurysmal bone cysts (ABCs), surgeons are faced with an even harder challenge. Into the fray step a group from **Guangxi (China)**, who have conducted a retrospective analysis of 60 patients diagnosed with GCTBs combined with secondary ABCs, and 196 patients diagnosed with simple GCTBs.[5] The cohort was treated with intralesional curettage or tumour resection. The study was undertaken in order to identify the impact of secondary ABCs, as well as other factors, on the postoperative recurrence of GCTB. Recurrence rate in the secondary ABCs group was significantly higher than that in the simple GCTBs group. Curettage showed a higher recurrence rate than tumour resection. Careful multivariate regression analysis identified that secondary ABCs and curettage were independent factors for recurrence of the GCTBs. Although the retrospective data suggests ABC as a poor prognostic factor, the reasons offered by the authors are unconvincing. An increased recurrence rate can be otherwise explained. First, secondary ABCs can easily cause haemorrhage because the blood does not clot, and the difficulty in controlling the intraoperative haemorrhage may result in contamination of surrounding tissues. Alternatively, the uncontrolled haemorrhage may blur the surgical field, which may cause incomplete tumour resection. Since 80% of recurrences occurred in areas where use of a tourniquet was feasible, it would be reasonable to suggest that uncontrolled haemorrhage should not be an issue, although this is not made clear from the manuscript. Furthermore, to account for this difference, there is no clarification as to whether there was a preponderance of grade III lesions in the ABC sub-group or whether a larger number of non-ABC GCTBs underwent resection. This raises some scepticism surrounding the results of this otherwise interesting paper.

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Children's orthopaedics

X-ref *For other Roundups in this issue that cross-reference with Children's orthopaedics see: Sports Roundup 1; Spine Roundups 3, 5 & 6; Oncology Roundup 2; Research Roundups 5 & 6.*

Manifestations of pseudoachondroplasia

Considering that pseudoachondroplasia is the second most common form of skeletal dysplasia, it is surprising that descriptive studies of its manifestations have been less than thoroughly described in the orthopaedic literature. This is why we at *360* were pleased to come across this work from **Akron, Ohio (USA)**.[1] The authors of this simple but important study set out to review the medical records and radiographs of 141 patients presenting with pseudoachondroplasia. Their paper represents an excellent opportunity to define and clarify the presentation and orthopaedic sequelae of this common condition. As anyone studying for an orthopaedic licensing exam will doubtlessly know, the condition is caused by a mutation in the collagen oligomeric matrix protein on chromosome 19. This leads to an accumulation of material in the rough endoplasmic reticulum of chondrocytes and, hence, impaired endochondral bone formation plus tendon abnormalities. Like most dysplasias, there are several individual mutations that can result in the same phenotypic condition. Mutations causing pseudoachondroplasia give rise to short limb and trunk stature with conventional craniofacial appearance. Individuals with the condition are of normal intelligence. Presentation is usually after walking age, with characteristic macroscopic findings such as a waddling gait. This study scrutinized positive clinical and radiological features and analyzed by body region. Features were defined as typical if they occurred in over 50% of individuals, common in 25% to 50%, or occasional in less than 25%. The precise and detailed analysis is listed in the paper, but many of the manifestations occur as a result of the spondyloepiphyseal dysplasia, with flattening or fragmentation of the epiphyses, and flaring or widening of the metaphysis regions of long bones. The femoral head and acetabulum were severely dysplastic in 100% of individuals studied. The knees showed either genu valgum (22%), genu varum (56%), or a windswept deformity (22%). Common manifestations in the spine at all levels included platyspondyly, anterior beaking, or an ovoid codfish deformity. In the cervical spine, these deformities were present in 89% of cases. This led to kyphosis (28%), scoliosis (58%), and lumbar lordosis (100%). The long-term sequelae are obviously complex and variable, but premature arthritis in the hips was particularly common in those individuals studied. Severe symptoms seen in the knees was frequent in the 20- to 30-year-old