concluded that the lesser trochanter profile can determine the position of the femur in both anteversion and retroversion, supporting its use as a method to restore pre-injury femoral rotation after fracture fixation.

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Oncology

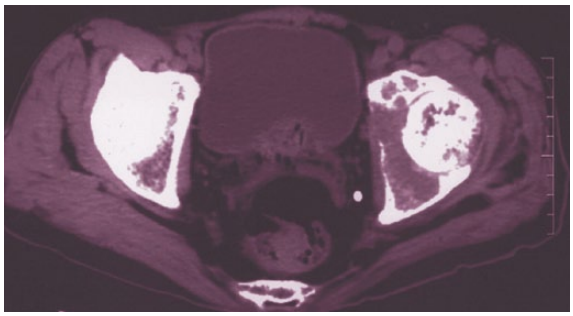
X-ref ***For other Roundups in this issue that cross-reference with Oncology see: Children's orthopaedics Roundup 3.***

New American Joint Committee on Cancer: change for change's sake, or does it really help?

The American Joint Committee on Cancer (AJCC) publishes the definitive description of cancer staging, and, with the eighth edition, there have been some significant changes to the staging algorithm for soft-tissue sarcoma (STS) in the limbs or trunk. This essentially boils down to the inclusion of two additional T (size) classifications and the grouping together of lymph node metastasis (LNM) with distant metastasis as stage IV disease. There is some significant debate as to whether this represents change for the sake of change, or whether these changes improve the performance of the staging system, and two timely papers have been published on this topic. The first, from **Nashville, Tennessee (USA)**, utilizes the Surveillance, Epidemiology, and End Results (SEER) database and undertakes an analysis of the 21 396 adult patients on the database with an STS of the limb or trunk.[1] This was with the aim of establishing if the new tumour size classification had a positive effect on disease-specific survival. The author used a flexible, non-linear Cox proportional hazard regression model utilizing restricted cubic splines and fractional polynomials. The comprehensive statistical approach based on real patient registry data of over 20 000 patients is somewhat difficult to argue with when a prognostic score is being tested. Sadly, despite all the work that has gone into the eighth edition of the AJCC, the author concludes that "The AJCC 8th edition staging system for STS is no better than the previous 7th edition", and goes on to use his extensive analysis to propose an alternative staging system based on histological grade, tumour size, and anatomic depth, which, across the SEER data set, showed significantly higher predictive accuracy, with higher model concordance than either AJCC staging system. A second interesting analysis of the new system from a research team in **Houston, Texas (USA)** went on to establish the potential benefit of the AJCC eighth edition compared with the seventh edition.[2] This team used a similarly large data set from the National Cancer Database (NCDB) to evaluate the comparative prognostic power of the new system when compared with the seventh edition. A data extract of 26 144 patients who were suitable for inclusion in the study from the NCDB between 2004 and 2013 was undertaken. The authors used overall survival using Kaplan–Meier and Cox proportional hazard models. The use of the T3 and T4 categories in the eighth edition resulted in an increased number overall of patients classified as stage III (5120 IIIA (19.6%) and 4280 as IIIB (16.4%) *vs* 7882 (30.1%) previously). This was matched by a small increase in the number of patients classified as stage IV (2776 (10.6%) *vs* 2565 (9.8%)). These authors established that the AJCC eighth edition far more accurately stratified overall survival in patients with large, high-grade tumours (T3/4) compared with those patients with T2 tumours, and provided a more accurate risk assessment than the previous version. So, taken together, these two helpful articles suggest that the use of the eighth edition of the AJCC system is more accurate than the previous seventh edition but there is still some way to go in improving the overall accuracy of the system for STS patients.

Chondrosarcoma survival under the spotlight

Although treatment is confined essentially to specialist tumour practice, we would draw readers' attention to three related articles that attempt to shed some light on the art and science of predicting survival in chondrosarcoma. The first article, from **Shanghai (China)**, asks whether a nomogram can be used to predict the overall cancer-specific survival in chondrosarcoma.[3] Nomograms offer a number of benefits over traditional survival prediction methods, in that they are a simple way in which to estimate non-linear survivals. The authors again utilized the Surveillance, Epidemiology, and End Results (SEER) database. A total of 1034 patients with grade II or III chondrosarcomas were used as the study cohort, of whom 919 patients had complete follow-up to a year. The authors utilized the X-tile method to determine optimal cut-offs and multivariate analyses were utilized to include factors independently predicting three- and five-year cancer-specific survival in the nomograms. The now familiar method of using training and validation cohorts (each of 517 patients) was employed. The authors used six independent prognostic factors to generate nomograms that can be easily used by providers in the office: age, histologic subtype, tumour grade, operative amenability, tumour size, and the presence or absence of metastases. These nomograms were tested with internal and external validation, and were found to be an effective predictor of overall and cancer-specific



survival in these cohorts. Another useful paper on chondrosarcoma survival that crossed the editorial desks this month from **Leiden (The Netherlands)** aims to shed some light on the prognostic factors that predict survival in patients with chondrosarcoma of the pelvis.[4] The authors report a series of 162 patients, all with primary chondrosarcoma of the pelvis. The overall survival for patients in this series was, perhaps as expected, pretty shocking, with 38% of patients (n = 62) experiencing local recurrence and 30% (n = 48) developing local metastases. The risk of disease-related death was very much in line with the tumour grade, with a 3% (1 of 30) risk for grade I tumours, 33% (31 of 93) for grade II tumours, and 54% (21 of 39) for grade III tumours. Helpfully, the authors were also able to identify risk factors for poor disease-specific survival as tumour grade, resection margins, and tumour size. This paper sheds some light on a very rare tumour, not only in terms of the overall survivals, but also by identifying some prognostic factors. The final of our three papers of interest comes from **Seoul (South Korea)** and concerns patients at the other end of the severity scale, with atypical cartilaginous tumours (ACTs) of long bones.[5] The authors report the outcomes of their adjuvant treatment after intralesional curettage with the aim of establishing if cryosurgery or chemical adjuvants provide poor oncological outcomes in patients with an ACT. The authors report a total of 24 patients, all treated with extensive curettage and burring for an intralesional excision. The bone defects were treated with bone cement and grafting as deemed clinically appropriate, and no chemical adjuvants or cryosurgery were used. The authors followed their patients up for 66 months and there were no cases of local recurrence on plain radiographs and MRI or CT images, nor were there any distant metastases or disease-specific deaths. The authors raise the question, is cryosurgery or chemical adjuvant needed to improve outcomes in these patients, or will careful intralesional curettage suffice without affecting outcomes?

Socioeconomic patterning in early mortality of primary bone cancer

In an interesting investigation, the bone tumour unit in **Newcastle (United Kingdom)** sought to determine whether there is any socioeconomic patterning in early survival following bone tumour surgery.[6] They utilized the national data set for osteosarcomas and Ewing's sarcomas diagnosed between 1985 and 2008 in Great Britain. The study population consisted of 2432 osteosarcoma and 1619 Ewing's sarcoma cases, and the authors undertook logistic regression modelling to establish the risk of death at the arbitrary follow-up periods of three months, six months, one year, three years, and five years after diagnosis. The authors then utilized the Townsend deprivation score at small-area level and the urban/rural status was studied at larger regional level. For patients with osteosarcoma, mortality at all timepoints studied out to a year was associated with higher area unemployment even after age adjustment, and mortality at six months was associated with greater household non-car ownership. In contrast, for patients with a diagnosis of Ewing's sarcoma, the authors could not find any significant associations between mortality and overall Townsend score, nor with its components for any time period. In both tumour diagnoses, however, increasing mortality was associated with less urban and more remote rural areas. This is one of the only studies to establish the socioeconomic and healthcare access effects for primary bone tumours. The authors have established that if you live in the countryside or are unemployed, you have worse survival for Ewing's sarcoma and osteosarcoma. This is probably a combination of the socioeconomic effect and the fact that patients in more remote areas have poorer access to health care.

Megaprostheses at long-term follow-up

The oncological world continues to turn out cohort series for patients treated with megaprosthesis following wide local excision for their bone tumour. The authors of this series from **Copenhagen (Denmark)** have entered the fray with their relatively small series of 50 patients who have, however, an impressive follow-up of 14 years.[7] The patient cohort were a mix of diagnoses, with 30 osteosarcoma patients, nine chondrosarcoma, six osteoclastoma, four Ewing's sarcoma, and a single angiosarcoma. All patients underwent limb-sparing reconstruction of the lower limb (nine proximal and 29 distal femur, nine proximal tibia, and three total femur). The outcomes were reported over 14 years in terms of failure as classified by the Henderson classification. Survival was estimated using the Kaplan–Meier survival analysis method for three outcomes: survival of the patient, prosthesis, and limb. The authors were able to establish the outcomes of the 28 patients who were alive at the final reported follow-up. Of the initial cohort, a little over half had had revision surgery (n = 27/50) and there was an excellent ten-year patient survival rate of 60%. However, the implants did not fare nearly so well, with a ten-year implant survival of 24%, and a limb survival rate of 83%. The Musculoskeletal Tumor Society (MSTS) score was a mean of 21, giving a good median score of 71%. The results from this series represent a realistic expectation of contemporary limb-salvage surgery in patients with bone tumours. Limb salvage is, as the authors argue, justified because the patient survivals are in line with the overall survival in the majority of series, no matter which reconstructive approach is used. The prosthesis survivals presented here are probably a realistic example of what can usually be expected in a bone infection unit with the average group of patients.

Megaprostheses for high-grade osteosarcoma around the knee

Another series worthy of attention in this roundup concerns megaprotheses used around the knee for the diagnosis of primary osteosarcoma. This paper from **Shanghai (China)** was designed to determine the long-term survival of cemented endoprostheses for bone tumours around the knee.[8] The authors set out to report the overall patient survival, the overall implant survival, and the frequency and types of failures observed in megaprosthesis reconstructions. In addition, the research team set out to establish functional results using the Musculoskeletal Tumor Society (MSTS) score and go on to unpick the differences between distal femoral and proximal tibial tumour reconstructions. As with many series from China, the volume of pathology presented here is impressive. In this retrospective series, the study team were able to report 108 cemented endoprosthetic knee replacements, all undertaken for

treatment of primary osteosarcoma. From a treatment perspective, patients underwent excision and reconstruction in combination with a multidrug protocol of neoadjuvant chemotherapy. The series had more distal femoral lesions (67%) than proximal tibial lesions (33%), and the patients were followed up to a mean of 53 months with a minimum known oncological follow-up of one year. There was a 71% survival at five years' final follow-up, and 67% at eight years. Deaths were due primarily to metastasis (n=33), and ten patients suffered local recurrence during the course of the study. Overall complication rates were rather high, as previously reported in other series, with 51 complications occurring in 45 patients. The overall prosthesis survivals were 78% at five years and 55% at eight years, with 59 surviving prostheses at the end of the observation period. Of the 21 implant failures, five were due to untreatable infection, eight to aseptic loosening, four to local recurrence, three to structural failure, and one to soft-tissue failure. The MSTS score gave a 76% functional level. This is a very similar series to the Danish series, with a reported 45% failure rate at eight years, although the authors were able to demonstrate slightly poorer survival in the proximal tibia than in the distal femur.

Core needle biopsy reliable in radiolucent bone tumours?

The core needle biopsy (CNB) is a widespread and accepted method of diagnosis of solid bone tumours where a reasonable core of tissue can be expected to give an accurate and reliable diagnosis. When interpreted in conjunction with clinical and radiological findings, it is the gold standard for treatment planning. However, there is less widespread acceptance of CNB in the diagnosis of aneurysmal bone cysts (ABCs), most likely due to concerns of safety with attendant complications and its reliability in ruling out malignant diagnoses such as telangiectatic osteosarcoma. Being sure that a tumour is benign (ABC) or malignant (telangiectatic osteosarcoma) is important. The authors from **Santa Monica** and **Los Angeles, California (USA)** report a retrospective study of their pathology database for ABC and telangiectatic osteosarcoma, and included those patients who underwent a CNB and then proceeded to definitive surgical resection with final histopathological diagnosis.[9] A surprisingly high total of 81% of CNBs were effective, and, based on eventual results and further investigations, 93% of CNBs (n=55/59) were determined by the study team to be accurate. Diagnostic CNBs had a sensitivity and specificity of 89% and 100%, respectively, and there were no reported complications within the series. Within the constraints of the numbers available, there was no difference in efficacy or accuracy between CNBs performed in-house and those referred from outside. This study suggests that core needle biopsy is essentially safe and reasonably accurate if sufficient material is obtained. There seem to be few downsides to adopting CNB as part of the diagnostic work-up for these patients.

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Children's orthopaedics

X-ref ***For other Roundups in this issue that cross-reference with Children's orthopaedics see: Spine Roundup 6; Research Roundup 1.***

Supracondylar fractures and BOAST 11 X-ref

In maintaining standards in modern surgical practice, outcome, system, and process measures have become used increasingly often. The British Orthopaedic Association Standards for Trauma (BOAST) have been a laudable development in trauma care in the United Kingdom and have undoubtedly improved standards of care across a range of injuries. The principle of the BOAST guidance is to provide auditable standards against which to measure the performance of individual care or systems at any scale. BOAST 11 addresses quality standards for care of supracondylar elbow fractures. These relatively common injuries are most commonly managed by general orthopaedic surgeons, despite their relative complexity. At points in the pathway, such as the initial assessment in the emergency department, some of the most junior medical staff are involved in care. This is important, as experience, training, and level of supervision can affect the quality of the assessment made. Neurovascular injury can mandate urgent surgery, and delayed surgery or missed injuries may, of course, have serious consequences. Guidelines only improve care if they are successfully implemented, and this collaborative group based in **Bristol (United Kingdom)** have performed a simple but effective multicentre audit to establish how closely the guidance on assessment is followed.[1] Specifically, the study team evaluated implementation of BOAST 11 standard one, which requires a documented assessment of the limb performed on presentation that must include the status of the radial pulse, digital capillary refill time, and the individual function of the radial, median (including the anterior interosseous), and ulnar nerves. This