in order to correct the deformity successfully, sometimes things just don't quite work out right – usually due to 'rebound' growth when the implant is removed. Yet again, the paediatric team in **Dallas, Texas (USA)** have stepped up to the plate and offered their insights into the magnitude of rebound growth seen in this circumstance based on a retrospective review of their series of 67 limbs, all treated with a tension band plate to correct an angular deformity.[8] The authors collected a range of radiological parameters including mechanical lateral distal femoral angle, mechanical medial proximal tibial angle, hip-knee-ankle angle (HKA), and mechanical axis measured before growth modulation, before implant removal, and at final follow-up. These, in combination with demographic details, were screened for factors predictive of rebound growth. The mean age of the patient cohort was 9.8 years at surgery and 11.4 years at implant removal. Around half of the patients suffered rebound growth of more than 5°, and 30% suffered rebound growth of more than 10°. In terms of prognostication, younger children (girls under ten and boys under 12) were more likely to rebound, as were patients with a higher initial deformity. The findings of this paper suggest that we should consider overcorrection in younger patients with higher initial deformity and watch all patients for recurrence of the deformity.

REFERENCES

1. Shore BJ, Shrader MW, Narayanan U, et al. Hip surveillance for children with cerebral palsy: a survey of the POSNA membership. *J Pediatr Orthop* 2017;37:e409-e414.

2. Jaquith BP, Parikh SN. Predictors of recurrent patellar instability in children and adolescents after first-time dislocation. *J Pediatr Orthop* 2017;37:484-490.

3. Wiley MR, Riccio AI, Felton K, et al. Quengel Casting for the management of pediatric knee flexion contractures: a 26-year single institution experience. *J Pediatr Orthop* 2017;37:e421-e426.

4. Morris AR, Thomas JMC, Reading IC, Clarke NMP. Does late hip dysplasia occur after normal ultrasound screening in breech babies? *J Pediatr Orthop* 2017. (Epub ahead of print) PMID: 28806199.

5. Hines AC, Neal DC, Beckwith T, Jo C, Kim HKW. A comparison of Pavlik harness treatment regimens for dislocated but reducible (Ortolani+) hips in infantile developmental dysplasia of the hip. *J Pediatr Orthop* 2017. (Epub ahead of print) PMID: 28777280.

6. Szymczuk VL, Hammouda AI, Gesheff MG, Standard SC, Herzenberg JE. Lengthening with monolateral external fixation versus magnetically motorized intramedullary nail in congenital femoral deficiency. *J Pediatr Orthop* 2017. (Epub ahead of print) PMID: 28746061.

7. Dibello D, Odoni L, Pederiva F, Di Carlo V. MRI in postreduction evaluation of developmental dysplasia of the hip: our experience. *J Pediatr Orthop* 2017. (Epub ahead of print) PMID: 28614289.

8. Leveille LA, Razi O, Johnston CE. Rebound deformity after growth modulation in patients with coronal plane angular deformities about the knee: who gets it and how much? *J Pediatr Orthop* 2017. (Epub ahead of print) PMID: 28525408.

Research

X-ref ***For other Roundups in this issue that cross-reference with Research see: Hip Roundup 3; Knee Roundup 1; Shoulder & Elbow Roundup 3; Spine Roundup 2; Trauma Roundup 4.***

GIRFT and regional knee arthroplasty services X-ref

The 'Getting it Right First Time' (GIRFT) report in the United Kingdom has many admirable attributes and is widely seen as part of the key to addressing the healthcare needs of an ageing and increasingly frail population. One of the principles of this report, published in September 2012, was the suggestion of changing how health care is delivered in a geographic region. This included the introduction of the minimum number of procedures for a specific operation to be undertaken by a surgeon and the centralisation of complex procedures to those units with the necessary expertise. This study from **Bristol (UK)** tracks the 'real-life' impact of such a policy on the delivery of orthopaedic care in a specific region.[1] Primary total knee arthroplasty (TKA) was performed by all surgeons in the study with a median annual volume of 33 TKAs (2 to 180). There were 21 surgeons (22%) who performed fewer than 13 cases (low-volume surgeons), resulting in 125 cases being performed by low-volume surgeons. The median unit volume of TKAs was 184 (7 to 527). Primary unicondylar knee arthroplasties (UKA) were performed by 48 surgeons in the region with a median of ten per annum (2 to 64). However, 26 surgeons performed fewer than 13 cases per annum and this resulted in 108 cases performed by low-volume surgeons. Patello-femoral joint (PFJ) arthroplasty was performed by 20 surgeons and the majority of these performed fewer than 13 procedures per annum. Revision TKA was performed by 50 surgeons and the median number per surgeon was five (2 to 57), while 37 surgeons performed fewer than 13 revisions per year. The authors then modelled the impact of introducing minimum surgeon thresholds to the Severn region, and what the additional workload would be, on the high-volume surgeons. The additional workload for higher-volume surgeons for primary TKA and UKA would be 3% and 17%, respectively. However, the increase in workload in the case of the PFJ arthroplasty and revision TKA would be 137% and 53%, respectively. The authors suggest a possible alternative approach: to rationalise the distribution of cases between surgeons who are currently operating within the grey area of between ten and 13 cases per year. If this was the case, the impact would reduce from 3% to 1.4% for primary TKA, 11.3% for UKA, and 31% for revision TKA. However, the introduction of this measure would not make any difference in the case of PFJ arthroplasty. The minimum unit volume was established following research into UKAs, where an inverse relationship between the number of cases and revision rates has been established. From this research, it was calculated that the minimum number of UKAs required per year in order to avoid a revision rate above the mean was 13. The authors of this study then extrapolated this figure to that of TKAs, revision TKAs, and PFJ arthroplasties. While an association has been established between surgeon volume and patient outcome with higher infection rates, higher transfusion rates, and longer lengths of stay in lower-volume surgeons, a specific minimum number of cases has not yet been recommended. The relationship between surgeon volume and outcome may be less pronounced than this study assumes. The authors did point out that research from the Scandinavian registry even suggested that the number of cases and the effect on revision rate varied according to which type of UKA was being undertaken. The recommendations from the GIRFT report are, without question, a step in the right direction. Most regions throughout the UK are currently assessing how best to deliver their orthopaedic services through their own Sustainability and Transformation Plans (STPs) and potentially changing regional practice, resulting in changes to the case-mix of some units. The GIRFT report is gaining traction with regional STPs adopting its philosophy. From this study, the take-home message was clear: all orthopaedic units need to be engaged with these discussions so that they feel part of the

decision-making process rather than being left on the sidelines by larger units. This will take careful negotiation and some frank discussions but we need to be able to demonstrate to our patients that we perform a sufficient number of cases and that they can expect a good outcome in our hands.

Polyethylene wear can be measured accurately on traditional imaging X-ref

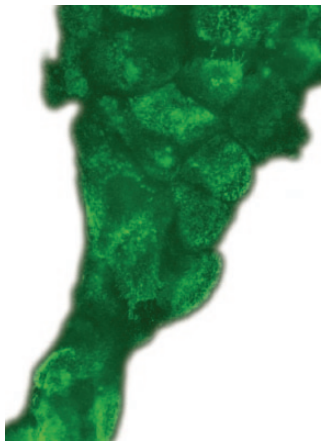
There have been a range of methods described to appraise polyethylene wear, which is essentially a measure of component migration and thereby gives an accurate assessment of both wear and failure in total joint arthroplasty. The most complex, time-consuming, and accurate method is the use of radiostereometric analysis (RSA) technology, where tantalum beads are attached to the bone, and implants are used to establish the relative positions of the components using calibrated radiographs. A cheaper and simpler solution that requires the purchase and use of specialised analysis software is Einzel-Bild-Röntgen-Analyse (EBRA), which has been shown to be accurate, although not as accurate as RSA. A further system is discussed here in a paper from **Wellington (New Zealand)** that describes the methodology, validation, and reliability of a new computer-assisted method to establish component migration and polyethylene wear.[2] This system uses CT-based imaging to provide models of the patient's bones and manufacturer-supplied models of the components to allow 3D fitting by the computer software system. This is then integrated into analysis of subsequent plain radiographs taken in clinic and allows the measurement of component migration. The authors describe the validation of the system using phantoms with known simulated migration and penetration, along with a clinical measurement of two patients. The authors of this paper describe a limit of agreement of 0.377 mm for the acetabulum and 0.33 mm for the femoral component, which is impressive. Nonetheless, despite these impressive results, there is the difficulty here that a CT scan is required, which means that the patients are exposed to a pelvic CT, while CT scanning is not required with the alternative options of either EBRA or RSA.

Tranexamic acid in orthopaedic surgery X-ref

Tranexamic acid has become commonplace in hip and knee arthroplasty, along with a range of other indications, such as part of most resuscitation protocols, in light of the various Clinical Randomisation of an Antifibrinolytic in Significant Haemorrhage (CRASH) studies. Tranexamic acid is increasingly utilised to reduce intra-operative bleeding in a range of procedures, including long bone fracture surgery. A review team from **Boston, Massachusetts (USA)** have undertaken a meta-analysis and systematic review with the reasonable aim of establishing whether tranexamic acid is efficacious in the setting of fracture surgery.[3] The authors included seven studies encompassing the results of 559 patients, which reported the outcomes of patients treated with and without tranexamic acid during fracture surgery. The meta-analysis indicated that when compared with standard care, the use of tranexamic acid significantly reduced total blood loss by 330 ml and went on to reduce the likelihood of post-operative transfusion to about half of baseline (relative risk of 0.54). These findings were in parallel with a decreased drop in post-operative haemoglobin by 0.76 g/dl. The authors established that there were no differences in the adverse event rates, including thromboembolic event rates. They demonstrated that tranexamic acid might be used in orthopaedic fracture surgeries to reduce total blood loss, reduce transfusion rates, and decrease the drop in haemoglobin level without increasing the risk of venous thromboembolism.

Risk factors for surgical site infection after posterior lumbar spinal surgery X-ref

Infection is a real problem in spinal surgery, often occurring in and around neurological structures due to the extended nature of a given procedure, or as a result of the large open incisions required in order to achieve correction. We were delighted to see this large retrospective review of patients undergoing posterior lumbar spinal surgery from **Nanchang (China),** with the aim of identifying those factors responsible for spinal surgical infection.[4] The review focuses on the outcomes of 2715 patients who underwent posterior lumbar spinal surgery between January 2010 and August 2016. The study team undertook a thorough review of the patients' medical records, and recorded all pre-operative and intra-operative risk factors that they felt could conceivably be associated with post-operative risk for infection. These factors were then screened using a univariate analysis for a link to infection, and a multivariate regression analysis was undertaken for the promising potential covariates to adjust for any confounders. Within the cohort of 2715, there was a 2.4% (n = 64) incidence of infection. The significant covariates were the presence of diabetes mellitus, low pre-operative calcium and albumin, high pre-operative serum glucose, multiple fusion segments, increased surgical time, estimated blood loss, decreased post-operative haemoglobin, and prolonged drainage duration. The strongest association was with multilevel fusion (odds ratio (OR) 2.3) and diabetes mellitus (OR 2.2). The take-home message is that multilevel fusion and a history of diabetes mellitus were the two strongest risk factors associated with surgical site infection. Other less important risk factors include increased surgical time, estimated blood loss, pre-operative serum calcium, decreased pre-operative



and post-operative albumin, and decreased post-operative haemoglobin.

Diagnosing periprosthetic joint infection: and the winner is? X-ref

There has been a plethora of excellent papers to have emerged from the Rothman Institute in **Philadelphia, Pennsylvania (USA)** over the past few years concerning the diagnosis of, treatment of, and outcomes following periprosthetic infection.[5] Septic loosening is one of the few diagnoses that is still difficult to make, with no benchmark investigation. This paper aims to establish the diagnostic odds ratio (DOR) of each of the currently available tests, which, in essence, is the best way of establishing the overall performance of a diagnostic test. The authors report the whole range of diagnostic assays (both serum- and synovial fluid-based), including erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP), synovial fluid white blood cell (SF WBC) count, synovial fluid polymorphonuclear (SF PMN%), and leucocyte esterase (LE) from their cohort of patients with suspected periprosthetic infection. The paper considers the results of 4662 ESRs, 4392 CRPs, 836 SF WBC, 804 SF PMN%, and 659 LE obtained in a genuine clinical setting. These authors established that although the diagnostic odds ratios were far from perfect for any of the tests,

there was a clear hierarchy, with LE performing best (DOR 30.06) followed by SF WBC (DOR 29.4), CRP (DOR 25.6), SF PMN% (DOR 25.5), and ESR (DOR 14.6). This paper is quite clear that leucocyte esterase is the most accurate for diagnosing periprosthetic infection; however, this does require an intra-operative sample. Not too far behind was the CRP, which, if a serum test is required, should be considered. What is notable, of course, is that there is plenty of room for improvement, with the best test giving a DOR of just 30!

REFERENCES

1. Barksfield R, Murray J, Robinson J, Porteous A. Implications of the getting it right first time initiative for regional knee arthroplasty services. *Knee* 2017;24:1191-1197.

2. Devane PA, Horne JG, Foley G, Stanley J. Measuring the migration of the components and polyethylene wear after total hip arthroplasty: beads and specialised radiographs are not necessary. *Bone Joint J* 2017;99-B:1290-1297.

3. Amer KM, Rehman S, Amer K, Haydel C. Efficacy and safety of tranexamic acid in orthopaedic fracture surgery: a meta-analysis and systematic literature review. *J Orthop Trauma* 2017;31:520-525.

4. Liu JM, Deng HL, Chen XY, et al. Risk factors for surgical site infection after posterior lumbar spinal surgery. *Spine (Phila Pa 1976)* 2017. (Epub ahead of print) PMID: 28922276.

5. Shahi A, Tan TL, Kheir MM, Tan DD, Parvizi J. Diagnosing periprosthetic joint infection: and the winner is? *J Arthroplasty* 2017;32:S232-S235.

 DOI: 10.1302/2048-0105.66.360572