

Are inflatable play structures really safe for our children? X-ref

■ After some pretty involved and high-quality papers in this issue of 360, a slightly more light-hearted pick from our reviewers is included. Most of us will be familiar with the increase in paediatric injuries associated with good weather and public holidays, and many of these occur on inflatable toys such as bouncy castles. This group from **Palma de Majorca (Spain)** conducted a review to investigate the risks posed by inflatable play structures and make suggestions for the mitigation of these risks.⁸ The mechanism of such injuries is varied and includes a fall both inside and outside of the bouncy castle, collision between children of differing sizes, and failure of the equipment itself, including the anchoring system. Over a one-year period, 114 children were treated for injuries sustained on inflatable play structures. In younger children, boys were more frequently injured, but the gender distribution was even after the age of ten years. In the upper limb, the most commonly injured region was the humerus, with supracondylar fractures forming the majority. The distal radius was also frequently injured. The most common injury in the lower limb was a sprain followed by a tibial fracture. Worryingly, in this series two

patients presented with lumbar vertebral fractures. Unsurprisingly, injuries were more common in the summer months, over half of patients had an unwitnessed fall, and almost half of parents were not supervising or in the vicinity of the bouncy castle at the time of injury. It is obvious that these structures pose a risk of injury and the authors make a number of recommendations, mainly on a common sense basis, to ameliorate such risks. These include attention to and regulation of the equipment itself as well as prohibiting children of different sizes and ages to play simultaneously. Furthermore, responsible and close adult supervision is strongly advocated, and the authors go so far as to suggest that children under the age of six should be prohibited from using such structures, anticipating a reduction in the burden of injury of 34%. Of course, it is impossible to calculate the number of children using such structures and, therefore, the raw injury rates. Fatalities and life-changing injuries have occurred and so this is a serious topic, and both regulatory change and public education are required to mitigate risks.

REFERENCES

1. Sankar WN, Gornitzky AL, Clarke NMP, et al. Closed reduction for developmental dysplasia of the hip: early-term

results from a prospective, multicenter cohort. *J Pediatr Orthop* 2019;39:111-118.

2. Eidelman M, Keshet D, Nelson S, Bor N. Intermediate to long-term results of femoral neck lengthening (Morscher osteotomy). *J Pediatr Orthop* 2019;39:181-186.

3. Morris AR, Thomas JMC, Readin IC, Clarke NMP. Does late hip dysplasia occur after normal ultrasound screening in breech babies? *J Pediatr Orthop* 2019;39:187-192.

4. Maranhão DA, Ferrer MG, Kim YJ, Miller PE, Novais EN. Predicting risk of contralateral slip in unilateral slipped capital femoral epiphysis: posterior epiphyseal tilt increases and superior epiphyseal extension reduces risk. *J Bone Joint Surg [Am]* 2019;101-A:209-217.

5. Broadhurst C, Rhodes AML, Harper P, et al. What is the incidence of late detection of developmental dysplasia of the hip in England? A 26-year national study of children diagnosed after the age of one. *Bone Joint J* 2019;101-B:281-287.

6. Mitchell PD, Brown R, Wang T, et al. Multicentre study of physical abuse and limb fractures in young children in the East Anglia Region. *Arch Dis Child* 2019. (Epub ahead of print) PMID: 30636223.

7. Quader N, Schaeffer EK, Hodgson AJ, Abugharbieh R, Mulpuri K. A systematic review and meta-analysis on the reproducibility of ultrasound-based metrics for assessing developmental dysplasia of the hip. *J Pediatr Orthop* 2018;38:e3015-e3311.

8. Corominas L, Fernandez-Ansorena A, Martinez-Cepas P, Sanpera J, Obieta A. Are inflatable play structures really safe for our children? *Journal of Children's Orthopaedics* 2018;12:282-287.

Research

X-ref For other Roundups in this issue that cross-reference with Research see: **Foot & Ankle Roundup 4**.

Preoperative opioid use and complications X-ref

■ Multiple studies have been published evaluating the effect of preoperative opioid use and postoperative outcomes. It will come as no surprise to any reader of 360, given the North American opioid crisis and the subsequent column inches in all journals given up to this dramatic problem, that research has now turned not only to quantifying the problem, but ascertaining what the potential risks in the surgical patient are. The majority of these previous investigations have defined preoperative use as any opioid consumption within one year prior to surgery, which is unlikely to be appropriate to drawing rigorous conclusions. Furthermore, there is as yet no evidence correlating the number and duration of opioids used and potential postoperative complications. To clarify this tumultuous situation, a group from **Columbus, Ohio (USA)** has investigated

preoperative opiate use prior to large joint arthroplasty and lumbar fusion and correlated it to postoperative complications.¹ This group used national insurance claims data between 2007 and 2015 to identify their cohort of 58 082 primary total knee arthroplasties (TKAs), total hip arthroplasties (THAs), and single- or two-level posterior lumbar fusions (PLFs) carried out to treat spondylosis. The group then divided preoperative opioid use into three categories (naive, three months or less, three to six months, more than six months but stopped three months before surgery, and more than six months of continuous use) and, by using these categorized outcomes, set out to establish if there was a link between opioid use and duration with adverse surgical outcomes. Using this large cohort, the group identified that preoperative opioid use of more than three months was associated with an increased likelihood of a visit to the emergency department within 90 days postoperatively if a patient had undergone TKA. If patients used opioids for greater than 90 days preoperatively, they showed a higher risk of postoperative emergency department assessment for all

causes. Patients also demonstrated a higher rate of wound dehiscence, infection, hospital re-admission within 90 days, and revision surgery within one year after TKA, THA, and PLF. In cases where preoperative opioids were ceased at least three months preoperatively, the team report a significant reduction in the risk of any adverse outcomes, with the greatest reduction seen after THA and PLF. This study intelligently separates out preoperative opioid cessation three months prior to surgery and identifies that this patient cohort is not at an elevated risk of postoperative complications. Patients who are using opioids should be counselled to stop use three months prior to surgery to reduce their likelihood of postoperative complications, particularly when they have been using these medications for six months or more.

CT-based cross-sectional evaluation of muscular atrophy and fatty degeneration around the pelvis and the femur

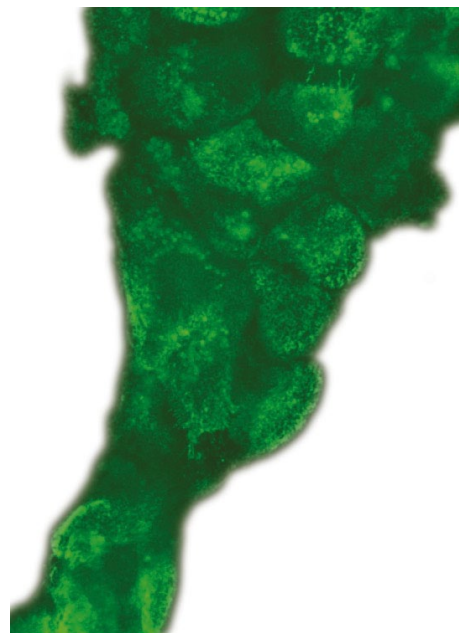
■ In order to successfully rehabilitate after hip arthroplasty, patients need sufficient muscle

strength to action the joint. Usually, muscular strength is assessed through physical strength testing, but with this method only the compound strength of a muscle group can be measured. There has been a great increase in depth of understanding of the changes that occur in muscle with ageing, disuse, and body composition changes that have been made possible by the increasing advancement of cross-sectional imaging. Cross-sectional imaging can now measure muscle volume and quality. In order to estimate the relative strength of individual muscles, cross-sectional areas measured by either CT or MRI can be used. Until now, it has not been clear if there is a correlation between the two-dimensional area of a muscle in section and muscle volume. In this study, a group from **Osaka (Japan)** took the CT images of 20 patients with unilateral hip pathology and assessed 14 muscles surrounding the joint with manual segmentation.² The group then calculated the coefficient between the 3D and 2D measurements at selected landmarks. The authors showed that 71% of periarticular muscles had a strong correlation coefficient between the 3D and 2D anatomic measurements. As a result, it was revealed that the cross-sectional area measured by CT or MRI correlates almost with the muscle volume. Since it is impossible to measure muscle atrophy in normal clinical practice, it is both significant and clinically useful that muscle volume can be predicted to some extent by the cross-sectional area visible on CT studies. While predominantly a research tool, the evolution of manual segmentation from digital imaging and communication in medicine (DICOM) studies has provided significant insights into the physiological changes that occur with ageing and also the composition changes that occur with fatty infiltration and volume loss in skeletal muscle.

How long does a knee or hip arthroplasty last?

■ Hip and knee arthroplasties are successful, everyday operations. Patients will always have many questions as they approach their procedure, but a common one is “how long will my joint last for?” Until now, we have used anecdotal evidence, relying on our experience and judgement of the patients activity levels to offer an answer. However, the group from **Bristol (UK)** have conducted a robust meta-analysis of published literature to determine the functional lifetime of total, unicompartmental, and patellofemoral knee arthroplasty, as well as total hip arthroplasty.³ The group found 33 case series describing outcomes to 25 years of the variations of knee arthroplasty, and 44 studies with similar

characteristics describing total hip arthroplasty. Of note, no study evaluating patellofemoral joint arthroplasty met the inclusion criteria for the analysis. The authors also included data from national joint registries to expand their included cases and improve the precision of their conclusions. Following careful analysis, the group showed that approximately 82% of total knee arthroplasties and 70% of unicompartmental knee arthroplasties last for 25 years. With regards hip arthroplasty, around 58% of patients will find their joints last 25 years. The importance of these studies is self-explanatory. We now know the long-term outcomes of some of the most commonplace and successful procedures in orthopaedic surgery. Precise data regarding specific implants will hone these conclusions further, but for now we are armed with up-to-date and accurate information to answer these most common of questions faced in lower limb clinics.



Risk factors for prosthetic joint infection following knee arthroplasty

■ The **Bristol (UK)** group have been doing the rounds of the big journals this past two months, with two papers published in *The Lancet*, and one in *Lancet Infectious Diseases*.⁴ Although the previous two papers are laudable estimates of survival in joint arthroplasty, we are much keener, here at 360, on this paper, which estimates the risk factors associated with prosthetic joint infection. Prosthetic infection is perhaps the worst complication following surgery in the whole of orthopaedic practice (perhaps bar spinal cord injury in paediatric scoliosis) and surgeons can often

remember, without prompting, those patients whose joints they did that became infected and required revision surgery. Despite good work on the potential risk factors for prosthetic infection identifying patient, surgical, and healthcare system factors that can be implicated in risks for prosthetic infection, there are no large enough series with reasonable follow-up to tease out the precise contribution of each identified risk factor. This paper, which reports on a ten-year cohort of the UK National Joint Registry (NJR) was also linked to the Hospital Episode Statistics (HES) data in England and the Patient Episode Database for Wales. The authors examined records for 679 010 primary knee arthroplasties done between 2003 and 2013 in England and Wales, of whom 3659 patients underwent revision for infection. The authors undertook the usual gamut of complex statistical analysis to establish which of the recorded demographic and operative variables were associated with an increased risk of infection. It is worth remembering, when reading papers such as this, that despite the significant benefits of a registry you can only analyze the data in the data set. So not all desirable covariates will be recorded. However, the authors established that infection was associated with male sex (rate ratio (RR) 1.8), younger age (RR for age \geq 80 years vs $<$ 60 years, 0.5), higher American Society of Anaesthesiologists grade (RR grade 3 to 5 vs 1, 1.8), elevated body-mass index (RR for body mass index \geq 30 kg/m² vs $<$ 25 kg/m², 1.5), chronic pulmonary disease (RR 1.2), diabetes (RR 1.4), liver disease (RR 2.2), connective tissue and rheumatic diseases (RR 1.5), peripheral vascular disease (RR 1.4), surgery for a traumatic indication (RR 1.9), previous septic arthritis (RR 4.9) or inflammatory arthropathy (RR 1.4), tibial bone graft (RR 2.0), posterior stabilized fixed bearing prostheses (RR 1.4), or constrained condylar prostheses (RR 3.5). There were a number of factors that were also found to be protective for infection including uncemented total, patellofemoral, or unicompartmental knee arthroplasty (RR 0.7, 0.3, and 0.5 respectively). The authors identified these risk factors – and there is some food for thought here. As only some variables were collected, it is impossible to know if there are any confounders here (for example in the Scandinavian registries, operative time has been linked to infection and uncemented and unicompartmental knees are quicker to perform for example). However, there are some important pauses for thought here, with the large numbers of patients included in this analysis and linkage to HES data. Although neither data source is completely accurate, this paper currently represents

state of the art in understanding infection in total knee arthroplasties.

No debate following ABATE X-ref

■ 'Prevention is better than cure' is the maxim that has been used to guide the battle against multidrug resistant bacteria in the past decade. With dire predictions of a resistant bacteria driven apocalypse when the antibiotics stop working (within ten years in some articles in the popular press), sensibly the focus has moved the antibiotic stewardship, and use of hygiene interventions, to prevent infection and reduce spread from patient to patient. The majority of hospitals now have policies of skin and nasal decontamination, at least for high-risk patients. These policies have been implemented based on evidence from an intensive care setting that supports the use of routine decontamination to prevent methicillin-resistant *Staphylococcus aureus* (MRSA). This practice has since spread from there, and is now commonplace in patients from high-risk environments, or undergoing high risk procedures such as orthopaedic surgery. The ABATE study is a high quality randomized

controlled trial set up to establish what the benefit is of chlorhexidine bathing in terms of reducing multidrug-resistant organisms. As is always the case with large projects, this is a multicentre collaboration and is led by a team in **Irvine, California (USA)** and was undertaken in 53 hospitals affiliated with HCA Healthcare.⁵ The trial was cluster randomized with a 12-month base line period, a two-month phase in, and 21-month intervention period. The intervention consisted of daily chlorhexidine bathing for all patients plus mupirocin for known MRSA carriers. The primary outcome measure was MRSA or vancomycin-resistant *enterococcus* (VRE) clinical cultures. As you would expect in a cluster trial of this size, there were literally masses of patients in this study. During the baseline period, 189 081 patients were treated and 339 902 patients received care during intervention period (156 889 patients in the routine care group and 183 013 patients in the decolonization group). In both groups, things improved relative to baseline with a hazard ratio (HR) of 0.79 in the intervention group and 0.87 in the standard care group. This difference was not statistically significant.

REFERENCES

1. Jain N, Brock JL, Malik AT, Phillips FM, Khan SN. Prediction of complications, readmission, and revision surgery based on duration of preoperative opioid use: analysis of major joint replacement and lumbar fusion. *J Bone Joint Surg [Am]* 2019;101-A:384-391.
2. Ogawa T, Takao M, Otake Y, et al. Validation study of the CT-based cross-sectional evaluation of muscular atrophy and fatty degeneration around the pelvis and the femur. *J Orthop Sci* 2019. (Epub ahead of print) PMID: 30827700
3. Evans JT, Evans JP, Walker RW, et al. How long does a hip replacement last? A systematic review and meta-analysis of case series and national registry reports with more than 15 years of follow-up. *Lancet* 2019;393:647-654.
4. Lenguerrand E, Whitehouse MR, Beswick AD, et al. Risk factors associated with revision for prosthetic joint infection following knee replacement: an observational cohort study from England and Wales. *Lancet Infect Dis* 2019. (Epub ahead of print) PMID: 31005559
5. Huang SS, Septimus E, Kleinman K, et al. Chlorhexidine versus routine bathing to prevent multidrug-resistant organism- and all-cause bloodstream infections in general medical and surgical units (ABATE Infection trial): a cluster-randomised trial. *Lancet* 2019;12:1205-1215.

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