ROUNDUP360

Research

Lightbulbs, bleeding and procedure durations

x-ref Hip, Knee, Foot, Hand, Shoulder, Spine, Trauma, Oncology, Children's orth

■ There was an audible chuckle at *360* HQ when this offering from the often-overlooked Singapore Medical Journal did the rounds of the Editorial teams. Although a simple paper, this straightforward fact-finding mission aimed to set a few records straight with our anaesthetic colleagues. The study team in **Singapore (Singapore)** undertook three different simple experiments, one to change six lightbulbs, a second to estimate fluid volumes and a third to estimate the procedure time, having watched it on the video camera. The study revolved around 60 participants (30 anaesthetists and 31 orthopaedic surgeons) who undertook each task individually. Surgeons and anaesthetists were equally capable of estimating fluid volumes (with the anaesthetists overestimating by 5.1% and the surgeons underestimating by 3.9%). Both groups were also equally capable at changing lightbulbs; six taking around 70 seconds. As perhaps might not be expected, however, both groups overestimated the time taken for the procedure, although the anaesthetists were significantly worse than the surgeons, estimating a whopping 43.1% longer than it actually took.[1] This lighthearted paper does, however, have a serious side. The inability of both surgical and anaesthetic teams to estimate procedure duration does raise significant concerns with planning efficient theatre utilisation.

Infection and rheumatoid agents

x-ref Hip, Knee, Hand, Foot, Shoulder, Spine

■ The discovery over a decade ago of the key role that tissue necrosis factors (TNFs), and in particular TNF-alpha, play in the nuclear mechanism of rheumatoid arthritis (conducted at the Kennedy Institute, London, now **Oxford, UK**) opened the door for the development of novel biological therapies for rheumatoid arthritis. With every passing year, new agents are introduced to subtly modify the autoimmune reaction that is the key disease-affecting step. These agents, however, have a profound immunosuppressive effect and ever since their introduction there has been concern in academic and arthroplasty circles about the potential to increase rates of periprosthetic infection. The incidence of infection in arthroplasty is small, as is the number of patients undergoing large joint arthroplasty taking disease-modifying antirheumatic drugs (DMARDS) of various types. This makes teasing out the excess incidence of infection associated with DMARD use (if indeed there is any) quite difficult. A collaborative team from **Alabama (USA)** and **Ontario (Canada)** have published an important review in The Lancet in which they attempt to establish a comprehensive contemporary meta-analysis quantifying serious infection rates in rheumatoids taking DMARDS. The review team designed an up-to-date meta-analysis using a comprehensive search of the indexed literature. They identified 106 studies that reported infection rates in those taking biologic and non-biologic (traditional) DMARDs. The studies were assessed using the Cochrane risk of bias tool and a Bayesian network meta-analysis model was used to establish odds ratios of serious infection in patients in whom biologic agents were used. In terms of crude odds ratios, the use of low dose biological DMARDs did not have an increased risk of serious infection (OR 0.93), but when standard dose agents (OR 1.31) or high dose (OR 1.90) were used, the risk of infection was significantly higher than for those on 'traditional' DMARDs. In absolute figures, around 55 excess infections can be expected in those taking biological and non-biological DMARDs compared with methotrexate alone, clearly a marked and clinically significant difference.[2] This study potentially highlights the risk of infection associated with taking DMARDs in rheumatoid patients. Although not specific to joint replacement, this is an important study and clearly more work is required to tease out the most effective and safest strategy for managing DMARDs in the peri-operative period following arthroplasty.

Infection rates and 'bundles of care' revisited

x-ref Hip, Knee, Foot , Shoulder

■ A turning point (in British Orthopaedics at least, and likely the wider orthopaedic community) in terms of management of arthroplasty units with 'bundles of care' to minimise infection rates came with a publication from Biant et al in the BMJ . This simple comparative cohort series had many flaws, but served an important purpose in highlighting the potential value of bundles of care in reducing infection rates in arthroplasty patients, a concept that has gained traction across the globe. Investigators in **Iowa City (USA)** have undertaken an impressive prospective study across 20 hospitals in nine states to revisit the concept of bundles of care. The research team undertook their investigation of the surgical site infection after cardiac surgery or hip and knee arthroplasty with and without decolonisation of MRSA or MSSA. Their study was a prospective comparative cohort series comparing rates of established deep infection, both before and after the institution of a pre-operative screening and decolonisation programme. Their study reports an impressive 28 218 operations pre-intervention and 14 316 post-intervention. The authors report a moderate decrease in the rates of post-operative infection in the arthroplasty group, with a relative risk of 0.48, and a less significant improvement in the cardiac surgery group (RR 0.86). They found a modest but significant reduction in Staph. aureus infections.[3] This study adds some evidence to the arguments for pre-operative screening and bundles of care, although the reduction in infection rates presented

here is not as impressive as those suggested in the initial and much smaller single-centre study.

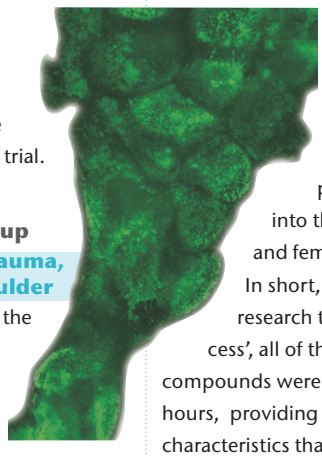
ACI: new application for a proven technology?

x-ref Knee

■ Autologous chondrocyte implantation (ACI) has, according to some, been a revolution in treatment of osteochondral defects around the knee, and there are plenty of case series suggesting other applications. While a more balanced view of the literature would suggest that, given the right indications, ACI offers a measure of improvement and has been able to generate 'hyaline like cartilage' in condylar defects, there is little evidence to support its use on the patella, an articulation with much higher joint reaction forces. Researchers from **Perth (Australia)** have taken things forward and published their own prospective clinical and radiographic study aiming to prove the efficacy of ACI in the patellofemoral joint. Their study of 47 consecutive patients all undergoing ACI for patellofemoral defects was followed up to two years post-surgery with an array of appropriate outcome measures including clinical scores (including KOOS, VAS Pain, six-minute walk, ROM) and quality-of-life measures (SF-36). In addition, the investigators utilised MRI scanning at three, 12 and 24 months following surgery. The study team undertook some subset analyses in an attempt to establish the effect of graft infill and the importance (or not) of defect location. Perhaps the most important finding is that irrespective of procedural subgroup, there were clinically and statistically significant differences at all time points. Graft infill and MRI scoring also showed improvements over time, with the authors claiming a realistic 40% of patients with complete defect infill at final 24-month follow-up. Patients reported an 85% satisfaction rating 24 months after surgery, which all of us who have sat in an anterior knee pain clinic will know is truly remarkable![4] This is particularly important evidence to publicise in the days of rationed health care, and particularly pertinent in the UK where there is recent NICE guidance suggesting that ACI should not be funded unless it is in a trial.

Hydrogel coating given the thumbs up

x-ref Hip, Knee, Trauma, Hands, Spine, Shoulder



In the quest to reduce the impact of periprosthetic infection, smart surface technologies are likely to come to the fore over the next few years. At the simplest level, antibiotic-coated or resorbable implants have been available for a while now, with the aim in the former of reducing bacterial load and in the latter of reducing the longevity of the implant and therefore the possibility of long-term biofilm formation. As nanotechnology and smart materials are becoming more and more technologically advanced, the ability to coat surfaces of implants with carriers to either elute antibiotics, promote bony growth or directly inhibit bacteria is becoming a reality. In one of, we are sure, a large number of papers on the topic, we were excited to see a research team in **Milan (Italy)** set out their stall for nanostructure modification of the implant. The technology they were testing was a hydrogel layer applied to the implant. This *in vitro* study focused on the feasibility of hydrogel coating either with or without antibiotic elution in a stemmed implant model.[5] The research team used Dis posable Antibacteria Coating (DAC) hydrogel, a novel surface technology coated on a test implant, and established the activity of the coating using spectrophotometry and a microbiologic assay. In a secondary study they also tested the resistance of the coating to press-fit insertion into the tibia (rabbit) and femur (human). In short, although the research team claim a 'success', all of the antibacterial compounds were released by 96 hours, providing no better elution characteristics than the collagen carriers already available. We are sure this kind of surface technology will become increasingly important as time goes on but are still not convinced, here at *360*, that the technology is yet mature.

Hydroxyapatite as a smart coating?

x-ref Hip, Knee

■ Hydroxyapatite may also hold potential as a smart material, with a basic science team from **Groningen (The Netherlands)** publishing their results of a modified hydroxyapatite coating for hip prosthesis use. Their technology revolves around the potential for implant coating with a compound of hyaluronic acid and polylactic acid (PLA) laden with antibiotic. Their paper describes the technology including *in vitro* data on antibiotic use through to studies in rabbit models both for safety and efficacy. They also describe further bone in-growth from canine studies and favourable pharmacokinetics including therapeutic dosages for four days after implantation.[6] Smart hydroxyapatite coatings are a tantalising technology. Implants with a biocompatible proven coating modified for antibiotic elution certainly seem an attractive option. Our advice here at *360* is to watch this space.

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