

ROUNDUP³⁶⁰

Hip & Pelvis

Diagnosing the infected hip replacement – biopsy beats aspiration

■ Diagnosing an infected joint replacement is not always as easy as it might sound, so work from **Markgröningen (Germany)** might have arrived at just the right time. Researchers there asked whether the value of a biopsy for diagnosing infection was better than aspiration and C-reactive protein (CRP). As part of a Level II prognostic study, the team obtained CRP values before revision on 100 endoprostheses. They also aspirated the joint and obtained five synovial biopsy samples for bacteriological analysis and five for histological analysis. Microbiological and histological analyses of the periprosthetic tissue during revision surgery were used to verify the results of the pre-operative analyses. Of the 100 endoprostheses, 45 were identified as infected. The biopsy, with a combination of the bacteriological and histological examinations, showed the greatest diagnostic value. The technique showed a sensitivity of 82%, specificity of 98%, positive predictive value of 97%, negative predictive value of 87%, and an accuracy of 91%. It thus appears that biopsy has a greater value than aspiration and CRP in the diagnosis of prosthetic infection of the hip.¹ In patients with a negative aspirate, but increased CRP or clinical signs of infection, 360 agrees that biopsy is preferable to just repeating the aspiration.

Tranexamic acid has a low complication rate

■ Anything that reduces blood loss at joint replacement must be for the good, hence an increasing interest globally in tranexamic acid. Surgeons from **Rochester (USA)** remind us that the use of antifibrinolytic medications in hip and knee replacement reduces intra-operative blood loss and decreases transfusion rates post-operatively. Tranexamic acid has not specifically been associated with increased thromboembolic complications, but clearly concerns about these do exist; particularly so when less aggressive chemical prophylaxis methods such as aspirin alone are used. The team thus undertook a Level III therapeutic study to establish whether the rate of symptomatic thromboembolic events differed among patients given intra-operative tranexamic acid when three different post-operative prophylactic regimens were used after primary total hip and knee replacement. To do this, they retrospectively reviewed 2046 patients who had undergone this surgery and received tranexamic acid between 2007 and 2009. The three prophylactic regimens included aspirin alone, warfarin and dalteparin. The primary outcome measures were venous thromboembolic events, including symptomatic deep-vein thrombosis (DVT) and pulmonary embolism (PE), and arterio-occlusive events, including myocardial infarction and cerebrovascular accident. However, those patients judged to

be at high risk for thromboembolism, either because of a recent cardiac stent insertion or a strong personal/family history of thromboembolic disease, were excluded. For aspirin, warfarin, and dalteparin, the rates of symptomatic DVT (0.35%, 0.15%, and 0.52%, respectively) and nonfatal PE (0.17%, 0.43%, and 0.26%, respectively) were similar. Indeed, there were no episodes of fatal PE. Between the three groups, there was no difference in the rates of symptomatic DVT or PE with or without stratification by ASA score.² This appears to be good news, we feel at 360. A low complication rate was seen when tranexamic acid was used as a method of blood conservation during primary total hip and knee replacement surgery, even with the less aggressive thromboprophylactic regimens such as aspirin alone and dose-adjusted warfarin. More to follow, we suspect.

Poor cementing technique and early failure of resurfacing

■ Once the rot starts it is difficult to stop, as a paper from **Hamburg (Germany)** reminds us. Here, surgeons looked at the cementation of hip resurfacing components. Hip resurfacing is now widely regarded as being a technically demanding procedure in which the use of inappropriate cementing techniques has been suggested as an adverse factor for the long-term survival of the prostheses. Inadequate initial fixation, thermal osteonecrosis and interface biological reactions are all

possible causes of failure. Consequently, the team analysed the morphological changes associated with the cementing technique in 150 retrieved femoral components. There had been a mean time to failure of 8.3 months. The components were obtained at revision surgery and were analysed morphometrically and histopathologically, the latter at the bone-cement interface on undecalcified processed bone tissue. The cement mantle and penetration were quantified in six different regions of interest. 360 was saddened to learn that for the majority of cases there was a substantial difference from the depth recommendations suggested by laboratory-based cement-penetration studies. Indeed, 59 cases had a fibrous membrane at the cement-bone interface. This membrane was significantly thicker in cases with osteonecrosis compared with cases that had viable bone.³ It appears that the authors' results demonstrate that most failures were cemented inappropriately. This is yet further evidence that technique is critical to the survival of a hip resurfacing procedure. A real worry we had at 360 about this paper was the mean time to failure of 8.3 months. This seems astonishingly short. Was cement really the only problem?

Debridement and retention for the infected replacement

■ How to handle a joint replacement should it become infected is a frequent matter of debate. Revise? Retain? One-stage? Two-stage? Debridement and retention is

certainly one popular method and yet, as surgeons from **Drammen (Norway)** have highlighted, previous studies have found inconsistent results. Success rates have ranged from 21% to 100% in the literature. Consequently, the Norwegian team looked prospectively at 38 patients with an early prosthetic joint infection who had received treatment by debridement and retention between 1998 and 2005. The median follow-up was four years. Early infection was defined as one that occurred within four weeks of the index replacement and the primary outcome measure was infection control. Of the 38 patients, 27 were successfully treated, with no signs of infection or continued antibiotic treatment at their latest follow-up. In nine of the 11 patients for whom treatment failed, infection was successfully treated with one-stage or two-stage reimplantation or resection. Intra-operative cultures were positive in 36 hips, and the most frequently isolated organisms were *Staphylococcus aureus* and coagulase-negative staphylococci. There were 15 infections that were polymicrobial, only eight of which were successfully treated with debridement and retention of the implant.⁴ At 360 we agree with the authors, that debridement and retention of the prosthesis is a reasonable treatment option in an early prosthetic joint infection after primary hip replacement, and that satisfactory functional results can be achieved. That said, we need to be sure that infection is diagnosed within four weeks of the index procedure for these conclusions to be valid. That is not always so easy.

Triple-tapered stems and bone mineral density

■ For any form of hip replacement it makes sense that periprosthetic bone mineral density (BMD) should be preserved as best as possible. However, as surgeons from **Kobe (Japan)** remind us, periprosthetic bone loss is frequently found after total hip replacement. The team had already shown that periprosthetic BMD loss

using a triple-tapered stem is consistently less than with a straight-type component. So in this current study, they compared periprosthetic BMD change with clinical factors. To do this, they undertook post-operative dual-energy X-ray absorptiometry measurements at follow-up. The BMD was determined based on the seven Gruen zones. They also further compared BMD with clinical examination, body mass index (BMI), age, Harris hip score (HHS) or University of California, Los Angeles (UCLA) activity rating score. The team found that the periprosthetic BMD of the triple-tapered stem was maintained. This was especially so in Gruen zone 1, which was maintained at 96%. When the researchers compared the change in BMD with clinical factors, they found no correlation with BMI, age or HHS. However, there was a correlation with the UCLA activity rating score in Gruen zones 1 and 2 for the triple-tapered stem. In addition, the correlation coefficient was increased at 48 months in comparison with 24 months.

It thus appears that a cementless triple-tapered stem maintains periprosthetic bone mineral density. Furthermore, activity may reflect an improving periprosthetic bone quality after hip replacement surgery using a triple-tapered stem.⁵ Does that mean, we ask at 360, that patients do not have to limit weight bearing after total hip replacement? The more weight bearing the better, perhaps?

Early discharge can be bad for your sleep

■ It seems to 360 that there is a headlong rush for patients to be discharged almost as soon as they are admitted, on some occasions even before they have arrived, so fast-track hip and knee replacement surgery is much in vogue. Yet what does it do to the whole patient?

Rapid discharge may be wonderful for hospital league tables but what is the real effect on those who count? A team from **Copenhagen (Denmark)** has looked at this by studying sleep disturbances in patients. They remind us that major surgery can be followed by pronounced sleep disturbances after traditional peri-operative care, and that this can potentially lead to a prolonged recovery. Their aim was thus to assess the rapid eye movement (REM) sleep duration and sleep architecture before and after fast-track hip and knee replacement where patients had a length of stay < 3 days. The primary endpoint was REM sleep duration on the first post-operative night compared with before surgery. They studied ten patients (≥ 60 yrs of age) receiving a



spinal anaesthetic and multimodal opioid-sparing post-operative analgesia for total hip or knee replacement. Ambulatory polysomnography was performed one night before operation at home, continuously while in hospital, and on the fourth post-operative night at home. Sleep staging was performed according to the American Academy of Sleep Medicine manual. Opioid use, pain, and inflammatory response (C-reactive protein) were also assessed. The mean length of stay was an astonishing 1.5 days. The REM sleep time decreased from a mean of 18.2% of total sleep time to 1.2% on the first post-operative night. Awake time increased from 19.1% to 44.3%. Meanwhile, sleep architecture on the first post-operative night was more disturbed than before surgery but returned to normal on the fourth post-operative night. There was no association between opioid use, pain scores, and inflammatory response with a disturbed sleep pattern. So it

seems that we do have a profound effect on these patients after all. Despite an ultra-short length of stay and the use of spinal anaesthetic with multimodal opioid-sparing analgesia, REM sleep was almost eliminated on the first post-operative night after fast-track orthopaedic surgery but returned to pre-admission levels when at home on the fourth post-operative night.⁶ 360 is unsure of the long-term effects of these findings, if any, but it pays to remind ourselves that patients are quite fragile and defenceless creatures in those early post-operative days.

An updated QFracture algorithm to predict the risk of an osteoporotic fracture

■ Sometimes studies can be so vast that they almost defy imagination. At the same time, such large studies can be enormously persuasive. Enter at this point a paper from **Nottingham (UK)** seeking to predict the risk of osteoporotic fracture in primary care by deriving and validating an updated QFracture algorithm. This was a prospective open cohort study using routinely collected data from 420 general practices in the United Kingdom to develop updated QFracture scores; 207 practices were used to validate the scores. The authors calculated measures of calibration and discrimination using the validation cohort. The numbers were huge, with 3 142 673 patients in the derivation cohort and 1 583 373 in the validation cohort, aged between 30 and 100 years, who contributed 23 608 337 and 11 732 106 person-years of observation, respectively. The team identified 59 772 incident diagnoses of osteoporotic fracture in the derivation cohort and 28 685 in the validation cohort. They found significant independent associations with overall fracture risk in women for age, body mass index, ethnic origin, alcohol intake, smoking status, chronic obstructive pulmonary disease or asthma, any cancer, cardiovascular disease, dementia, diagnosis or treatment for epilepsy, history of falls, chronic liver disease, Parkinson's disease, rheumatoid arthritis or

systemic lupus erythematosus, chronic renal disease, type 1 diabetes, type 2 diabetes, previous fracture, endocrine disorders, gastrointestinal malabsorption, any antidepressants, corticosteroids, unopposed hormone replacement therapy, and parental history of osteoporosis. The risk factors for hip fractures in women were similar except for gastrointestinal malabsorption and parental history of hip fracture. Meanwhile, the risk factors for men were largely the same as those for women but also included care home residence. The updated hip fracture algorithm explained 71.7% of the variation in women and 70.4% in men, and clearly performed better than the 2009 algorithms.⁷ This was an impressive size of study, and a very useful result, we felt at 360.

Local infiltration analgesia and total hip replacement

■ Pain relief is manifestly critical after total hip replacement. Without it post-operative mobilisation can be a real struggle. Many different forms of pain relief exist but local infiltration analgesia (LIA) is one method that has gained popularity since Kerr and

Kohan first brought it to widespread attention in 2008. A systematic review has been undertaken by researchers from **Cork (Ireland)**. The analgesic technique involves the infiltration of a large-volume dilute solution of a long-acting local anaesthetic agent, often with adjuvants (e.g. epinephrine, ketorolac, an opioid), throughout the wound at the time of surgery. Placing a catheter in the surgical site to allow post-operative administration of further local anaesthetic can then prolong the duration of the analgesic effect. The technique has been adopted for use for post-operative analgesia after a range of surgical procedures (orthopaedic, general, gynaecological, and breast surgery). The primary objective of this paper was to determine, based on the current evidence, if LIA was superior when compared with no intervention, placebo, and alternative analgesic methods in patients after total hip replacement. The outcomes considered were post-operative analgesia scores, joint function/rehabilitation, and length of hospital stay. To do this, the authors undertook

a review of the evidence-published trials. 360 notes the authors' findings that the existing data about the use of LIA after total hip replacement consist of the results from a relatively small number of clinical trials. Despite this, the LIA technique has been shown to be an effective analgesic method, and is superior to no infiltration, placebo saline infiltration and, in one study, epidural analgesia. It has not been shown to provide additional analgesic or outcome benefit in the setting of a comprehensive multimodal analgesic approach but can be regarded as an effective analgesic method after THR. The authors recommend that consideration should be given to its use in the planning of the analgesic strategy for hip replacement surgery.⁸ 360 can but agree.

REFERENCES

1. **Fink B, Gebhard A, Fuerst M, Berger I, Schäfer P.** High diagnostic value of synovial biopsy in periprosthetic joint infection of the hip. *Clin Orthop Relat Res* 2012;(Epub ahead of print) PMID: 22806261.
2. **Gillette BP, Desimone LJ, Trousdale RT, Pagnano MW, Sierra RJ.** Low risk of thromboembolic complications with tranexamic acid after primary total hip and knee arthroplasty. *Clin Orthop Relat Res* 2012;(Epub ahead of print) PMID: 22814857.
3. **Krause M, Breer S, Hahn M, et al.** Cementation and interface analysis of early failure cases after hip-resurfacing arthroplasty. *Int Orthop* 2012;36:1333-1340.
4. **Westberg M, Grøgaard B, Snorrason F.** Early prosthetic joint infections treated with debridement and implant retention: 38 primary hip arthroplasties prospectively recorded and followed for median 4 years. *Acta Orthop* 2012;83:227-232.
5. **Hayashi S, Nishiyama T, Fujishiro T, et al.** Periprosthetic bone mineral density with a cementless triple tapered stem is dependent on daily activity. *Int Orthop* 2012;36:1137-1142.
6. **Krenk L, Jennum P, Kehlet H.** Sleep disturbances after fast-track hip and knee arthroplasty. *Br J Anaesth* 2012;(Epub ahead of print) PMID: 22831887.
7. **Hippisley-Cox J, Coupland C.** Derivation and validation of updated QFracture algorithm to predict risk of osteoporotic fracture in primary care in the United Kingdom: prospective open cohort study. *BMJ* 2012;344:e3427-e3427.
8. **McCarthy D, Iohom G.** Local infiltration analgesia for postoperative pain control following total hip arthroplasty: a systematic review. *Anesthesiol Res Pract* 2012;2012:709531-709531.