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Foot & Ankle

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Platelet-rich plasma for ankle arthritis: is there any benefit?

■ There has been a noticeable increase in interest in using platelet-rich plasma (PRP) injections for pathology around the foot and ankle (possibly due to its failure to show efficacy elsewhere in the musculo-skeletal system). Its reported use now extends to a wide range of conditions including tendinopathies, plantar fasciitis and osteochondral pathology. We were delighted, here at 360, to read a report from a group in **Chiba (Japan)** who have examined the effects of PRP injection into the ankle for symptomatic treatment of ankle osteoarthritis, an area of relatively common use without much in the way of quality evidence.¹ This interesting article provides some literature in an area in which there are very few studies. These authors recruited 20 patients, all with proven varus ankle arthritis, after performing a power analysis for minimal clinically significant difference, based around the expected effect size of the PRP. Patients were included only if they had not responded to at least six months of conservative therapy and no patients with post-traumatic ankle arthritis were included. There were 15 women and five men, with a mean age of 59 years (37 to 76). Pre-operative clinical evaluations were performed at one week before the first injection, followed by four, 12 and 24 weeks after the last injection. The primary outcome measure was the visual analogue scale (VAS) score for pain.

An independent orthopaedic surgeon who was not part of the patient evaluation performed all of the PRP injections, and a single injection of 2 ml of PRP was injected into the ankle using an anteromedial approach under ultrasound guidance. Patients received a total of three injections spaced at two-week intervals. First, there were no significant adverse effects noted, although a single patient experienced pain and swelling at the injection site that resolved after two days. When evaluating the primary outcome measure, overall, the VAS score significantly decreased over time from baseline. This remained statistically significant at each clinical assessment interval, but was lowest at 12 weeks. The patients in this study experienced a significant reduction in their ankle pain for four weeks following intra-articular injection of PRP. However, with no control group, this study has a serious limitation when interpreting these results, and it is not clear what the treatment effect for the PRP would be if judged against placebo or steroid. Although this study does add to the global picture, for us at 360 it effectively establishes that there are no adverse events. However, there remains insufficient evidence to make a sound judgement on the value of PRP injection for ankle arthritis based on this small study.

Vitamin D and bone marrow oedema

■ Bone marrow oedema syndrome (BMOS) is a poorly understood condition for which the aetiology remains largely unknown. There has, however, been rampant interest in vitamin D deficiency in all branches

of orthopaedics and, given that there is known to be an increase in bone turnover associated with BMOS, it does seem logical that, despite the potential 'me too' nature of vitamin D studies at the moment, it may well play an important role in the cause of this condition. A group from **Würzburg (Germany)** studied 31 patients, all with a diagnosis of BMOS of the foot and ankle diagnosed with an MRI scan, in what is quite a sizeable cohort study given the rarity of the diagnosis.² The investigators measured serum 25-hydroxyvitamin D (25(OH)D) levels in all patients on the day of their outpatient consultation. The guidelines of the Endocrine Society were used in the definition of vitamin D deficiency as 25(OH)D of 20 ng/ml or less, and insufficiency as 25(OH)D levels between 21 and 29 ng/ml. In this cohort of 31 patients, 61% (n = 19) of patients were found to be vitamin D deficient and 23% (n = 7) were vitamin D insufficient, with just 16% (n = 5) of patients having essentially normal vitamin D levels. There was no significant difference in vitamin D levels in samples from different ages or genders and, despite the small sample, the authors attempted to establish if there was a significant difference between vitamin D levels taken during different seasons of the year, but there was not. This is the largest study of this kind, with the only other study to look at vitamin D levels in BMOS including only ten patients and showing a similar result. Although more information is needed about this condition, this study, especially when considered in the context of the previous, suggests

a significantly low vitamin D level in patients with bone marrow oedema syndrome. Vitamin D has been associated with many orthopaedic pathologies and it is possible that it has a role to play in this condition too. What we have here, of course, is an association study, not a causation study. It would be ideal to establish what, if any, the potential efficacy is of treatment.

Evaluating the learning curve for total ankle arthroplasty

■ There is undoubtedly a learning curve for every procedure that we carry out, and this has particularly come into focus in the arthroplasty world, where outcomes are increasingly being shown to be affected by volume. Increased experience has been shown to be associated with a decrease in peri-operative and post-operative complications and, in hip arthroplasty surgery at least, to be associated with longevity. The exact number of cases required in total ankle arthroplasty for this learning curve to stabilise remains unclear. In this paper from **Milan (Italy)**, an analysis was performed of the learning curve for a single fellowship-trained foot and ankle surgeon who was not an implant designer.³ The first 46 cases of primary total ankle arthroplasty performed were included in the study; however, patients undergoing any additional procedures were excluded from the study, leaving a final study population of 31 patients. These patients underwent isolated primary total ankle arthroplasty for ankle arthritis using the HINTEGRA total ankle prosthesis. Outcome evaluation took place at six, 12 and 24



months, and assessment included the American Orthopaedic Foot and Ankle Society (AOFAS) ankle and hindfoot score, visual analogue scale (VAS) for pain and the SF-12. An objective assessment of range of movement was performed along with a radiological assessment of weight-bearing radiographs. Intra-operative metrics were collected and post-operative complications were recorded. An assessment of the learning curve was made by examining the relationship between surgeon experience and patient outcome at 24 months. The learning curve stabilised in terms of surgical time after the fourteenth patient. There was also, perhaps most surprisingly, a learning curve appreciable in clinical outcomes and measurable with the VAS score, ankle range of movement and AOFAS score of 11, 14 and 28 patients, respectively. The authors were able to establish a learning curve associated with the sagittal alignment of the talar component but not when examining for alignment on any other measure used in the study method. There are clearly limitations to the generalisability of a study of this nature. Overall surgeon experience, exposure to ankle arthroplasty as a trainee, prosthesis ease of use and prosthesis design all affect the learning curve and cannot be factored into this study. However, the results from this surgeon do suggest that there is a learning curve that did affect overall patient-reported outcomes for the initial 28 cases.

Reconstruction of Achilles tendon defects

■ TendoAchilles dysfunction is a disabling condition and, when surgical reconstruction is required, particularly for old tears or re-ruptures, the surgeon can be left to deal with large tendoAchilles defects. The options then include lengthening, autografts, or even artificial ligaments, with little to recommend one surgical procedure over another. Given the rarity of these conditions and the myriad of surgical options available to us, we often have to rely on biomechanical and cadaveric data to sort the wheat from the chaff. Of the two most commonly used options, one is an Achilles turndown, which has the potential disadvantage of requiring a large incision that can lead to the risk of sural nerve injury and slow rehabilitation. A variety of local and allograft options have been suggested in the past to overcome these potential disadvantages but none have really taken off. These surgeons from **Baltimore, Maryland (USA)** have compared this relatively newer option with the turndown in a cadaveric study.⁴ They created 8 cm defects in the tendoAchilles in 18 cadaveric lower limbs and each pair of legs received either a turndown or semitendinosus allograft. Following the cadaveric reconstruction, the specimens were loaded onto an instrumented load frame, pre-conditioned and then loaded to failure. The tensions required to cause clinical failure (defined at 1 cm lengthening), and ultimately complete failure, were recorded. The allograft fared better than the turndown at clinical failure (156 N vs 107 N) and at ultimate failure (290 N vs 140 N). There was also a different mechanism of failure noted, with bone bridge failure in the calcaneus being the mechanism of failure in the allograft group, while the turndown failed via suture pull out. Although this result on its own is of course interesting, one should remember that there is likely to be a difference clinically as time progresses. The

turndown is likely to strengthen as healing occurs, while allografts tend to weaken with time. A clinical study, however, would not be unreasonable given these results.

Day-case ankle arthroplasty?

■ There seems to be no stopping the train of day-case arthroplasty. More and more hip and knee procedures are being performed within 24 hours, or in some cases as a 'day case', and then discharged to a lower-cost (usually physiotherapy-run) facility. This approach has obvious cost and healthcare provider advantages, although perhaps unusually it also appears to have high levels of patient acceptance. When done correctly in the larger joints, it can be safe and effective, and can leave patients satisfied. Investigators from **Durham, North Carolina (USA)** have asked the question: can this be achieved with total ankle arthroplasty?⁵ The authors undertook to set a benchmark for day-case total ankle arthroplasty, and investigated 90-day medical and operative complications, re-operations, re-admissions or emergency room visits, and pain control in a comparative case series. The authors were able to identify 81 patients who had undergone total ankle arthroplasty and, overall, there was a 10% complication rate. The authors divided their 81 patients into 16 who stayed two nights or more, and 65 who were treated essentially with a stay of 24 hours or less. There was a significant difference in complication rates between the two groups (31% vs 5%). When looking carefully at the data, there were no differences in re-admission rates or re-operation rates. Similarly, there were no differences in post-operative phone calls, narcotic refills, or VAS pain scores at the first post-operative visit. So, putting all this together, along with the nature of the study, it appears that a 24-hour stay can be achieved without increasing complication rates. Nevertheless, there is no evidence that it is actually 'better'.

HbA1c and diabetic foot surgery?

■ The anaesthetic fraternity are becoming more and more 'hooked' on glycated haemoglobin (HbA1c) as a predictor of post-operative complications and part of the toolbox of risk stratification used peri-operatively. However, the evidence is somewhat mixed as to how predictive it actually is, and there have been a range of meta-analyses suggesting that the evidence isn't as strong as perhaps some think. We were delighted to read this excellent database-based study of over 4500 patients, which was undertaken to answer the question of HbA1c as a predictor of complications in forefoot surgery. The study team in **Charlottesville, Virginia (USA)** set out to establish if there was a link to post-operative surgical site infection (SSI) following forefoot surgery and HbA1c levels pre-operatively in 4630 patients whose results were included on a national data set.⁶ The authors chose three months as the follow-up interval and stratified risk by HbA1c using 0.5 mg/dL increments and then receiver operating characteristic (ROC) curve analysis to undertake a sensitivity and specificity test to establish the ideal threshold value. The rates of SSI within this cohort ranged from 2.3% to 11.8% and the ROC analysis suggested that 7.5 mg/dL was the most sensitive and specific threshold value. A multivariable analysis then established that, in patients with an HbA1c level over 7.5 mg/dL, there was in fact a significantly increased risk for post-operative wound infection, even when accounting for all available confounders. Clearly, in the highest risk group, i.e. diabetics, undergoing forefoot surgery, the surrogate for diabetic control HbA1c does predict complications following surgery. This is valuable evidence to support the use of multidisciplinary clinics to optimise diabetic control as well as treating the sequelae of diabetic feet operatively.

Arthrodesis takedown and ankle arthroplasty

■ Ankle arthroplasty has yet to be shown to provide more reliable and satisfactory results than fusion in a range of patients. However, we suspect that this is only a matter of time - as the prostheses and the long-term outcomes improve, arthroplasty will likely seem a more and more appealing option, certainly for lower-demand patients. It also potentially has an application in those patients who have ongoing painful ankles following a failed fusion, although use here is somewhat more controversial. Surgeons in **Wiesbaden (Germany)** have shared their experiences of total ankle arthroplasty following arthrodesis takedown, one of the most challenging procedures in foot and ankle surgery.⁷ The authors report on the outcomes of 18 patients who underwent the procedure in their institution over a seven-year period. The mean age was 51 years and the mean follow-up was to 54 months. Reassuringly, this appears to represent a typical cohort of patients, with arthrodesis having been undertaken around six years prior to revision and all patients being revised to an unconstrained cementless total ankle arthroplasty. In common with many series of complex ankle arthroplasties, there

was a not insignificant risk of medial malleolar fracture which sat at around 10% in this series ($n = 2/18$). As far as the radiographs go, the results were not exactly stunning and just 14 patients had entirely osseointegrated at final follow-up. However, none was loose enough to require revision, although one required revision for medial tilt. As far as the clinical results are concerned, the series was a success, with VAS scores decreasing from an average of 9 pre- to an average of 1.7 post-operatively. This reduction in pain was reflected in the change in SF-36 scores, with improvement in both physical (34 to 74) and mental outcome scores (49 to 76). This study essentially demonstrates revision of arthrodesis to be a success when undertaken for pain to a total ankle arthroplasty. These authors were also able to report reasonable outcomes when a contemporary design with uncemented bearings was used.

Post-operative films more useful than we think?

■ Post-operative radiographs are a staple of all healthcare systems for both personal audit of results and medicolegal purposes. These authors from **Daegu (South Korea)** ask, however, if there may be more information there than

immediately meets the eye.⁸ Their investigation aimed to establish whether hallux valgus recurrence could in any way be predicted on the appearance of the immediate post-operative radiographs. The authors reviewed the post-operative radiographs of 113 feet in 93 patients, all of whom had hallux valgus surgery consisting of a proximal Chevron osteotomy and distal soft-tissue correction, to establish whether any of the observed changes in the hallux valgus angle (HVA), the intermetatarsal angle (IMA), and sesamoid position had any bearing on eventual incidence of recurrence. Overall, 17% of patients had suffered recurrence during the period of the study, and a post-operative HVA of $> 8^\circ$ and a poor sesamoid position were predictive of eventual recurrence. Perhaps entirely unsurprisingly, the authors also established that the greater the pre-operative deformity ($HVA \geq 40^\circ$), the greater the chance of recurrence. It appears that by six months following initial surgery, there is no ongoing increase in HVA or in any of the other radiological parameters. Also, based on these data, one can say with relative confidence that, if a good correction is achieved, the patients will not likely require subsequent revision.

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Wrist & Hand

X-ref For other Roundups in this issue that cross-reference with *Wrist & Hand* see: *Research Roundup 3*.

Steroid or release in trigger finger?

■ As surgeons, we must always consider non-operative measures prior to surgical interventions. Certainly, around the hand and wrist, steroid injections are universally commonly used to avoid, or at least delay, surgery for trigger finger. The

question, however, is: How effective are these injections? A team from **Aarhus (Denmark)** report one of the few randomised trials in trigger finger, with the aim of comparing the two interventions.¹ Their study was designed to compare cure rates between the two interventions with follow-up at three and 12 months. At final follow-up, the results of 165 patients randomised either to ultrasound-guided injections ($n = 84$) or

to surgery ($n = 81$) were available. The authors defined success as the digit having normal movement at final follow-up. A range of secondary outcomes were also reported, including complications and post-operative pain. They did not consider discomfort a failure. In terms of the primary outcome measure, by final follow-up (12 months) there was a dramatic difference between the two groups, with 99% of surgery patients

and 49% of injection patients cured. However, in the surgical group there was one damaged digital nerve and three superficial infections, and in the injection group 11 steroid flares were seen, as well as two patients with fat necrosis. These authors have quantified the effect-size differences that have always been known, and this is a useful paper in terms of planning treatments for patients. Essentially, an injection gives a 50%