

years were likely to achieve a good long-term outcome and, therefore, this seems a good technique in suitable patients compared with other, limited options.

Iliac bone grafting for scaphoid nonunion with avascular necrosis

■ In the previous issue of 360, we reported a paper that challenged the commonly accepted dogma that the proximal pole of the bone is ischaemic in scaphoid nonunion, that an MRI should be performed to demonstrate this, and that subsequent surgical reconstruction in the presence of avascularity requires insertion of a vascularized graft.⁹ There are certainly firm believers in the hand surgery community that this approach is necessary, but it is also true that the adoption of these assumptions leads to expensive MRI scans and complex surgery, for which only a few aficionados

might feel comfortable. In this issue, we report another paper challenging these presumptions, this time from **Seoul (South Korea)**.¹⁰ This group reports the outcomes of a series of 24 patients, all with proximal pole avascular necrosis treated operatively with a non-vascularized iliac crest autograft. The avascularity in all cases was confirmed preoperatively using MRI and intraoperatively by the clinical absence of punctuate bleeding. The operative technique of the Fisk–Fernandez wedge-shaped corticocancellous graft was used in 11 patients; cancellous bone grafting was used in 13 patients. The vast majority (n = 22/24) of the surgeries went on to heal. The two who did not have a successful outcome had both undergone previous surgeries; they subsequently underwent a further procedure using the Fisk–Fernandez technique and both then went on to union. Although relatively

small series, these two papers in consecutive 360 issues include a total of 55 patients. It seems that we can therefore conclude from these papers that the issue of avascularity may be overblown, and that routine MRI scanning and vascularized bone grafting should be avoided.

REFERENCES

1. **Costa ML, Achten J, Parsons NR, et al.** Percutaneous fixation with Kirschner wires versus volar locking plate fixation in adults with dorsally displaced fracture of distal radius: randomised controlled trial. *BMJ* 2014;349:g4807.
2. **Peng F, Liu Y-X, Wan ZY.** Percutaneous pinning versus volar locking plate internal fixation for unstable distal radius fractures: a meta-analysis. *J Hand Surg Eur Vol* 2018;43:158-167.
3. **Martinez-Mendez D, Lizaur-Utrilla A, de-Juan-Herrero J.** Intra-articular distal radius fractures in elderly patients: a randomized prospective study of casting versus volar plating. *J Hand Surg Eur Vol* 2018;43:142-147.
4. **Dunn JC, Kusnezov NA, Koehler LR, et al.** Outcomes following carpal tunnel release

in patients receiving workers' compensation: a systematic review. *Hand (N Y)* 2018;13:137-142.

5. **Lin FY, Wu CI, Cheng HT.** Coincidence or complication? A systematic review of trigger digit after carpal tunnel release. *J Plast Surg Hand Surg* 2018;52:67-73.

6. **Andersson JK, Hansson-Olofsson E, Karlsson J, Fridén J.** Cost description of clinical examination and MRI in wrist ligament injuries. *J Plast Surg Hand Surg* 2018;52:30-36.

7. **Kaile E, Bland JDP.** Safety of corticosteroid injection for carpal tunnel syndrome. *J Hand Surg Eur Vol* 2018;43:296-302.

8. **Ha NB, Phadnis J, MacLean SBM, Bain GI.** Radioscapholunate fusion with triquetrum and distal pole of scaphoid excision: long-term follow-up. *J Hand Surg Eur Vol* 2018;43:168-173.

9. **Rancy SK, Swanstrom MM, DiCarlo EF, et al.** Success of scaphoid nonunion surgery is independent of proximal pole vascularity. *J Hand Surg Eur Vol* 2018;43:32-40.

10. **Kim J, Park JW, Chung J, et al.** Non-vascularized iliac bone grafting for scaphoid nonunion with avascular necrosis. *J Hand Surg Eur Vol* 2018;43:24-31.

Shoulder & Elbow

X-ref For other Roundups in this issue that cross-reference with *Shoulder & Elbow* see: *Children's orthopaedics Roundup 4; Research Roundup 5.*

Lateral acromioplasty in rotator cuff repairs

■ Subacromial decompression is a hot topic in arthroscopic shoulder surgery at present, following the Can Shoulder Arthroscopy Work? (CSAW) trial,¹ which reported that surgical groups had superior outcomes for shoulder pain and function, although this difference was not clinically significant. Recently, attention has turned to the importance of the morphology of the lateral acromion and its role in mechanical subacromial impingement. It has previously been suggested that a critical shoulder angle (CSA) of more than 34°

is associated with rotator cuff tears. However, although widely quoted, the evidence for this is not yet strong. Some surgeons advocate removal of this lateral bone when performing a rotator cuff repair, but, while further research disentangles the multitude of factors that affect the outcome of a rotator cuff repair, it is important to know if this subacromial decompression is appropriate or not. This study from **Zürich (Switzerland)** reports the outcomes of 49 consecutive patients, all with a high CSA, who underwent an arthroscopic rotator cuff repair for a degenerative, full-thickness supraspinatus tear.² All of the patients underwent a lateral acromioplasty that reduced their CSA from a mean of 37.5° to 33.9° postoperatively; no patients underwent an anterior acromioplasty. At

a mean follow-up of 30 months, the mean Constant shoulder score had increased from 59 to 74 points, and seven repairs had failed. Interestingly, the postoperative CSA was significantly larger in failed than in healed repairs. Patients who had a healed cuff repair and a CSA corrected to 33° or less had 25% more abduction strength than patients with a healed cuff and a CSA of 35° or more. Importantly, the deltoid integrity was unaffected on follow-up MRI scanning, with no cases of dehiscence, atrophy, or other complications of this procedure. The authors conclude that a lateral acromioplasty is safe to perform and that large, insufficiently corrected CSAs are associated with poorer outcomes in cuff repair. While further research is certainly required with respect to

improving outcomes, it is useful to know that such procedures can be undertaken safely.

Glenosphere lateralization in reverse shoulder arthroplasty

■ Another current talking point among shoulder surgeons is the management of the subscapularis when performing a reverse total shoulder arthroplasty. Conventional wisdom was that repair was necessary to restore the force-couple with the posterior cuff, thereby balancing the prosthesis and preventing instability, while also preserving the power of internal rotation. The reverse shoulder, however, is a non-anatomical prosthesis and, as more recent designs are evolving from a traditional Grammont design towards prosthesis requiring

increased lateralization of the components, the excursion required of subscapularis to reach its insertion is therefore increasing. Cadaveric studies have shown that this increases the force required by the posterior cuff and deltoid to elevate the arm, increases the joint reaction forces, and may restrict external rotation. This group from **Virginia, New York, and Minnesota (USA)** therefore sought to retrospectively review their patients, and to analyze the effects of lateralization and subscapularis management.³ Their study is based on the results of 109 patients and their outcomes. Participants were included in the study who underwent primary reverse shoulder arthroplasty and had both baseline and minimum two-year postoperative American Shoulder and Elbow Surgeons (ASES) shoulder scores. Like all cohort studies, there was variation in practice; of the 109 participants, 71 had undergone a subscapularis repair and 38 had not. Patients were stratified according to the presence of a subscapularis repair and then subgrouped according to lateralization of the glenosphere component. On an individual basis, subscapularis repair and lateralization had no effect on ASES scores but had a significant effect in combination. Overall, patients with a lateralized glenosphere and a repaired subscapularis had significantly less improvement in ASES scores than both those without lateralization and those without subscapularis repair. Importantly, they reported no increase in their dislocation or instability rate. Although this study has a number of methodological limitations, the results stimulate debate. Here at 360 we look forward to prospective studies that incorporate more outcome measures, including range of motion. It is also important to remember that there are many prostheses on the market, with variable lateralization of both the glenoid and humeral components, and results may not be generalizable between them.

Operative or nonoperative? The evidence for treatment of full-thickness rotator cuff tears

■ Rotator cuff pathology is common and there are many people at large in the community with asymptomatic cuff tears. Some would argue that the common ‘shoulder arthropathy’ seen in the elderly is almost a ubiquitous process. Others would argue that most symptomatic tears are traumatic and, as such, there is a specific pathology here. Many patients do experience symptoms and do present for treatment, but there is not a firm consensus on how this large volume of patients should be managed. This group from **Washington DC (United States)** performed a systematic review and meta-analysis of randomized controlled trials comparing operative and nonoperative management of full-thickness, atraumatic rotator cuff tears.⁴ Despite an extensive search, there were only three trials meeting their inclusion criteria, with 269 patients having a minimum one-year follow-up; the mean age of these patients was between 59 and 65 years. The Constant score and visual analogue scale (VAS) for pain were selected for comparison, as these were reported in all included studies. Both Constant and VAS scores were significantly improved at one year, with mean differences of 5.64 and -1.08, respectively. However, neither of these differences met the minimally clinically important difference values. In common with most studies of cuff treatments, there are methodological differences between the included studies, which may potentially have more of an impact than one might anticipate. For example, one study included only supraspinatus tears and another had no limit on cuff tear size. Acromioplasty and biceps management were also left to the discretion of the treating surgeon. The nonoperative management was not uniform either, with only one study having a standardized physical

therapy protocol. The number of corticosteroid injections in this group was variable too. Advocates for repair would point to the opportunity cost of failure to repair with respect to the halting of tear progression, and the development of fatty infiltration and muscle atrophy. From this study and the evidence synthesis it provides, however, the answer is still not clear. In common with the majority of systematic reviews and meta-analyses, all the authors can do is offer the now familiar advice that more high-quality studies with longer follow-up are required.

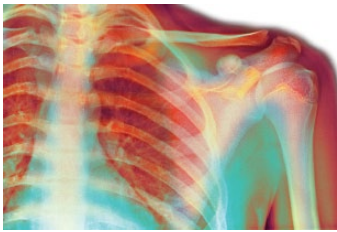
Is arthroscopically assisted latissimus dorsi tendon transfer feasible for irreparable posterosuperior rotator cuff tears?

■ The management of irreparable rotator cuff repairs is a matter of great debate within the shoulder community, with many techniques on offer, ranging from extensive debridement through the varieties of ‘patches’ and even extending to arthroplasty. One option, although not widely in use, is that of a latissimus dorsi tendon transfer. This is thought to act in a number of ways, including: as a spacer between the humeral head and the acromion; as a depressor of the head, which allows the recreation of the fulcrum for elevation; and by rebalancing the force-couples acting within the shoulder, which acts to improve remaining cuff function. However, the procedure is lengthy, complex, and invasive, and is a challenge for the occasional surgeon. A surgeon from **Fuku (Japan)** sought to evaluate his personal results and learning curve with an arthroscopically assisted technique for latissimus dorsi transfer for irreparable posterosuperior rotator cuff tears.⁵ In this clinical report, a partial repair of the remainder of the posterior cuff was performed arthroscopically in all patients, followed by arthroscopic assistance to create the tunnel for the latissimus transfer. The tendon itself was harvested through

an axillary mini-open incision and passed into position with arthroscopic assistance. The reported series included the outcomes of 30 patients with a mean follow-up of 34 months. Significant improvements were seen in a range of outcome measures, with University of California, Los Angeles (UCLA) scores (from 16 preoperatively to 29 postoperatively), active forward elevation (improved from 105° to 149°), and active external rotation (improved from 22° to 32°) all superior at nearly three years of postoperative follow-up. After statistical transformation, a linear correlation was seen between operative time and cumulative number of cases, indicating improved surgical efficiency with experience. The mean operative time itself was 145 minutes. While this is clearly not an operation for the occasional shoulder surgeon, the results here are promising for an otherwise very challenging-to-treat pathology. It appears from this data that those surgeons committing to performing a sizeable number should expect a long learning period for this technically demanding operation, which does, however, seem to improve outcomes in a select cohort.

Polyethylene: the glenoid of choice in young patients

■ The treatment of osteoarthritis of the shoulder in patients under 60 years old is controversial, due to high functional demands. Given the patient’s expected lifespan, the longevity of arthroplasty presents an ongoing difficulty. A particular challenge in this group is revision of the glenoid; the components can loosen, leading to extensive bone loss and difficult revision. The optimal type of glenoid fixation in these patients is not entirely clear, and surgeons must take into account the more likely need for revision surgery in this group of patients. These authors from **Nice, Toulouse, Brest, and Lyon (France) and Wahoonga (Australia)** examined their results of 69 consecutive anatomic total shoulder arthroplasties (46 using a



cemented polyethylene component and 23 using a cementless metal-backed component) in patients aged under 60 years.⁶ These subgroups were comparable in terms of demographics, including age, gender, preoperative function, mobility, and pre-morbid glenoid erosion. One of the strengths of this series was the long mean follow-up of 10.3 years. Overall, 26 patients (38%) underwent revision surgery in this time. This was significantly more likely in the metal-backed group (16 of 23 patients, 70%) compared with the polyethylene group (ten of 46 patients, 22%). Survival rates for the polyethylene component at 12 years' follow-up was 74%, whereas for metal-backed components this was significantly (and potentially catastrophically) lower at 24%. In the polyethylene group, the reason for revision was predominantly glenoid loosening, whereas indications for revision in the metal-backed group were polyethylene wear leading to metal-on-metal contact, instability, and insufficiency of the rotator cuff. It was also identified that Walch B2 glenoids had an adverse effect on the survival of the metal-backed components. Difficulties with two of the theoretical arguments for using a metal-backed glenoid were also highlighted by the authors. These include the ease of exchange of a worn polyethylene insert, which they found was often precluded by loosening, glenoid bone loss, or damage to the tray, and the ease of revision, which in the authors' experience was often precluded by osteolysis and bone loss. The metal-backed glenoid is therefore not in favour with the authors. It should be noted that some designs have been withdrawn from the market due to high revision rates and that evolutions in design have

taken place. However, the authors' conclusion – that they will be using a cemented polyethylene component until better options are available – seems sound to us here at 360.

Body mass index and rotator cuff repair

■ We are in the midst of an obesity epidemic, and the challenges that this represents in orthopaedic surgery are significant. If we are to commit obese patients to surgeries in which the risks of anaesthetic are higher, we must be sure that the benefit of the procedure justifies this risk. Multiple previous studies have found conflicting conclusions about the influence of obesity on outcomes after rotator cuff repair. Although there is already a sizeable volume of literature available, this paper from a group from **Ann Arbor, Michigan (USA)** certainly has something to add to the debate.⁷ The study team hypothesized, not unreasonably, that obesity would lead to adverse functional outcomes and more complications. The authors report their retrospective series of rotator cuff repairs, having reviewed their single-centre database for patients fulfilling the inclusion criteria. They were able to analyze the outcomes of 213 arthroscopic rotator cuff repair of full-thickness tears, comparing the results of patients with a body mass index (BMI) of over 30 and under 30 with non-obese patients. Remarkably, in this data set, 40% of patients had a BMI in this higher range. Baseline characteristics of the two groups were compared, showing no significant difference in other possible confounders, such as smoking rates or diabetes. The data was collected for patients operated on over a three-year period; a minimum final three-year follow-up of outcome scores was required. Data analysis, including regression analyses, was performed. When controlling for covariates, the obese and non-obese groups had no significant difference at baseline and at three years in their Western Ontario Rotator Cuff, American Shoulder and

Elbow Surgeons, or visual analogue scale pain scores. Furthermore, there was no difference in the incidence of postoperative complications. Obese patients were more likely to require an inpatient hospital stay, but this was booked before surgery in the majority of patients, with sleep apnoea being the most common reason. There are weaknesses in this study, and the results in the extremely obese (those with a BMI over 40) were not sub-analyzed. A prospective study would therefore be helpful but, at present, there seems no specific surgical issue that would prevent surgery being offered, aside from the fact that an inpatient stay should be anticipated.

Reverse shoulder arthroplasty following fracture of the proximal humerus X-ref

■ There has been much debate in the trauma community about the initial management of the proximal humerus, particularly following the publication of the Proximal Fracture of the Humerus Evaluation by Randomization (PROFHER) study. Surgeons are still in the process of discussing, digesting, and cogitating on how to take the results forwards into their own practice. However patients are treated in the initial period following a fracture, a considerable number will be left with post-traumatic sequelae, including collapse of the humeral head or osteonecrosis, which can be challenging to treat. A multicentre team from **Munich (Germany)** and **Lyon (France)** have published a highly interesting paper looking at their experience of treating these post-traumatic sequelae with reverse shoulder arthroplasty.⁸ The indications for reverse arthroplasty included patients who had concomitant deficiency of the rotator cuff or severe stiffness of the shoulder. Overall, the authors were able to report the outcomes of 38 patients who were treated in three specialist shoulder units in France and Germany. In terms of previous surgery, 18 patients had been treated with open reduction and internal fixation of their fracture,

22 patients had a rotator cuff tear, and 11 patients had external rotation of 0° or less. Mean follow-up was to 4.3 years. Overall, the mean Constant scores improved from 25 points preoperatively to 57 points at final follow-up. In terms of stratification, perhaps unsurprisingly, those with a rotator cuff tear had overall lower Constant scores than patients without a rotator cuff tear. Forward elevation also objectively improved from 73° to 117°. Unsurprisingly, patients with preoperative stiffness had significantly lower postoperative external rotation than those without. Interestingly, the authors found that previous surgeries did not, in general, alter the overall outcomes. These patients can often have a significant malunion but, likely due to the non-anatomical design, the authors did not identify a significant effect of preoperative varus or valgus deformity on outcomes. Patients seemed satisfied, with 90% rating their outcome as good or very good. The take-home message is that reverse shoulder arthroplasty is certainly an option in this group but will not overcome pre-existing stiffness. Previous surgery and varus or valgus malunion are not contraindications, and as such there is hope for patients with a range of post-traumatic complications. Perhaps the sagest advice based on these results is that restoring early motion is key following a shoulder fracture, as, if it all goes wrong, the salvage of a reverse arthroplasty is less effective when there is a moderate amount of shoulder stiffness.

Is nonoperative management of partial distal biceps tears really successful?

■ Partial distal biceps ruptures are often managed nonoperatively but the literature base is sparse regarding the success of this approach and the outcomes of those who undergo delayed repair. We were therefore pleased to see this study of a large cohort of patients reported by a team from **Philadelphia (USA)**.⁹ They retrospectively identified 132 patients presenting to their unit

with a partial distal biceps rupture treated in their institution. Given the retrospective nature of the design, it is not surprising that the authors were only able to successfully contact 74 of these patients with an outcome survey. In this population, 56% of the contacted patients who tried an initial nonoperative course (34 of 61 patients) ultimately underwent surgery, meaning that 27 patients had completely nonoperative treatment, 34 patients failed nonoperative management and underwent delayed repair, and 13 patients underwent immediate surgery after their injury. There was no difference in satisfaction scores between patients who tried a nonoperative course before surgery and those who underwent immediate

surgery. The only preoperative factor identified as being predictive of having a delayed repair was an MRI-diagnosed tear of greater than 50% of tendon width. Perhaps most importantly in this study, there were no differences in complication rates between those patients who underwent acute and delayed repairs. This study is useful for the initial counselling of these patients and they can be advised that, although there is a sizeable chance that they will fail nonoperative management, there is no lost opportunity and a delayed repair is not likely to incur a disadvantage. Higher-demand patients and those with a tear width over 50% should also be advised of their increased risk of need for delayed repair.

REFERENCES

1. Beard DJ, Rees JL, Cook JA, et al. Arthroscopic subacromial decompression for subacromial shoulder pain (CSAW): a multicentre, pragmatic, parallel group, placebo-controlled, three-group, randomised surgical trial. *Lancet* 2018;391:329-338.
2. Gerber C, Catanzaro S, Betz M, Ernstbrunner L. Arthroscopic correction of the critical shoulder angle through lateral acromioplasty: a safe adjunct to rotator cuff repair. *Arthroscopy* 2018;34:771-780.
3. Werner BC, Wong AC, Mahony GT, et al. Clinical outcomes after reverse shoulder arthroplasty with and without subscapularis repair: the importance of considering glenosphere lateralization. *J Am Acad Orthop Surg* 2018;26:e114-e119.
4. Piper CC, Hughes AJ, Ma Y, Wang H, Neviasser AS. Operative versus nonoperative treatment for the management of full-thickness rotator cuff tears: a systematic review and meta-analysis. *J Shoulder Elbow Surg* 2018;27:572-576.
5. Yamakado K. Clinical and radiographic outcomes with assessment of the learning curve in arthroscopically assisted latissimus dorsi tendon transfer for irreparable posterolateral rotator cuff tears. *Arthroscopy* 2017;33:2144-2151.
6. Gauci MO, Bonneville N, Moineau G, et al. Anatomical total shoulder arthroplasty in young patients with osteoarthritis. *Bone Joint J* 2018;100-B:485-492.
7. Kessler KE, Robbins CB, Bedi A, et al. Does increased body mass index influence outcomes after rotator cuff repair? *Arthroscopy* 2018;34:754-761.
8. Raiss P, Alami G, Bruckner T, et al. Reverse shoulder arthroplasty for type 1 sequelae of a fracture of the proximal humerus. *Bone Joint J* 2018;100-B:318-323.
9. Bauer TM, Wong JC, Lazarus MD. Is non-operative management of partial distal biceps tears really successful? *J Shoulder Elbow Surg* 2018;27:720-725.

Spine

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X-ref For other Roundups in this issue that cross-reference with Spine see: *Children's orthopaedics Roundups 2 & 8; Research Roundup 1.*

Bariatric prior to spinal surgery: as good as it sounds?

■ Obesity is an ever-increasing problem. Currently in the United States, 35% of the population is obese (defined as a body mass index (BMI) of 30kg/m² or higher), and these patients are more likely to present to spinal surgeons than those with a normal weight. Obese patients presenting for spinal surgery are, as with any systemic comorbidity, more likely to encounter complications during their care. One answer to this problem may be to undertake bariatric surgery in an effort to aid the patient in aggressive weight loss prior to treating the spinal pathology. Bariatric surgery has been shown to positively influence obesity-related health problems, and so a group from **San Francisco, California (USA)**

have taken it upon themselves to see if the positive effects of this intervention extend into spinal surgery.¹ Retrospectively, a group of 180 425 adult patients who underwent posterior spinal fusion was gleaned from the State Inpatient Databases of New York, Florida, North Carolina, Nebraska, Utah, and California. There were 156 517 patients included in the analysis, who were divided into three groups: the first group of patients had bariatric surgery followed by fusion; the second group of patients were obese and underwent fusion without bariatric surgery; and the third group of patients were of normal weight and underwent fusion. There were 590 patients who had undergone prior bariatric surgery, 5791 who were severely obese, and 150 136 who were not obese. Patients undergoing revision or anterior surgery were excluded, as were those with bone malignancy or metastatic disease, infection, or trauma. Medical and surgical complications at 30 days and

length of stay were assessed. Patients undergoing bariatric surgery prior to fusion were younger than the other groups and, when compared with obese patients without surgery, were found to have lower rates of respiratory failure, urinary tract infections, and acute renal failure. There was an overall reduction in medical complications (OR 0.59) and infection (OR 0.65). However, when comparing patients following bariatric surgery with non-obese patients, there were no significant differences in medical complications. When compared with patients with normal BMI, however, the bariatric surgery group maintained a higher rate of infection, revision surgery, and readmission. So, our obese patients do better following bariatric surgery, but not as well as those who have no history of obesity. The authors recommend a full nutritional workup of the patients prior to carrying out any procedure. As bariatric surgery has an association with poor bone quality, however,

perhaps weight-loss procedures should be part of the larger treatment plan for this patient group.

A MAP to loss of intraoperative cord monitoring

■ Intraoperative cord monitoring is recommended by the Scoliosis Research Society to optimize outcomes in complex spinal procedures through the early identification of neurological dysfunction. However, intraoperative cord monitoring can be a volatile beast. Loss of signal can indicate a range of problems, which can be both patient-related or technical in nature, and which may not necessarily indicate damage to the spinal cord. Vitale suggested a checklist of steps that should be taken when changes occur in cord monitoring signal to exclude the causes of signal loss in a systematic way, one of which is to address the mean arterial pressure (MAP). A group from **Los Angeles,**