

five years, the mean relapse was 5° of extension for MCPJs and 35° for PIPJs. This is consistent with previous studies, and it seems clear that either patients should be counselled of this risk, or other techniques should be considered. We are pleased to see these two studies in this issue of 360 and look forward to seeing more high-level evidence, particularly randomized controlled trials, which will help to determine the place of collagenase treatment with respect to efficacy, recurrence, and complication rates when compared with the other more limited or extensive

treatments for Dupuytren's. Certainly, from this particular study, the long-term recurrence rate is high for PIPJ disease.

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## Shoulder & Elbow

**X-ref** For other Roundups in this issue that cross-reference with *Shoulder & Elbow* see: *Hip & Pelvis Roundup 7; Research Roundup 2.*

### High rate of recurrent instability following arthroscopic revision anterior shoulder stabilization: is it worth it? X-ref

■ A few years ago, revision arthroscopic shoulder stabilization was a rare thing, with surgeons in general preferring open approaches such as the Latarjet procedure. In recent years, however, the arthroscopic option has gained popularity. With recurrence rates reported in the literature ranging from 6% to 28%, there is certainly plenty of opportunity for surgeons to apply their revision surgical option of choice. A randomized trial of 196 patients comparing open with arthroscopic stabilization for recurrent traumatic instability previously found no difference in patient-reported outcomes, but a lower rate of recurrence with open repair. In this retrospective case series from **Pittsburgh, Pennsylvania (USA)**, the authors report on the rate and risk factors for recurrent instability in 92 patients who

underwent arthroscopic revision anterior stabilization following failure of an index arthroscopic or open stabilization.<sup>1</sup> The final study cohort included 65 patients with a minimum of two years follow-up. The primary outcome measure reported in this study was incidence of recurrent anterior instability defined by symptomatic instability, subluxation, or dislocation. Details of the revision procedure used are clearly set out in the paper. The mean patient age was 26 years, mean time from the index procedure to revision was six months, and the mean follow-up was 4.7 years. Ligamentous laxity was noted in 23% of the study cohort, and there were 27 patients (42%) deemed as failures of the revision surgery at a mean of 2.3 years. Further trauma was the precipitant in 44% of these cases. On multivariate analysis, the authors determined independent predictors of failure were an off-track lesion (odds ratio (OR) 9), age under 22 years (OR 5.4, failure rate 59%) and ligamentous laxity (OR 7.8). The authors report that in the cohort of patients without any of these risk factors, the failure rate was just 19%. There are obvious limitations associated with a

retrospective study design that are well acknowledged in the paper, including loss to follow-up and the lack of standardized protocols. Nevertheless, this study highlights a higher rate of recurrent instability following arthroscopic revision anterior shoulder stabilization than has previously been reported. This may be related to the heterogenous patient group included within this study and, as the authors correctly point out, patient selection is clearly essential when considering this procedure for recurrent instability of the shoulder.

### Platelet-rich plasma fibrin matrix for rotator cuff repair: no good evidence X-ref

■ The use of platelet-rich plasma (PRP) fibrin matrix (FM) for rotator cuff repair has been advocated by some as a good option to improve the clinical outcomes following surgery. However, a recent meta-analysis concluded that, despite evidence that PRP use in rotator cuff repairs may lead to superior healing rates and functional outcomes, this was not the case for platelet-rich fibrin, with the only observable difference being a significantly longer surgical time. In

this small, prospective, single-blind, randomized controlled trial from **Minneapolis, Minnesota (USA)**, the authors randomized 76 patients undergoing arthroscopic rotator cuff repair to either autologous PRP in FM (n = 32) or a standard double row repair (n = 44). Inclusion criteria were patients between 40 and 80 years of age with a symptomatic full-thickness tear limited to the supraspinatus and infraspinatus tendon.<sup>2</sup> Confusingly, the authors report that the study was powered to both the Simple Shoulder Test (SST) and the Western Ontario Rotator Cuff (WORC) Index. Using these parameters, the study required 62 patients per arm. However, later in the study, the primary outcome measure is defined as the change in the WORC Index from baseline to the two-year review. Secondary outcomes included the visual analogue scale, strength testing, and MRI. The groups were well matched at baseline and all patients were blinded to the treatment they received. Of the original 76 patients recruited, only 56 (74%) completed follow-up over a two-year period. The authors report that the WORC Index was not significantly different at any timepoint

over the two years following surgery, with improvement seen in both arms of the trial. There was no statistically significant difference found in any of the secondary outcome measures, although the re-tear rate was 19% for the double-row repair group and 7.4% for the PRPFM group. The authors conclude there is no benefit in using PRPFM for rotator cuff repair. Although the authors should be commended for attempting to address an area of deficiency in the literature, from the information presented, this study was underpowered at the start. Combined with its high loss to follow-up, this does not allow for any meaningful conclusions to be made, although this study will be helpful in informing a future trial, should anyone else wish to undertake one. There is an urgent need for both a better understanding of the underlining mechanism of action of these biologics, as well as robust randomized trials that have strict inclusion and exclusion criteria, standardized preparations, and minimal reporting criteria.

### **Elbow prosthetic joint infection: two-stage revision still the gold standard where possible**

■ Prosthetic joint infection (PJI) following total elbow arthroplasty is reported to vary in incidence, with series giving ranges of 0% to 12%. In general, most series reflect an increased risk of infection when compared with other major joint arthroplasties. The reason for this wide range of reported incidence is likely associated with the heterogeneity of current series in the literature, the small size of many published series, and the varying diagnostic criteria used in each paper to define deep infection. The paucity of studies surrounding single-stage revision in the literature makes comparison of the two now widely recognized techniques of single- and two-stage revision difficult. Across the elbow surgery community, two-stage revision is currently seen as the gold

standard and, even with two stages reported, recurrent infection rates range from 12% to 28%. In this retrospective study from **Philadelphia, Pennsylvania (USA)**, the authors present a comparative study of 26 patients with a mean age of 64 years who were managed for PJI of the elbow using either the more modern (but less reported) debridement and implant retention approach (DAIR,  $n = 10$ ) or two-stage revision or exchange ( $n = 16$ ).<sup>3</sup> Of the total cohort, five patients had diabetes, four had rheumatoid arthritis, and one had HIV. *Staphylococcus aureus* was the most common causative organism, with six cases having no organism identified. The mean follow-up period was four years and the rate of recurrent infection was around 50% ( $n = 5$ ) in the DAIR group compared with 25% ( $n = 3$ ) in the two-stage revision group. Of note, in the two-stage group, only 12 patients went on to have undergone definitive reimplantation. The overall rate of implant retention for the cohort was 42% (11/26). Those patients with recurrent infection were noted to be younger (58 vs 66 years). Like many studies in this area, it is limited by the small sample size. However, as the authors conclude, two-stage revision does seem to be the current gold standard for managing elbow PJI in those patients fit enough for such surgery. This publication supports much of what is given in the recent British Elbow and Shoulder Society (BESS) evidence and consensus-based guidelines for the management of prosthetic joint infection of the shoulder and elbow.

### **Complications following distal biceps tendon repair in nearly 1000 patients**

■ Distal biceps tendon tears are not common injuries but it is quoted that, following surgical repair, 95% of patients have good or excellent results with comparable strength testing to the contralateral side. Despite this, there is an inherent risk of significant complications that can



be potentially catastrophic for the patient. In this retrospective comparative study from **Charlotte, North Carolina (USA)**, the authors report a large database based study covering a 12-year period to identify 970 patients (956 primary and 14 revision), all of whom had undergone a distal biceps tendon repair with a minimum of two months' follow-up (median 3.8 months).<sup>4</sup> The primary outcome measure reported here was the major complication rate. As with all databased studies, the results are subject to the fields collected and the limitations associated with regards to data fidelity. There were a large number of surgeons ( $n = 73$ ) and a variety of surgical techniques were used; a single incision was performed in 652 cases, with a two-incision approach utilized in 318 cases. There were 38 cases that required allograft augmentation at the time of surgery for reconstruction of subacute, chronic, and/or revision tears. The overall major complication rate was 7.5% ( $n = 73$ ) and included proximal radioulnar synostosis, heterotopic ossification (HO), re-rupture, deep infection, posterior interosseous nerve palsy, and complex regional pain syndrome. The overall reoperation rate was 4.5% ( $n = 44$ ), with the most common reasons for reoperation being re-rupture, HO, loss of range of movement, and proximal radioulnar synostosis. The minor complication rate was reported to be 21.5%, with lateral antebrachial or superficial radial neuritis or numbness most commonly seen. The authors report that the single-incision approach was associated with an increased risk of neurological complications, while the two-incision approach was associated with an increased risk of proximal radioulnar

synostosis (odds ratio 19). Despite the large number of patients in this study, the conclusions are somewhat limited by the retrospective design and the heterogenous nature of the patients included. However, it is one of the largest studies to date documenting the major and minor complication rates for this surgery.

### **Another clavicle trial X-ref**

■ The humble midshaft clavicle fracture is a common injury and has been the focus of more research and debate regarding its optimal management than almost any other orthopaedic injury of late. This is an important matter not only for patient outcome but also due to the healthcare costs involved in its treatment. Early series suggested a high satisfaction rate with nonoperative treatment and low non-union rates. More recent studies have identified a number needed to treat of seven to prevent a nonunion and satisfactory late outcomes for both operative and nonoperative treatment. Others argue that early return to function and economic activity are an advantage of operative treatment. This multicentre study from **Farsø (Denmark)** adds another randomized trial to the evidence base.<sup>5</sup> In this trial, 146 adult patients with an acute displaced clavicle fracture were randomized to sling treatment or fixation with a pre-contoured locking plate. Outcomes were assessed using the Disabilities of the Arm, Shoulder and Hand (DASH) and Constant scores alongside clinical and radiological follow-up at regular intervals of six weeks and 3, 6, and 12 months. Nonunion was defined as lack of callus or persistent fracture lines at six months. Follow-up rates were good, with 85% of patients in both arms of the study completing one year of follow-up. At six weeks' and three months' follow-up, the mean DASH and Constant scores were significantly better in the operative group, but there was no significant difference after this. Overall, 11 patients in the nonoperative groups (17%) developed a nonunion, of which ten

were symptomatic; nine of these underwent operative fixation and all went on to unite. Two patients in the operative arm (3%) developed nonunion, one of whom had non-protocol treatment with only two screws in each main fragment; the other declined surgery after randomization and so was not really an operative failure. The rate of complications in this study was low, with one infective loosening requiring revision treated successfully and 16 patients having the plates removed, which was routinely offered as part of the treatment protocol. With equivalent outcomes and successful treatment of nonunions, the evidence remains that nonoperative treatment is generally appropriate in those who can wait. Depending on individual circumstances and health system, there is certainly an economic argument for initial fixation. Statistical comparison between populations also ignores outliers but risk stratification is challenging and identifying a group of patients who would definitely benefit from early operative management is difficult. This should be the aim of further research and we are sure the debate will continue.

### Functional outcomes after arthroscopic suture bridge subscapularis tendon repair

■ The subscapularis tendon is infrequently torn when compared with the posterosuperior rotator cuff, but it is critical for the anteroposterior force couple. The long-term integrity of repair is therefore an important outcome measure of surgical treatment success. Open repair was historically the gold standard but more recent advances have included arthroscopic approaches, as well as many surgeons promoting single- and double-row repairs in an attempt to recreate the subscapularis footprint and encourage healing. The knotless double-row transosseous-equivalent repair has been well

publicized and studied in the posterosuperior cuff. The relative efficacy of double-row techniques compared with single-row techniques for subscapularis tears, however, is less well understood. This group from **Funabashi (Japan)** retrospectively investigated and reported on their cohort of 101 shoulders subjected to arthroscopic suture bridge repair for full-thickness subscapularis tear at a minimum follow-up of two years.<sup>6</sup> The study group comprised 57 male and 44 female patients with a mean age of 66 years. All patients were assessed clinically with scores including the University of California, Los Angeles score (UCLA) and the American Shoulder and Elbow Surgeons (ASES) score. All were assessed radiologically for repair integrity and fatty degeneration of the muscle belly using MRI at a mean of 14 months follow-up. Repairs were performed using two medial anchors loaded with three sutures, and a suture bridge was formed and inserted in lateral row anchors in the bicipital groove. The two remaining medial row sutures were then tied as a mattress. The biceps were always treated with a tenotomy or tenodesis and the posterosuperior cuff was repaired using a suture bridge technique if required, but massive or partially repairable tears here were excluded from the study. In terms of outcomes, significant improvements were seen in UCLA, ASES score, internal rotation, and forward flexion at final reported follow-up. The re-tear rates were surprisingly low, with a 5% incidence in this series, and fatty degeneration was significantly improved in the intact group but not in the re-tear group. Clinical muscle strength significantly improved after surgery but weakness did persist in patients who had significant fatty infiltration of their muscle prior to surgery; this was the case even where no re-tear was evident. This transosseous-equivalent series shows better re-tear rates than

other reported series of single- or double-row repairs but there is the ever-present possibility of a selection bias given the design of this series. A healed tendon must be the goal as, even where strength is weak, the check-rein effect is likely to be important for function and prognosis. Weaknesses of this report include the relatively low follow-up rate at 66%, but the results presented here are promising and further prospective studies would be welcome.

### Recurrence of anterior-inferior instability after Bankart repair in young patients

■ This study from **Iksan (South Korea)** examines the outcomes of primary repair in patients below the age of 30 years.<sup>7</sup> They conducted a retrospective review of patients with anterior-inferior shoulder instability over a six-year period, all of whom were followed up for at least two years. By dividing the cohort into two groups according to the recurrence of instability or otherwise, the authors here were able to undertake a reasonably thorough statistical analysis using binary logistic regression. Overall, in the cohort of 170 shoulders, 32 suffered recurrence, giving a second dislocation rate of 19%. There were significant differences between the groups in terms of the number of preoperative dislocations, such that the adjusted odds ratio for recurrent instability in those suffering two to five prior dislocations was 6.4, compared with 8.8 in those suffering more than five prior events. Patients with a time interval between first dislocation and surgery of greater than six months had an overall odds ratio of 5.6 and those with a Hill–Sachs lesion had an odds ratio for failure of 4.3. Functional outcomes were assessed using Rowe and Walch–Duplay scores reported at two years post-operatively. These were significantly improved in both groups; however,

the mean scores were significantly lower in the group of those who suffered an instability recurrence. A limited number of previous studies have shown a correlation with successful stabilization, and an earlier surgical intervention and the British Elbow and Shoulder Society (BESS) guidelines suggest consultation and treatments within a period of weeks. It would therefore have been interesting had the authors analyzed the results of patients treated earlier than six months, but often this approach is compromised by the relatively few numbers of patients involved in the study. The findings are interesting, however, and do seem to suggest benefits to early intervention in this younger age group.

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