Posterior glenohumeral dislocations and occurrence of associated injuries

The shoulder joint is the most frequently dislocated synovial joint within the human body. However, despite the common diagnosis, just 5% of injuries occur in a posterior direction, meaning that relatively little research is directed towards this distinct pathology. This is also reflected in the general awareness of the condition, which seems relatively low, with anywhere from 50% to 80% of posterior dislocations being missed at initial presentation. In order to clarify and consolidate the evidence with respect to the aetiology, diagnosis, and treatment of this pathology, this group from **Dublin (Republic of Ireland)** performed a systematic review of studies conducted between 1997 and 2017.[7] All of the studies reviewed aimed to report on both acute subluxation or dislocation of the glenohumeral joint posteriorly, in addition to the aetiology of the lesion. Overall, 54 studies were identified, including a total of 182 patients with a mean age of 44 years. Seizures were implicated in almost 40% of patients with 9% attributable to sports pursuits, 12% reported following road traffic accident, and 4% following electric shock. Only one patient had multidirectional instability listed as a causative factor. Delay in diagnosis was not uncommon, ranging from a few days up to 25 years after the index event. Open reduction was the most common treatment method utilized in 142 patients and a variety of fixation methods were also described, including the McLaughlin, modified McLaughlin, and Neer procedures, as well as a multitude of other methods, including arthroplasty, open reduction internal fixation, and resection arthroplasty. Reverse Hill–Sachs lesions occurred in 78 shoulders and proximal humerus fractures in 12 shoulders, with diaphyseal factures associated with dislocation in a further seven patients. Only four patients had evidence of nerve injury, with three axillary nerve palsies and one suprascapular nerve palsy. In this review cohort, only two patients were identified and reported as having subsequently developed osteonecrosis of the humeral head. This review article nicely summarizes the recent literature on the aetiology of posterior shoulder dislocations, although the existing research is relatively limited in volume and quality. Seizures are the largest independent cause and, in this context, bilateral injury has been proven to be not uncommon, as is to be expected.

Infection in reverse shoulder arthroplasty

The range of indications for reverse shoulder arthroplasty have expanded significantly since the initial introduction of the prosthesis, and the number being performed is expanding rapidly in most healthcare systems. While the clinical results are widely reported to be impressive, especially in patients with poor rotator cuff function, the procedure is not without its complication profile. The technical nature of the surgery and the need for large open approaches is probably the reason for the higher complication rates. It has been identified previously that the risk of deep infection is higher in reverse polarity prostheses when compared with their anatomical counterparts. Various theories have been advanced for this, including the relatively larger anatomical dead space that is produced with a reverse polarity joint arthroplasty. In order to understand this effect and its size in more detail, a group from **Copenhagen (Denmark)** interrogated the Nordic Arthroplasty Register Association dataset.[8] Overall, 17730 primary shoulder arthroplasties were recorded between 2004 and 2013 and, using the Kaplan–Meier method, the ten-year cumulative revision rate due to infection was reported for the whole cohort and by arthroplasty design. A Cox regression model was then utilized to obtain the hazard ratio of the relative risk of revision due to infection. Over the study period, at a mean follow-up of three years and nine months, 188 revisions due to infection were reported in this large series. The ten-year cumulative rate of revision due to infection was seen to be 1.4% overall but was 3.1% for reverse shoulder arthroplasty. In the male population, a reverse shoulder conferred an 8% risk of revision at this stage. Younger male patients below the age of 65 years had a higher risk of infection. This was more so below the age of 55 years, where the adjusted relative risk was 2.58 compared with those patients over the age of 75. When compared with an indication of osteoarthritis, fracture and fracture sequelae conferred an adjusted relative risk ratio of 2.0 and 2.5, respectively. Rotator cuff arthropathy was also a relative risk factor for revision due to infection, with an adjusted relative risk of 2.95. Although the overall incidence of revision due to infection was relatively low, the registry data will underestimate the rate of actual occurrence of deep infection. The figures are useful for counselling of patients, and further efforts should be directed towards the identification of the mechanism by which some subgroups appear to be at more risk.

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Spine

Traumatic spinal implants: what do the biomechanics tell us? X-ref

Pedicle screws are commonly used to establish bony purchase in spinal fractures, and are able to instrument all three spinal columns with low surgical risk. Short-segment fixation in spinal injuries (i.e. one level above and below the unstable segment) offers the advantage of sparing motion segments and minimizing abnormal biomechanics. On the other hand, in some instances, a construct that relies on pedicle screws alone may not provide sufficient stability. Alternatives include

circumferential reconstruction and long-segment fixation (at least two levels above and two levels below the unstable segment) augmented by screw insertion at the fracture level. These strategies may provide a stronger, stiffer construct but are associated with greater related surgical risk. This systematic literature review from **Chicago, Illinois (USA)** reviews studies that compare the biomechanics of each of these different potential reconstruction techniques.[1] Eight studies were selected for inclusion, which included biomechanical studies using human, bovine, and porcine spine specimens and computational analysis. The authors found that, based on the current biomechanical data, inclusion of screws at the fracture level improves overall short-segment construct stiffness. The failure rate of short-segment posterior fusion was found to be significantly reduced when augmented by screw insertion at the fracture level, and long-segment fixation was found to lead to more stiffness and a restricted range of movement compared with short-segment fixation. A single large case series comparing outcomes of patients who underwent short-segment fixation with screws at the fracture level *versus* long-segment fixation excluding the fracture level found that radiological and neurological outcomes were similar. The authors of this review conclude that insertion of screws at the fracture level in short-segment fixation may improve construction stiffness, to the point that it may be comparable to long-segment fixation or circumferential reconstruction in some scenarios.

Preoperative opioids and one-year patient-reported outcomes after spine surgery

■ A 2016 review found that 57% of patients presenting for spine surgery used opioids preoperatively, despite the evidence demonstrating no long-term benefit in terms of pain scores. This study from **Nashville, Tennessee (USA)** aimed to determine how preoperative chronic opioid therapy relates to long-term outcomes for patients after undergoing either elective lumbar or cervical spine surgery.[2] Chronic opioid therapy was defined as opioids taken most days for 90 days and high opioid dosage was defined as > 30 morphine milligram equivalents daily. Long-term outcomes were determined using patient-reported outcome measures and opioid prescription data. This timely paper addresses some of the concerns many clinicians have surrounding chronic opioid use in the United States and elsewhere. The findings of this study are based on the outcomes of 2128 patients, all of whom underwent elective spine surgery between 2010 and 2017. Data were extracted from routinely collected healthcare data as part of the authors' institutional registry, and were linked to the state's prescription monitoring service. Preoperative chronic opioid use was found to be routine in 21% of patients, and was associated with failure in achieving meaningful improvements at one year in limb pain, function, quality of life, and dissatisfaction, all with an increased odds of achieving satisfaction of around 1.5. In addition to these poorer outcomes, patients were three times as likely to suffer a complication and 15 times as likely to have postoperative chronic opioid use problems. Patients with preoperative chronic opioid therapy had significantly less improvement in limb and axial pain, function, quality of life, and dissatisfaction at one year, and fewer had returned to work. This group also had more 90-day complications and postoperative chronic opioid use at one year. Higher preoperative opioid dosage, even when not associated with chronic opioid therapy, was significantly associated with postoperative chronic opioid use at one year. This study adds to the evidence surrounding the detrimental effects of opioids. Early reports of preoperative opioid weaning as a component of preoperative optimization shows promise and is felt to have the potential to substantially improve clinical outcomes.

Mental health is not an influence on outcomes following anterior cervical discectomy and fusion

■ Increasing numbers of anterior cervical discectomy and fusion (ACDF) procedures are being performed to treat neck pain with associated radiculopathy and myelopathy. This is against a background of known poorer outcomes with almost every procedure in spinal surgery for those with baseline mental health issues. The authors of this study from **Singapore (Singapore)** examined the influence of preoperative mental health on outcomes after a single ACDF, and aimed to determine the impact of surgery on postoperative mental health by analyzing the pre- and postoperative data collected from 104 patients, who were divided into two groups based on the preoperative Mental Component Score of the 36-Item Short-Form Health Survey (SF-36) questionnaire.[3] The results show that patients with poor baseline mental health experienced greater pain, neurogenic symptoms, and limitations in function preoperatively and up to two years postoperatively. However, these patients experienced a clinically significant improvement in all outcome scores and, in some areas (function and mental health), they had greater improvements than patients who had better baseline mental health. Thus, despite relatively greater pain and disability at two years, patients with poor baseline mental health experienced similar improvement in clinical outcome, return to work, and satisfaction rates *versus* those who had a better baseline mental health. This study provides useful information regarding patient postoperative outcomes in relation to mental health, and – in cervical pathology, at least – a poor baseline mental health should not be a bar to surgery. Of course, however, preoperative optimization of mental health should still be pursued for other reasons.

Minimally invasive *versus* open transforaminal lumbar interbody fusion

■ Transforaminal lumbar interbody fusion (TLIF) is an effective treatment for degenerative lumbar disc disease and spondylolisthesis. Traditionally, TLIF has been performed as an open procedure. However, minimally invasive surgery (MIS) is becoming increasingly popular with patients and surgeons, due to a perception of fewer associated morbidities, less blood loss, and shorter hospital stays. MIS is technically more difficult, and some concerns have been raised regarding proper disc preparation and interbody fusion volume, with the risk that poorer fusion rates may be achieved. The authors of this study from **Taipei (Taiwan)** quantified the interbody bone graft area of 77 disc levels in 59 patients following TLIF using open and MIS techniques in their comparative cohort series, and went on to correlate these findings with fusion rates, complications, and clinical outcomes.[4] Fusion was determined by a CT scan (3 mm slices) at six months. The clinical outcomes, complications, and

fusion rates were similar in patients who underwent open and MIS TLIF. Fusion rates of 79.1% and 82.4% were achieved in the open and MIS groups, respectively. The area bone grafted within the disc space showed no overall difference between the two groups. However, analysis of the graft area distribution within the disc space showed that the contralateral side had the lowest bone graft area ratio in both groups, with the contralateral-dorsal part exhibiting the lowest bone graft area overall and the MIS group exhibiting significantly lower bone graft area ratio than the open group. The authors concluded that open and MIS TLIF produced comparable fusion rates, overall bone graft area ratios, clinical outcomes, and complications. Nonetheless, the contralateral-dorsal aspect of the disc space remains the most difficult area to prepare and graft. There is some sensible advice here in terms of where the surgeon's attention should be focused intraoperatively, especially if using a MIS approach.

Fusion and lung volume for adolescent idiopathic scoliosis

One of the purposes of corrective surgery for adolescent idiopathic scoliosis (AIS) is to prevent the deterioration in pulmonary function caused by progressive severe spinal deformity. However, corrective surgery itself may affect pulmonary function and the underlying mechanism of pulmonary impairment in AIS patients is not fully understood. The authors of this study from **Tokyo (Japan)** measured the lung volume of 111 patients with AIS who underwent posterior spinal fusion for right-sided major thoracic curves using CT pre- and postoperatively.[5] They then sought to validate total lung volume (TLV) assessed by CT with pulmonary function tests, and to identify factors associated with the postoperative lung volume change. Overall, the authors report that the mean TLV had increased at two years' follow-up. In 18% of patients, the authors report that TLV decreased significantly immediately postoperatively. Analysis found that TLV correlated moderately with vital capacity and strongly with forced expiratory volume, both pre- and postoperatively, proving it to be a useful measure of pulmonary impairment. Comparison of pre- and postoperative TLV showed a significant postoperative reduction. At two years, the data showed a significant increase of the left lung volume. Further analysis indicated that the only reported factor was that a longer fusion (more than 11 segments) may lead to a postoperative lung volume reduction. The study therefore recommends that avoiding fusions of 11 segments or more would be preferable for preserving lung volume.

Early or later decompression for traumatic cervical cord injury?

There is some considerable debate about how best to manage cervical spinal injury – not in terms of the need for decompression, but surrounding the timing of decompression. We were delighted to see this paper from **Xi'an (China)**, which explores whether the AO Spine classification system for cervical spine injury can be used to guide decompression timing in these patients.[6] The study draws on a large single-centre cohort of 402 patients treated in 18 months, who were divided into early (before 72 hours after injury) and late decompressive groups. The authors then subdivided their cohort according to AO subgroups and assessed outcomes using the American Spinal Injury Association (ASIA) Impairment Scale and Spinal Cord Independence Measure III (SCIM version 3) at a final follow-up of 12 months. In addition to the primary outcome, the authors report a range of secondary measures, such as complications, mortality, and hospital length of stay. Overall, the authors were able to make some surprisingly firm conclusions and recommendations based on their own findings. In terms of who should get emergent decompression, the authors established that type B and type C/F4 fractures should undergo early surgical decompression and stabilization, as this yields better clinical outcomes on the ASIA Impairment Scale. This was reflected on the SCIM scale for type B fractures, but the improvement did not quite reach significance. There are some simple lessons to learn from this large series of patients, and it seems that the AO system is helpful, in some circumstances, in identifying those patients who benefit from surgery within 72 hours.

Do patient-reported outcome measures relate to wearable activity trackers?

There have been numerous articles surrounding patient-reported outcome measures (PROMs) – including on developing, reviewing, validating, correlating, and converting them – but we don't yet have much in the way of external validity. As most PROMs are based on COSMIN (Consensus-Based Standards for the Selection of Health Status Measurement Instruments) methodology and are developed with qualitative methods and item response theory, most validation usually occurs with anchor methods, which risks becoming a self-reinforcing cycle. Here at *360*, we were delighted to see this innovative study from **Chiba (Japan)**, which asks whether a relationship exists between activity levels measured by wearable activity trackers and patient-based scoring systems.[7] The study relates to a cohort of 66 patients with lower back pain, all of whom wore a Micro-Motion logger (from Actigraph), with symptoms measured using the Japanese Orthopaedic Association Back Pain Evaluation Questionnaire (JOABPEQ), Roland-Morris Disability Questionnaire, the Oswestry Disability Index, and visual analogue scale (VAS). The authors went on to explore the relationship between each score and activity level, along with a number of potential confounders (age, sex, body mass index (BMI), lower back pain, and muscle mass). The domains of the JOABPEQ were each correlated well with the activity scores, as were the low back pain VAS scores. The adjusted analysis using a multiple regression model established that, as well as lower back pain, the individual factors affecting activity level of the patients were sex, BMI, and muscle mass. This is a useful paper, in that it partly validates the activity levels against the outcome scores. This makes the activity tracker a potentially helpful tool, and provides a further level of external validation for the outcome scores in question.

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