A peculiar periprosthetic humeral fracture managed in a simple but effective way

Sir,
Periprosthetic fractures of the humerus are rare injuries. No large series exist, with most articles reporting only a few cases.\(^1\)-\(^4\) A few classification schemes exist sharing the same principles of classifying the fracture according to the site of the fracture and stability of the fixation of the prosthesis.\(^1\)-\(^4\)

A 40-year-old male with a four-part posterior fracture dislocation of the right shoulder had been managed with a cemented shoulder hemiarthroplasty. The functional result postoperatively was excellent, with a Constant score of 95. Four years after the index operation, the patient sustained a periprosthetic humeral fracture [Figure 1]. X-ray showed the fracture to be spiral with a large butterfly and centred around the tip of the prosthesis. This pattern was not described in the different classifications of periprosthetic humeral fractures to the best of our knowledge. The closest category that fits is B1 according to the classification of Worland et al.\(^4\), which is a spiral fracture located around the stem with a stable prosthesis. The prosthesis was judged to be stable; therefore, the decision was to keep the prosthesis and fix the fracture.

After exposing the fracture posteriorly and securing the radial nerve, the distal fixation was performed first using three 4.5 mm AO cortical screws that were applied in a compression/lag mode to fix the large butterfly to the main distal fragment, converting the fracture to a two-part fracture. Next, the butterfly was secured to the main proximal fragment using a single double-stranded cerclage loop. The wound was closed in layers and a U-shaped slab was applied.

The patient was discharged the next day. At 4 weeks, the slab was removed and a control X-ray was obtained. Early callus was noted at the fracture site and the patient was instructed to perform assisted active mobilization of the elbow and shoulder. X-ray obtained at 2 months showed union at the fracture site and, clinically, there was no pain and a good range of motion of both the shoulder and the elbow as well as good muscle power. At 2 years' follow-up, the Constant score was 89 and the DASH score was 4. The patient was able to return to his work [Figure 2].

For such a fracture, it was definitely impossible to use any sort of screws around the prosthesis as the stem and cement filled the medullary cavity and the remaining cortex was too thin to provide purchase for any kind of screw. Therefore, a form of circumferential surface fixation was contemplated. This mandated the use of the posterior approach to clearly visualize and protect the radial nerve. Plates such as Mennen and cable-plate systems were not available in our setting, and were also economically not feasible. The utilized form of minimal fixation kept the fragments bound together until healing occurred. A U-shaped plaster slab and a pouch arm sling minimized elbow shoulder movement.
Twenty-nine healthy volunteers were recruited; 22 male and 7 female, with a mean age of 22 years (18-23). Using two-point discrimination, sensation was assessed at the posterior and lateral shoulder portals, while the subject was blindfolded. The posterior shoulder portal was defined as 1 cm medial and inferior to the posterior corner of the acromion; and the lateral shoulder portal was defined as 2 cm distal to the mid-point of the acromion on the lateral aspect [Figure 1]. These two regions were tested on each shoulder, and two measurements were taken at each location, and an average minimum separation at each location was calculated. Two-point discrimination data were normally distributed, and paired t-tests were used to compare posterior and lateral sites. The significance level was set at \( P \leq 0.05 \).

In all, 84% (\( n = 49/58 \)) of shoulders had a lower average two-point discrimination value (i.e., a greater discriminatory ability) at the lateral portal. The difference in two-point discrimination between lateral and posterior shoulder portals was significant (mean difference 6.6 mm, 95% CI 5.0-8.2, \( P < 0.0001 \)).

As sensory discriminatory ability was greater around the lateral portal, the innervation density must be increased in this area.

"Translated into a clinical setting, this data means that an injection using the lateral shoulder portal would potentially be more painful than an injection using the posterior portal. There is a clear relationship between a patient’s experience of pain and increasing dissatisfaction with healthcare interventions; patients receiving a lateral shoulder portal injection are therefore more likely to be dissatisfied with their management. As such it seems that pain severity should be considered when deciding which shoulder portal to utilize."