Salvage of the head of the radius after fracture-dislocation of the elbow

A CASE REPORT
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We describe a patient with a Mason type-III fracture of the head of the radius associated with traumatic dislocation of the elbow. The radial head was intact throughout its circumference despite being completely detached from the shaft and devoid of any soft-tissue attachments. Severe comminution of the radial neck prevented reconstruction by internal fixation and precluded prosthetic replacement of the head. The head was fixed to the shaft with a tricortical iliac-crest bone graft which replaced the neck. Two years later, the patient had a stable elbow with flexion from 10° to 130°. Radiologically, the head of the radius appeared to be viable and the bone graft had incorporated.

We describe a patient with a Mason type-III fracture of the head of the radius associated with dislocation of the elbow. The head was salvaged despite being found at operation to be completely devoid of soft-tissue attachment.

Case Report

A 61-year-old man fell off a ladder and sustained a dislocation of his left elbow along with a fracture of the coronoid process, a comminuted fracture of the neck of the radius with displacement of the head (Fig. 1) and an associated fracture of the distal radius. The dislocation of the elbow was reduced under general anaesthesia. The joint was grossly unstable and was explored through a lateral approach. The extent of comminution of the fracture of the neck of the radius rendered reconstruction impossible and the loose bony fragments were excised.

The radial head, although grossly displaced from its anatomical location and completely devoid of soft-tissue attachments, was intact throughout its circumference and potentially salvageable. A tricortical block of bone was harvested from the iliac crest and fashioned to replace the neck. The head was first fixed to the bone graft with an AO mini-fragment plate and 1.5 mm cortical screws. The head and the bone-graft composite were then attached to the shaft with an AO 1/3 tubular plate using 3.5 mm cortical screws (Fig. 2). At this stage the stability of the elbow was assessed. The joint was stable when held in flexion but tended to dislocate in full extension. The wound was left partially open because of the soft-tissue swelling and was formally closed two days later. The fracture of the distal radius was treated by closed reduction and percutaneous Kirschner (K-) wire fixation. The fracture of the coronoid was treated conservatively.

The elbow was immobilised in 90° of flexion in a plaster splint for two weeks, followed by active mobilisation as tolerated by the patient. The wrist was immobilised in a below-elbow cast for a further four weeks, after which the K-wires were removed.

At follow-up two years after injury the patient had flexion from 10° to 130° at the elbow, 80° pronation and 10° supination. The joint was stable to stressing and he was satisfied with its function. Radiographs showed that the head had united to the bone graft which had incorporated on to the shaft (Fig. 3).

Discussion

The Mason classification or one of its modifications, which provides a guide to management, is commonly used for fractures of the head of the radius, and describes those in which the head is completely detached from the neck as type-III fractures. These are further classified as simple or complex, depending upon whether there is an associated fracture or a ligamentous injury such as dislocation of the elbow. This distinction is important since the head is an effective secondary stabiliser of the elbow against valgus stress (the medial collateral ligament being the primary restraint). Excision of the head is recommended for simple Mason type-III fractures without dislocation of the elbow since it does not alter the kinematics of the
joint⁴ and provides satisfactory long-term results.⁵⁻⁷

It is estimated that 5% to 10% of fractures of the head of the radius are associated with dislocation of the elbow.¹ Treatment of these complex fractures is directed towards reducing the dislocation followed by management of the fracture on its merits.⁸ When the ligamentous restraints are damaged, attempts should be made to salvage the head in order to preserve its role as a secondary stabiliser of the elbow while the ligaments heal.³,⁹,¹⁰ The incidence of redislocation of the elbow after simple excision of the head

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Fig. 1
Radiographs of the elbow on presentation showing fragmentation of the neck of the radius as distal as the level of the tuberosity. The circumference of the head was intact.

Fig. 2
Radiographs after operative reconstruction.
of the radius for fracture-dislocations is reported to be as high as 62%.\textsuperscript{11} Reconstruction of the fracture of the head by internal fixation can restore stability of the elbow.\textsuperscript{12,13} Clearly, if comminution of the fracture precludes reconstruction, excision of the head may have to be considered, and in these circumstances prosthetic replacement can reliably restore stability.\textsuperscript{14,15} Preservation of the neck of the radius is essential if a prosthesis is used, since excessive loss or removal of bone will prevent load transmission through the prosthesis\textsuperscript{14} and may also compromise its fixation.

In our case, the fragment of the head of the radius was intact but the extent of comminution of the neck precluded reconstruction by internal fixation. Prosthetic replacement of the head was not possible owing to loss of the bony support of the neck. In view of the instability of the elbow, it was necessary to try to salvage the head. We opted to excise the fragmented neck and replace it with a tricortical bone graft from the iliac crest. This allowed the head to be repositioned in its anatomical location, thus restoring the length of the lateral column of the elbow. Two years after injury the head appeared viable, with the graft soundly incorporated with both the shaft and the head; the elbow was stable.

This technique appears to offer a viable means of restoring stability to the elbow when neither internal fixation nor prosthetic replacement is feasible. To the best of our knowledge this method has not previously been described.

The authors would like to thank Jane Morgan of the Medical Illustration Department at St Peter’s Hospital, Chertsey, for preparation of the illustrations.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

References