A posterior approach to the elbow joint
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We describe a posterior approach to the elbow which combines the advantages of both splitting and reflecting the triceps. It gives protection to the ulnar nerve and its blood supply during the operation while providing excellent exposure of the distal humerus. During closure, the triceps muscle can be tensioned, thereby improving stability of the elbow. This approach has particular relevance to unlinked total elbow arthroplasty allowing early rehabilitation of the joint.

Operative technique

Many surgical approaches to the elbow have been described, of which the posterior is the most common. It provides excellent access for the fixation of fractures of the distal humerus and olecranon, and is the approach used most commonly for total elbow arthroplasty.\(^1\)\(^-\)\(^4\)\) In the posterior approach the triceps\(^3\)\(^,\)\(^5\)\(^,\)\(^6\) is either split or reflected\(^4\)\(^,\)\(^7\) or the olecranon is divided.\(^1\)\(^,\)\(^8\)

Osteotomy of the olecranon is particularly valuable in the treatment of comminuted distal fractures of the humerus involving the articular surface. It cannot be used, however, for total elbow arthroplasty since this requires an intact ulna for the fixation of the distal component of the prosthesis. Techniques in which the triceps is split or reflected can be used for fixation of fractures and for total elbow arthroplasty, but they give a less satisfactory exposure of the distal humerus than can be achieved by olecranon osteotomy when fractures of the distal humerus are comminuted and involve a significant portion of the articular surface.

We describe an approach in which the triceps is both split and reflected.

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position. Reattachment of the triceps to the olecranon allows adjustment of soft-tissue tension. Balancing of the two components of the triceps mechanism can be undertaken so that the risk of postoperative dislocation for unlinked surface replacement arthroplasties is minimised.

**Clinical experience**

Since 1993, we have undertaken 86 total elbow arthroplasties and reconstructed 20 distal fractures of the humerus using this approach, encountering only one case of post-
operative neurapraxia of the ulnar nerve. Spontaneous recovery occurred in this patient after eight weeks. Dehiscence of the triceps was seen on one occasion in a patient who had undergone several previous surgical procedures through posterior approaches after an infected comminuted distal fracture of the humerus.

Discussion

Campbell\textsuperscript{5} described the posterior split of the triceps muscle in the midline, and continued the exposure distally in the forearm by elevating the anconeus and flexor carpi ulnaris. Steiger et al\textsuperscript{3} modified this approach by raising osteoperiosteal flaps from the olecranon. Van Gorder\textsuperscript{6} created an inverted ‘V’-shaped flap of the triceps mechanism to expose the distal humerus. In all of these approaches there is considerable mobilisation of the ulnar nerve. Petalling of the olecranon, described in the Gschwend approach, can be difficult to achieve safely in patients with rheumatoid arthritis who have marked bony erosion of the ulna. The technique, described by Boyd\textsuperscript{9}, involves reflecting the entire triceps mechanism from the lateral to the medial side. Bryan and Morrey\textsuperscript{7} used a similar technique but with reflection of the triceps from medial to lateral, beginning at the medial intermuscular septum. The triceps was reflected in continuity with the fascia of the forearm and the periosteum. The advantage of this approach is that the muscle is neither split nor violated and continuity of the extensor mechanism is maintained with the forearm fascio-ulnar-periosteal complex. Ten out of 80 total elbow arthroplasties carried out by Morrey et al\textsuperscript{2} had ulnar neuropathies, eight temporary and two permanent. They presumed that the cause was traction or pressure on the nerve during the operation.

Our technique allows the raising of the major part of the triceps in continuity. Protection of the ulnar nerve by the medial part of triceps reduces the possibility of damage to its blood supply and at the end of the operation it can glide and slide in its original position. The availability of the two segments of the triceps muscle for the repair allows satisfactory balancing of the medial and lateral sides of the elbow, reducing the risk of postoperative dislocation.

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References