PRIMARY DEGENERATIVE ARTHRITIS OF THE ELBOW

TREATMENT BY ULNOHUMERAL ARTHROPLASTY

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Degenerative arthritis of the elbow is a poorly recognised condition, usually seen in a middle-aged man with an occupation or activity which involves the repetitive use of his dominant arm. Flexion contracture and pain at terminal extension are common presenting features.

Fifteen patients were reviewed at a mean of 33 months after debridement by ulnohumeral arthroplasty. Fourteen had good relief of pain, elbow extension had improved by an average of 11° and elbow flexion by 10°. On an objective scale 12 of the 15 patients had good or excellent results and 13 (87%) felt that they were improved by the operation.

Primary degenerative arthritis of the elbow is an uncommon problem. Age-related changes in the articular surfaces of the distal humerus (Ortner 1968) and the radiohumeral joint (Goodfellow and Bullough 1967) have been described, but primary osteoarthritis of the whole elbow is not discussed in some standard textbooks. Even in texts dealing exclusively with the elbow there are only brief references to the condition (Smith 1972; Wadsworth 1982; Morrey 1985), and then in relation to trauma (Smith 1972; Salter 1983), or osteochondritis dissecans (Smith 1972; Wadsworth 1982; Kelley et al 1989). Primary osteoarthritis of the elbow is said to account for only 1% to 2% of patients presenting with degenerative arthritis (Collins 1949; Huskisson et al 1979).

Because of its rarity the diagnosis is sometimes missed or misinterpreted as a post-traumatic condition and many surgeons have little experience of its treatment. Management is often non-operative, or by minimal debridement and removal of the loose bodies which does not usually improve motion.

Degenerative arthritis of the elbow has a characteristic presentation; we reviewed our experience to define the condition and discover the indications for a more extensive debridement. This procedure, which we call ulnohumeral arthroplasty, has been performed in 15 patients and the results are reviewed after a two-year follow-up.

PATIENTS AND METHODS

From 1985 to the present, 40 patients with primary degenerative arthritis of the elbow have had an ulnohumeral arthroplasty, and 15 have been followed up for at least two years. Pre-operative details were recorded for these 15 (Table I). Pain was graded as: none (0); mild, occasional, not restricting activities (1); moderate, limiting some activity, and requiring occasional analgesics (2); or severe, occurring at rest, and needing regular medication (3).

Eight patients were reviewed at this Clinic and seven by local physicians, with records of range of motion and a radiograph taken at least two years after surgery for 14.

Presentation. All 15 patients were men with an average age of 50.7 years (20 to 65). Eight had occupations or avocations involving repetitive use of the arm. Three had a previous extra-articular injury (cases 6, 7 and 10), and there was no apparent predisposing cause in four (cases 2, 12, 13 and 15). The dominant arm was involved in 13, with bilateral involvement in four. Twelve had loss of extension and three complained of catching. All had pain with the characteristic symptom of terminal extension pain. Eleven also had terminal flexion pain. In four elbows the symptoms were present throughout the arc of motion. Pain was mild in four elbows, moderate in ten, and severe in one. The mean arc of flexion before surgery was 38° to 113°.

A rating system was used to define the state of the elbow before and after surgery, comprising assessments of pain (45 points), motion (20 points), function (30 points), and stability (five points). Joint function was then classified as excellent (95 points); good (75 or more
The surgical technique of ulnohumeral arthroplasty. The triceps tendon is either split and retracted, or elevated (a) to expose the proximal ulna and distal humerus. The tip of the olecranon is removed and the olecranon fossa is opened with a trephine (b) which is directed slightly proximally (see text). Any loose bodies are removed. The coronoid osteophyte is excised with an osteotome (c).

**Radiography.** The characteristic radiographic features, visible on the anteroposterior and lateral radiographs of all 15 patients, were an anterior osteophyte of the coronoid and a posterior osteophyte of the olecranon process (Fig. 1) as described by Minami (1977). The anteroposterior view showed ossification and osteophyte formation in the olecranon fossa in all elbows (Fig. 2). If operation was being considered, the pre-operative films included a lateral tomogram to assess the presence and location of loose bodies and osteophytes (Fig. 3).

In the 15 patients reviewed there were loose bodies in seven and osteophytic involvement of the radial head in seven; one additional patient had had prior resection elsewhere (case 15).

**Surgical technique.** The ulnohumeral arthroplasty (UHA) used for these patients differs in two respects from the original description (Kashiwagi 1978):

1) A trephine is used to remove the osteophytes encroaching on the olecranon and coronoid fossae; and
2) The triceps is elevated rather than split to expose the olecranon.

The patient is supine with a sandbag under the scapula. An unsterile tourniquet is applied and the arm is prepared and brought across the chest. The patient is rotated about 35° to give good access to the back of the elbow. A straight incision over the posterior aspect of the joint exposes triceps fascia. The triceps is either split in the midline to reveal the supracondylar bony columns (Fig. 4a), or, particularly if the ulnar nerve is to be explored or decompressed, the medial margin and
attachment of the triceps tendon are elevated. Release of the medial quarter of the triceps attachment gives enough exposure for the three essential elements of the operation:
1) The tip of the olecranon is osteotomised and any loose bodies removed from the olecranon fossa.
2) A trephine with a diameter slightly larger than the original olecranon fossa is used to core out and excise a ring of bone and all the osteophytes from both the olecranon and the coronoid fossae. It should be directed slightly proximally to accommodate for the anterior curve of the distal humerus thereby producing a clean opening through to the anterior part of the joint (Fig. 4b). This creates less bone debris than piecemeal clearance, probably reducing the chance of ectopic bone formation.
3) The elbow is then flexed, which brings the coronoid process into view through the trephine hole. Its anterior osteophyte is removed using a curved 7 mm osteotome (Fig. 4c). Obvious loose bodies are excised, and an index finger is introduced to palpate the anterior capsule for others. Exposed bone surfaces are sealed with bone wax, a Gelfoam sponge is placed in the defect and the wound closed over drains.

Postoperative management. Postoperative treatment is similar to that reported after release of a stiff joint (Morrey 1990). On the day of surgery a brachial plexus block is established with constant infusion of local anaesthetic. The arm is elevated in a continuous passive motion (CPM) machine, using as large an arc of motion as can be tolerated. The anaesthetic block ceases after about three days, but CPM continues for an additional three days. A hinged splint is then applied and the patient is given detailed instructions on its use to maintain flexion and extension (Morrey 1990).

RESULTS

The results for the first 15 consecutive patients are shown in Table I. Extension improved by a mean of 11°, flexion by a mean of 10°. Thirteen patients were satisfied with their result at a mean of 33 months (24 to 60) after surgery. One patient (case 5) developed ulnar neuropathy one year after UHA, and hypertrophic changes in the cubital tunnel required nerve translocation. Elbow function had improved but the patient was not satisfied with his activity level. The other unsatisfied patient (case 9) gained no significant increase in range of motion, but had failed to follow the postoperative splint programme.

Before UHA there were two good, three fair and ten poor joints. After surgery there were four excellent, eight
good, and three fair results. Only two patients (cases 3 and 6) failed to improve by at least one grade. Radiographs have shown only one recurrence (case 5) of the hypertrophic osteophytes to date (Fig. 5).

DISCUSSION
In the past most cases of degenerative arthritis of the elbow have been thought to be secondary to injury. Smith (1972) recognised that osteoarthritis could follow "hard usage" and described many of the features, such as the extensive osteophyte formation. He recognised the value of joint debridement, recommending "house-cleaning" if conservative management failed. He thought of debridement as a temporary solution which did not preclude a subsequent implant arthroplasty.

Osteoarthritis of the elbow and its radiographic features have been well recognised in Japan (Minami 1977) but it is considered to be uncommon (Kashiwagi 1986), and associated with overuse. Symptoms are usually mild. The so-called 'O-K' (Outerbridge-Kashiwagi) arthroplasty has been used in Japan by Kashiwagi (1978), and a recent brief report in the English literature describes the basic surgical technique but gives no results (Stanley and Winson 1990).

Not all elbows with degenerative arthritis require this operation: the 15 patients were selected from 35 seen with this diagnosis. Two patients had arthroscopic removal of loose bodies but neither improved; one underwent extensive soft-tissue and bone-spur release and the other 17 have been treated without surgery.

Painful limitation of movement is the element of functional disability best treated. Minami and Ishii (1986) reviewed 111 elbows followed for six months to 11 years after UHA. Males were more frequently involved by a ratio of 5:1; all 15 of my cases were men and this pattern continued in my 25 cases with less than two years of follow-up. The Japanese authors reported that 39% had complete relief of pain. Some 21% had relief of pain with motion and an additional 61% had partial relief. Overall, 76% of patients had improved flexion and 55% had improved extension. These results are similar to mine, but these authors warn that recurrence of pain and decrease in range may develop in some cases with time.

The surgical technique proposed here, with the use of a trephine, is safe and simple. Rehabilitation is relatively easy, and the procedure can be used by most orthopaedic surgeons. The complication rate is very low, an uncommon feature of reconstructive procedures at the elbow. The placement of the trephine is very important: if it is too distal the trochlea may be damaged (Fig. 6); if

Fig. 5
Radiograph three months after operation of the elbow shown in Figure 1.

Fig. 6a
Fig. 6b
Case 5. Anteroposterior radiographs of the elbow shown in Figure 3. Figure 6a – Three months after ulnohumeral arthroplasty. Figure 6b – Three years later more ectopic bone had reformed in the fossa and the result was only fair.
too far lateral the capitellum is in danger; and if too medial the medial column may be weakened. We have avoided such problems in 40 patients.

The modification of partially elevating the triceps tendon rather than splitting it, especially when the ulnar nerve requires decompression, causes less bleeding and swelling, and probably improves the ultimate arc of motion.

The best indications are moderate osteophyte formation and moderate or severe pain at terminal extension: both should be present. Less severe radiographic involvement and pain are unlikely to give such a satisfactory outcome.

Pain relief may not be complete and, of course, the procedure does nothing for the radiohumeral compartment: improvement in flexion may be modest. Both Minami (1977) and Kashiwagi (1978) described recurrence of radiographic changes in approximately 50% after five years, but we have seen this in only one patient to date (case 5).

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REFERENCES


