Guest Editorial

Arthroplasty of the elbow

Normal elbow movement is necessary for carrying the hand to and from the head and for activities of daily living. The elbow is not a simple hinge, but has a carrying- angle shift of the forearm in flexion-extension that is mediated by the polycentric contour of the distal humerus. Stability is related to the shape of the articular surfaces and to the ligaments. The medial collateral ligament is the most important stabilizer, but also the most important ligament for absorbing torsional forces across the elbow, thereby preventing dislocation. The joint forces can be as high as in a weight-bearing joint due to the long lever arms.

Half of the patients with long-standing rheumatoid disease will show evidence of elbow involvement (Souter 1989). The presenting symptom is pain, later followed by loss of movement and progressive instability. All too often, the rheumatoid elbow reaches the surgeon at a stage where a satisfactory result cannot be expected with synovectomy and/or excision of the radial head.

Resection arthroplasty of the elbow carries the risk of instability, and has during later years been replaced by anatomic restoration of the joint with different kinds of implants. Proper positioning of the center of rotation and neutral alignment of the prosthetic components most likely have a bearing upon function and longevity of the implant (Figgie and Inglis 1986).

The fully constrained hinged implants have shown a high early failure rate due to mechanical loosening (Dee 1982), which can be explained by the transfer of joint forces solely by the implant resulting in an unacceptable load on the bone fixation of the implant. The semi-constrained implants—i.e., prostheses with a hinge providing some rotation and medial/lateral laxity—permit some load transfer through the soft tissues, and have resulted in a reduction of the incidence of loosening, which, however, still is high if radiographic loosening is considered a precursor of clinical failure. Madsen et al. in this issue report on 25 semi-constrained elbow prostheses followed for 2–5 years with one quarter having radiographic loosening of the humeral component. The results in terms of pain relief are, however, rewarding and as reliable as those following other types of implants.

Resurfacing implants have to be divided into surface implants with an intramedullary stem and true resurfacing shell prostheses. It seems important that shell fixation of surface implants must be supplemented by some form of intramedullary stem to aid in a secure fixation to bone, especially in joints with advanced rheumatoid destruction, which is confirmed by the paper by Ljung et al. in this issue. Replacement of the radial head is attractive considering optimization of load transfer, but doubtful when considering the difficulties in fixation to the often atrophic superior part of the diaphysis, which follows excision of the radial head.

For all the types of implants, pain relief is the major benefit (Rosenberg and Turner 1984). Recovery of flexion is usual, whereas the results with regard to extension have been much less satisfactory. Many patients starting with a mild flexion deformity often lose some extension postoperatively (Souter 1989), but rotation of the forearm is often improved (Ewald et al. 1980). Improved motion is more predictably achieved after constrained arthroplasty, because the soft tissue release can be more complete (Goldberg et al. 1988).

Thus, it seems today that the optimal design of an elbow prosthesis for patients without extensive bone loss on either side of the joint accords with the successful total condylar type of knee prosthesis, i.e., surface replacement with intramedullary stem fixation. This design has resulted in the lowest incidence of mechanical loosening, probably due to the joint forces being transmitted chiefly through the ligaments and soft tissues. It is important that prosthetic design and surgical technique allow retention of the ligaments.

Postoperative dislocation is not uncommon after surface replacement. Attention to the surgical technique with correct handling and proper balancing of the soft tissues is of importance for avoiding postoperative instability

and dislocation, as well as wound complications. Malarticulation and dislocation are not uncommon when surface replacement is used (Weiland et al. 1989); but they are, together with delayed wound healing and/or superficial infection, chiefly attributable to surgical technique, and can in most instances be avoided. Deep infection occurs regardless of the type of prosthesis, and the infection rate in most later reports is acceptable at a rate of 1–3 percent (Goldberg et al. 1988).

Revision of a failed elbow prosthesis is not necessarily easier after surface replacement than after hinged implants due to the sometimes advanced bone resorbtion following loosening of surface shells (Ljung et al. 1989).

A lateral or posterolateral approach to the elbow, avoiding incisions into the triceps tendon probably minimizes problems with wound healing and postoperative mobility. Minimal disturbance of the ulnar nerve—i.e., identification but no preparation or transposition of the nerve—may minimize the rather high reported postoperative incidence of nerve symptoms, which, however, in most cases are reversible (Goldberg et al. 1988, Weiland et al. 1989).

In conclusion, current clinical experience makes it reasonable to offer the patient with an arthritic elbow with pain and loss of function and mild-to-moderate bone loss the possibility of a stemmed surface replacement arthroplasty. The patient with severe bone loss may be offered a semi-constrained implant, if necessary custom-designed. Accordingly, both types of patients can expect relief of pain and unchanged or slightly improved motion. However, the patient and the surgeon should be aware of the comparatively high risk of initial complications. The surgeon should know that his learning curve is rather flat, and he should provide the patient with realistic information regarding the uncertain long-term function.

At present, primary as well as revision total elbow replacement should be carried out in specialized centers by experienced surgeons with adequate and complete instrumentation and a full range of prostheses.

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