OSTEOTOMY IN THE TREATMENT OF OSTEOARTHRITIS OF THE FIRST CARPOMETACARPAL JOINT

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Degenerative changes of the first carpometacarpal joint commonly cause pain, weakness and adduction deformity. Many patients respond to conservative treatment, but in resistant cases an abduction wedge osteotomy of the base of the first metacarpal has been found to relieve symptoms with less complications than other operations.

Twenty-one patients with 23 osteotomies have been reviewed, with a follow-up from 2 to 17 years. All have had lasting relief from pain and consider that they have full function, with no stiffness or limited abduction. Osteotomy is indicated mainly for cases where the arthritis is confined to the carpometacarpal joint, but also relieves pain in cases of peritrapezial arthritis.

Although much has been written on the use of osteotomy in the treatment of osteoarthritis of the major joints, scant attention has been given to its application for disease of the small joints and almost nothing has been written on its use in carpometacarpal osteoarthritis of the thumb. Since a preliminary communication describing the operative technique and early results of basal osteotomy of the first metacarpal nearly eight years ago (Wilson 1973) only one further report has been made (Bossley 1981).

The other operative procedures for the treatment of this condition are not without their problems. Arthrodesis, although probably the most reliable operation, can be technically difficult to achieve and may cause increased strain on adjacent joints later (Sims and Bentley 1970); excision of the trapezium and excision of the base of the first metacarpal are unpredictable in the degree of pain relief and may leave an unacceptable adduction deformity and weakness; and prosthetic replacement of the trapezium (Swanson, Swanson and Watermeier 1981) carries with it all the hazards of small-joint prosthetic arthroplasties.

Because the condition usually responds well to conservative treatment (Mayer 1970) no one surgeon is likely to accumulate a large personal series of cases. The small number of osteotomies reported here from two surgeons reflect this fact, but it is felt that the long-term results which have been obtained compare very favourably with other methods of operative treatment and therefore justify further publication.

MATERIAL AND METHOD

The patients reviewed were all operated on by one or other of us. There were 21 patients (23 osteotomies) with a follow-up of 2 to 17 years. There was only one man in the series. The ages ranged from 38 to 67 years with an average age of 48 years. In all cases the diagnosis was considered to be osteoarthritis. In no case was there evidence of rheumatoid disease, and there were no examples of post-traumatic arthritis. Pain was the main presenting symptom, usually brought on by prolonged use of the hand, such as when knitting, sewing or writing; or when using the hand at full spread, opening a jar, or

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Fig. 1
Adduction deformity of the first metacarpal seen associated with arthritis of the carpometacarpal joint.
cutting with scissors or secateurs. Some of the patients complained only of weakness of the hand and loss of full spread. On examination crepitus and local tenderness over the carpometacarpal joint were invariable findings, along with thenar wasting and diminution of pinch grip.

The operation. The operative technique has remained virtually unchanged from that originally described in 1973. The degenerative condition of the first carpometacarpal joint is invariably associated with some degree of radial subluxation, and often with a fixed adduction deformity of the thumb and hyperextension of the first metacarpophalangeal joint, which is often painful (Fig. 1). The operation is designed to correct this deformity by carrying out a closing wedge osteotomy at the proximal end of the metacarpal, the base of the wedge being directed radially (Fig. 2).

Drawings to illustrate the principle of basal wedge osteotomy in the treatment of osteoarthritis of the first carpometacarpal joint. To avoid instability it is important that the apex of the wedge should coincide accurately with the ulnar cortex of the metacarpal. The width of the base varies with the amount of adduction deformity to be corrected.

Through a four-centimetre incision centred on the prominence of the first carpometacarpal joint and in line with the shaft of the bone, the tendon of extensor pollicis longus is retracted to one side, along with any cutaneous branches of the radial nerve, and the proximal third of the metacarpal is exposed as far as the carpometacarpal joint (Fig. 3). At the site of the osteotomy, which should be approximately one centimetre from the joint, the whole circumference of the bone should be stripped subperiosteally and small levers inserted round the deep surface. The site of the osteotomy is first marked out with an osteotome, the size of the wedge needed to correct an adduction deformity of 20 to 30 degrees being about five millimetres wide. If wire is to be used for fixation this should be inserted before the wedge is removed (Fig. 4). The bone wedge is excised piecemeal or with a small oscillating saw, keeping the far cortex intact and ensuring that the apex of the wedge coincides with this far side of the bone. The remaining cortex is drilled and the wedge closed by osteoclasis and held closed by twisting the ends of the wire together to complete a compression loop (Fig. 5). However, provided the soft-tissue dissection has been minimal and the periosteal hinge on the ulnar side maintained, the osteotomy is basically stable with the thumb in the abducted position and the wire suture can be omitted (CJB). A forearm plaster is applied with the thumb in the corrected position and maintained for six weeks.

**FOLLOW-UP RESULTS**

The follow-up was by direct examination or by postal questionnaire. Two patients failed to answer, but in both a good result had been recorded, at one and eight years after operation respectively. All but three of the patients reviewed have been completely relieved of pain. In three other patients there was a slow response to the procedure, one patient taking as long as nine months to become entirely free from pain. Even the three patients who still complain of slight pain are very satisfied with the result. Two patients have returned at a later date to have the same operation on the other side. There have been no relapses and no secondary operations have been necessary. A powerful grasp and spread of the hand has been restored, allowing the patient to grip large objects without difficulty (Fig. 6). In three patients the osteotomy did not succeed in correcting the adduction deformity but, despite this, pain was relieved and the grasp of large objects regained by hyperextension at the metacarpophalangeal joint (Fig. 7). Unlike the response to osteotomy in the hip, however, there was no radiological improvement in the joint, although no further deterioration has been demonstrated. All the osteotomies have united by bone within three months of the operation, and there have been no complications other than minor loss of sensation of the tip of the thumb in one patient. There was breakage of the wire loop in one patient but this gave no disability, and it has not been necessary to remove the wire from any patient.

**DISCUSSION**

The operation of basal osteotomy of the first metacarpal in the treatment of osteoarthritis of the carpometacarpal joint appears to be a very satisfactory alternative to the standard methods of treatment. It is a simple and easy

![Fig. 3](image-url)  ![Fig. 4](image-url)  ![Fig. 5](image-url)

Figure 3—The subperiosteal exposure of the base of the first metacarpal. Figure 4—Wires in position and abduction wedge removed. Figure 5—Closure of the wedge and the wires ready for tightening. (Reproduced, with permission, from Wilson JN, Br J Surg 1973;60:854–8.)
procedure to carry out, and in this small series has had no complications. With an average follow-up of 12 years without recurrence of symptoms it seems reasonable to assume that the operation gives long-lasting relief of pain. The operation results in the same stability as that obtained by arthrodesis and has the added advantage of relieving pain even where there is peritrapezial arthritis. This report may be criticised because there is no comparative trial with conservative regime, such as a period of immobilisation in plaster. This is fair comment but in defence of the present series let it be said again that the numbers of patients requiring operation are very small and a valid statistical trial would therefore take a considerable time; also, every patient reported in this paper had previously received the usual forms of conservative treatment, such as steroid injections, physiotherapy and plaster immobilisation, all without success.

We feel that although it is possible that a straight osteotomy might be as effective as the one we describe, removal of a wedge is desirable in order to correct the adduction deformity which is almost invariably present and which contributes to the arthritic pain. It is emphasised that great care must be taken during the operation to avoid extensive soft-tissue stripping, particularly on the deep surface of the metacarpal, otherwise there may be instability after closing the wedge. Although one of us (JNW) still prefers to use a wire loop for fixation, this does add a minor complication to an otherwise very simple procedure and is not entirely necessary unless the osteotomy is unstable.

In summary, degenerative changes in the first carpometacarpal joint may be responsible for considerable disability of the thumb. The accepted surgical procedures of arthrodesis and arthroplasty are not without their problems. The results of 23 basal osteotomies of the first metacarpal show that at follow-up 2 to 17 years after operation all 21 patients had substantial and lasting relief of pain and consider they have full function of the thumb.

REFERENCES


