

# Osteotomy versus tendon arthroplasty in trapeziometacarpal arthrosis

## 17 patients followed for 1 year

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We evaluated 2 consecutive cohorts of patients with primary trapeziometacarpal arthrosis 1 year after either first metacarpal osteotomy or trapezium excision with abductor pollicis longus tendon arthroplasty. At follow-up, 4 of 7 patients treated with osteotomy had pain at rest and/or with light activities and were dissatisfied with the results of surgery, all 4 had advanced (stage III) preoperative trape-

ziometacarpal arthrosis. 1 of 10 patients (5 having stage III arthrosis) treated with abductor pollicis longus arthroplasty had pain with light activities, and no patient was dissatisfied. Our findings indicate that first metacarpal osteotomy as a surgical option in trapeziometacarpal arthrosis should be limited to patients with early disease.

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Radial wedge excision osteotomy of the base of the first metacarpal has been advocated as a simple, effective and safe procedure for the treatment of primary trapeziometacarpal (TMC) arthrosis (Wilson and Bossley 1983). Trapezium excision with different types of tendon suspension interposition arthroplasty has been more widely performed, with good outcome (Weilby 1988, Kleinman and Eckenrode 1991, Sigfusson and Lundborg 1991, Atroshi and Axelsson 1997). However, this procedure can be technically difficult and many patients require prolonged rehabilitation.

We compared the 1-year outcome of first metacarpal osteotomy to outcomes of trapezium excision with abductor pollicis longus (APL) tendon arthroplasty in patients with primary TMC arthrosis, using outcome parameters of principal concern to patients, including pain, ability to perform activities of daily living (ADL) and satisfaction with the outcome.

## Patients and methods

Consecutive patients with primary TMC arthrosis treated surgically in 2 units from September 1992 to May 1995 were evaluated. In one unit metacarpal osteotomy was performed, while in the other unit, trapezium excision with APL arthroplasty was performed. The indication for surgery in both units was primary

TMC arthrosis, causing substantial thumb pain at rest and/or with light activities, despite treatment with splints and nonsteroidal anti-inflammatory medication.

Metacarpal osteotomy was performed in 7 patients (5 women), mean age 58 (53–70) years. The dominant hand was operated on in 2 patients. 3 patients had stage II and 4 had stage III arthrosis (Eaton et al. 1985). A 30° radial wedge osteotomy was made 1 cm distal to the TMC joint. The osteotomy was fixed with a cerclage and/or 2 or 3 K-wires. A thumb cast was applied for 4 weeks.

APL arthroplasty was done in 10 patients (all women), mean age 58 (44–67) years. The dominant hand was operated on in 8 patients. 5 patients had stage II, and 5 had stage III arthrosis. The trapezium was excised. A distally based 5 cm long APL strip was prepared. The tendon strip was introduced through the joint capsule into the trapezium space and then through a longitudinal cut in the flexor carpi radialis (FCR), around one half of FCR and then around 1 APL tendon and finally secured with sutures stabilizing the first metacarpal base. The capsule was repaired. A thumb cast was applied for 5 weeks.

After cast removal, the patients were instructed by therapists concerning immediate active thumb and wrist motion exercises. Gradually increasing strengthening exercises were started. All operations



Stage II trapeziometacarpal arthrosis in a 55-year-old man.

1 year after first metacarpal osteotomy, the patient was pain-free and satisfied with the outcome.

were performed under general anesthesia or axillary block by 2 experienced hand surgeons, each performing only 1 of the 2 procedures.

#### Follow-up evaluation

2 independent examiners, who could not be blinded for the surgical procedure, evaluated all patients 1 year after surgery. The assessment included the absence or presence of thumb pain at rest, with light activities or heavy activities. The patients answered a questionnaire regarding their ability to perform 11 ADL (personal hygiene, hair care, brushing teeth, toileting, buttoning clothes, driving, writing, typing, using knife and fork, house-work and leisure activities) obtaining for each activity a score of 1 (no difficulty), 2 (mild difficulty), 3 (moderate difficulty), 4 (severe difficulty) or 5 (unable to perform activity because of thumb symptoms). The mean of all the scores was recorded as the patient's ADL score. They were also asked whether they were satisfied or dissatisfied with the results of surgery. The same ADL questionnaire was given to 20 randomly selected healthy control subjects (10 women), mean age 56 (49-68) years.

## Results

No complications were observed following any of the procedures.

**Osteotomy.** Only 2 patients were pain-free (Figure), 1 had pain with heavy activities and 4 patients had pain at rest and/or with light activities, all 4 had preoperative stage III arthrosis.

The mean ADL score was 1.1 (1-1.4) for the 3 patients who were pain-free or had pain only with heavy activities and 1.8 (1.5-2.5) for the 4 patients who had pain at rest and/or with light activities. 3 patients were satisfied with the results of surgery and 4 were dissatisfied. All dissatisfied patients had preoperative stage III arthrosis.

**Arthroplasty.** 4 patients were pain-free, 5 had pain only with heavy activities and 1 patient had pain with light activities. The mean ADL score was 1.3 (1-1.7) for the 9 patients who were pain-free or had pain only with heavy activities and 1.3 for the patient who had pain with light activities. All 10 patients were satisfied with the results of surgery.

The control subjects' mean ADL score was 1.2 (1-1.5) for the women and 1.1 (1-1.4) for the men.

## Discussion

Surgery for TMC arthrosis includes arthrodesis, silicon implant arthroplasty, total joint arthroplasty, trapezial excision with interposition arthroplasty and first metacarpal osteotomy. Factors that have been reported to influence the choice of procedure include stage of arthrosis, age and occupation and patient and surgeon preferences.

TMC arthrodesis can require prolonged immobilization and cause some functional limitations and may result in non-union (Bamberger et al. 1992). Silicon implant arthroplasty has been associated with complications, such as implant dislocation and wear and silicon-induced bony changes (Sollerman et al. 1988, Creighton et al. 1991). Total TMC arthroplasty entails a high risk of prosthetic loosening (Sondergaard et al. 1991).

A common surgical option for TMC arthrosis has been trapezial excision with tendon interposition arthroplasty, using FCR strip (Burton and Pellegrini 1986, Weilby 1988). In addition to tendon interposition, APL arthroplasty includes stabilization of the first metacarpal by suspending its base between FCR and APL tendons, using APL strip. It is not established whether intermetacarpal ligament reconstruction (Burton and Pellegrini 1986) would achieve better results than suspension interposition arthroplasty

concerning pain relief, functional improvement or patient satisfaction. Further, there is no evidence suggesting that different types of tendon suspension interposition arthroplasty differ regarding their outcome. The outcome of APL arthroplasty in our study is consistent with previous studies reporting a high degree of pain relief and patient satisfaction, following trapezial excision with APL arthroplasty (Kleinman and Eckenrode 1991, Sigfusson and Lundborg 1991). Kleinman and Eckenrode (1991) reported that 34 of 38 patients (40 thumbs) were satisfied at mean of 21 (9-41) months after APL arthroplasty, with no pain in 23 thumbs and mild pain in 11. Sigfusson and Lundborg (1991) reported that 17 of 19 patients (21 thumbs) were satisfied with APL arthroplasty at mean follow-up of 25 (11-38) months, with 8 thumbs being pain-free, 10 being painful only with heavy work and 3 with light work or at rest.

Metacarpal osteotomy has been reported to bring pain relief in TMC arthrosis, including advanced disease (Wilson and Bossley 1983, Molitor et al. 1991, Futami et al. 1992, Holmberg and Lundborg 1996). Osteotomy has the possible advantages of being technically simple, resulting in quicker postoperative recovery and making future revision surgery easier by preserving the trapezium. Wilson and Bossley (1983) reported complete pain relief in 20 of 23 osteotomies with 2-17 years follow-up, but gave no data about radiographic staging or patient evaluation methods. Molitor et al. (1991) reported complete pain relief in 8 and improvement in 9 of 17 osteotomies without giving data about the length of follow-up or radiographic staging. Futami et al. (1992) followed 12 osteotomies for a mean of 4 (1-6) years and reported that all 9 patients with arthrosis involving the TMC joint alone were satisfied and had little, if any pain, while 2 of 3 patients with TMC and scaphotrapezial arthrosis had unsatisfactory results. Holmberg and Lundborg (1996) reported that all 11 patients with stage II or III arthrosis and 4 of 6 patients with stage IV were fully or fairly satisfied after osteotomy, with a mean follow-up of 9 (2-21) months. The short follow-up time in many of their patients limits the conclusions that can be drawn from their results.

In our study, metacarpal osteotomy achieved inferior results with regard to pain relief, ability to perform ADL and patient satisfaction in patients with more advanced TMC arthrosis. A recent study provided support for the possible efficacy of osteotomy in early, but not in advanced TMC arthrosis, as the favorable effect was explained by unloading of the palmar contact areas of the joint (Pellegrini et al. 1996). Our findings indicate that metacarpal osteoto-

my for TMC arthrosis should be limited to patients with early (stage II) disease. In more advanced TMC arthrosis, trapezial excision with APL tendon arthroplasty seems to result in better pain relief and patient satisfaction.

Our study has a number of limitations, including the small sample size. The 2 procedures were performed by 2 surgeons which raises the possibility of performance bias. However, the poorer outcome was obtained in the technically easier procedure. Although the patients were treated in 2 units, the indications for surgery were identical, making selection bias less likely. Our study did not address the possible advantages of osteotomy with regard to postoperative recovery and rehabilitation. Furthermore, the long-term efficacy of osteotomy is not yet established.

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