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EXTIRPATION OF THE TRAPEZIUM FOR OSTEOARTHRITIS OF THE FIRST CARPOMETACARPAL JOINT

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Primary essential osteoarthritis of the carpometacarpal joint of the thumb has received relatively little attention in the literature. It has been described as being more common in women, in whom it occurs most often after the menopause (Forestier 1937, Aune 1955, Murley 1960, Leach & Bolton 1968).

As in primary osteoarthritis of other joints, the aetiology is obscure and though trauma, single or repeated, may occasionally be traced in the patient's history this is not the rule (Aune 1955). It has not been possible to relate the condition with certainty to any particular occupations (Forestier 1937, Aune 1955).

Some authors have thought subluxation of the first metacarpal to be a contributory cause (Aune 1955), but it has not been possible to ascertain whether the subluxation has been primary or secondary to the osteoarthritis.

The symptom ushering in osteoarthritis is local pain on use of the joint. This pain may later become spontaneous and intense enough to disturb sleep. Impairment of mobility of the joint leads to reduced functional capacity and many sometimes terminate in adduction contracture of the thumb. Tenderness to palpation, swelling, crepitations, radial subluxation of the base of the first metacarpal bone and thenar atrophy are also components of the clinical picture.

Roentgen examination usually reveals an ordinary picture of osteoarthritis with degenerative changes in the joint cartilage, subchondral sclerosis and marginal deposits. In some cases the metacarpal base is subluxated in a radial-proximal direction (Figure 1). There appears to be no certain correlation between the roentgen findings and the subjective symptoms (Aune 1955).

Figure 1. Osteoarthritis of the first carpo-metacarpal joint with radial subluxation of the base of first metacarpal.

Most authors agree that conservative methods such as immobilisation (Lasserre et al. 1949), physiotherapy, and injection of steroids do not produce satisfactory results. Surgical treatment may therefore be indicated. The operative methods available fall mainly into two groups, *viz.* arthrodesis and excision of the trapezium.

Arthrodesis between the trapezium and the first metacarpal bone has been described by Müller (1949), Bunnel (1956), Leach & Bolton (1968), Eaton & Littler (1969), Mattsson (1969), Marmor & Peter (1969), Eiken & Carstam (1970) and others. Excision of the trapezium has been used by Gervis (1948, 1949), Murley (1960), Haraldsson (1966), and Marmor & Peter (1969).

Goldner & Clippinger (1959) excised the trapezium and a portion of the metacarpal base, and Froimson (1970) resected the trapezium and inserted tendon graft interposing material. Aune (1961) described carpometacarpal arthroplasty with a vitallium ball.

During the last 12 years extirpation of the trapezium has been performed all together 30 times at the clinic of orthopaedic surgery, Hörnösand. The indication for 27 of these operations was primary osteoarthritis of the trapeziometacarpal joint. The results obtained in this series are described below.

METHOD

The radial surface of the trapezium is exposed through a bayonet incision in the anatomic snuff-box, from the styloid process of the radius to the ulnar part of the base of the first metacarpal bone. The superficial sensory branches of the radial nerve and the radial artery are isolated and pulled aside. Injury to these nerve branches may cause not only disorders of sensibility, but also troublesome neurinomas in the scar (Murley 1960). The joint capsules and the ligaments between the trapezium, on one side, and the first and second metacarpals, the trapezoid and the scaphoid, on the other, are divided. After loosening the partial origin of the opponens and flexor pollicis brevis muscles from the crest of the trapezium the bone may be removed *en bloc*. At dissection of the volar surface of the trapezium, care should be taken not to injure the tendon of flexor carpi radialis, which lies in a groove in the bone.

Only the skin is sutured and active mobilisation of the thumb is started immediately after the operation. The patient can leave hospital the day after the operation.

MATERIAL

The material consisted of 25 patients, 16 women and 9 men, in whom the trapezium had been removed because of primary carpometacarpal osteoarthritis the thumb. Two patients were operated upon bilaterally. The total number of operations was thus 27. Of these, 14 were performed on the left side and 13 on the right.

The patients' ages at the time of operation had ranged from 45 to 73 years (mean 57.8). All of the patients except 3 were over 50 at the time of the operation. The preoperative duration of symptoms ranged from 4 months to 10 years (mean 3.1 years).

As for the occupations of the patients, two were dressmakers, one was a factory worker who operated a vibrator, which placed a considerable strain on the thumb in question, and one woman was working in a bakery where she had to carry heavy loads, likewise placing a strain on the thumbs. Five other patients reported a single trauma to the thumb in question as the cause of the onset of the symptoms.

None of the remaining patients had an occupation requiring strenuous use of the affected thumb and none of them could remember having sustained any relevant trauma before the onset of symptoms.

In 17 of the patients the osteoarthritis was unilateral, while the remaining 8 showed roentgenographic evidence of bilateral osteoarthritis. Two of these 8 had been operated upon bilaterally, 4 had only trivial symptoms on the unoperated side and 2 had no symptoms at all on the contralateral side.

All of the patients had sought advice because of pain on movement or use of the first carpo-metacarpal joint. All except 3 had local spontaneous pain, which was so severe in 18 that it disturbed their sleep at night.

In all except one patient, movement of the affected thumb was reduced preoperatively and in all the gross functional strength of the thumb was reduced. In 17 hands the joint was swollen and 21 hands were locally tender to palpation.

None of the patients had changed their occupation preoperatively because of the affection. The preoperative sick leave varied from none to 2 years.

RESULTS

Of the 27 excisions of the trapezium because of primary carpo-metacarpal osteoarthritis of the thumb, 3 were performed too recently to permit evaluation of the results of the operation.

The review thus comprised 24 operations on 22 patients (2 patients operated upon bilaterally). The operations were carried out during 1959–1970. The interval between the operation and the review varied between 6 months and 12 years (mean 5.1 years).

At the review, local spontaneous pain was denied by all patients except one who, however, reported less spontaneous pain than before

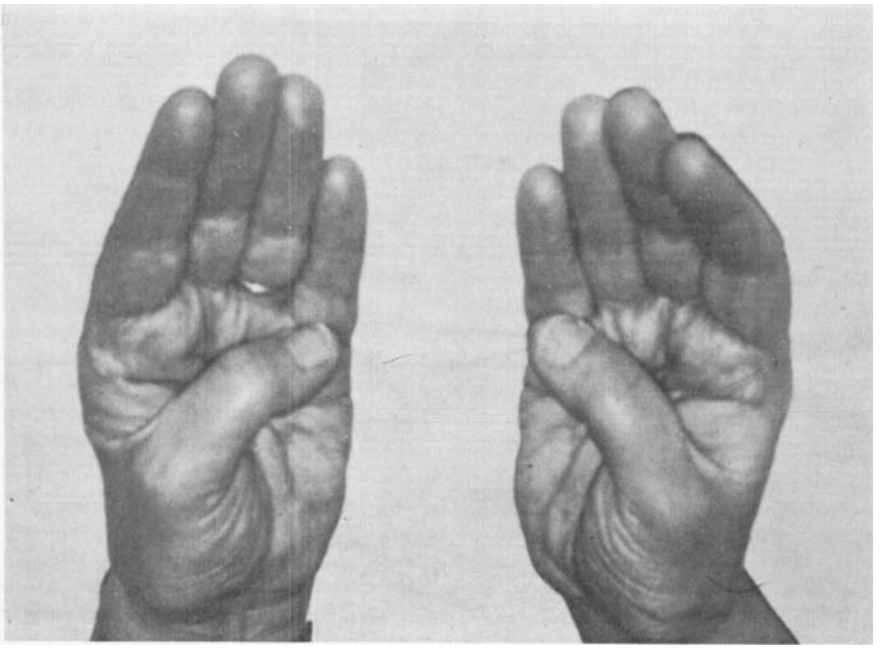

Figure 2. Measurements of flexion-adduction of thumb. Distance from tip of thumb to ulnar border of 5th MP joint is compared on operated and non-operated hands. Right hand operated upon.

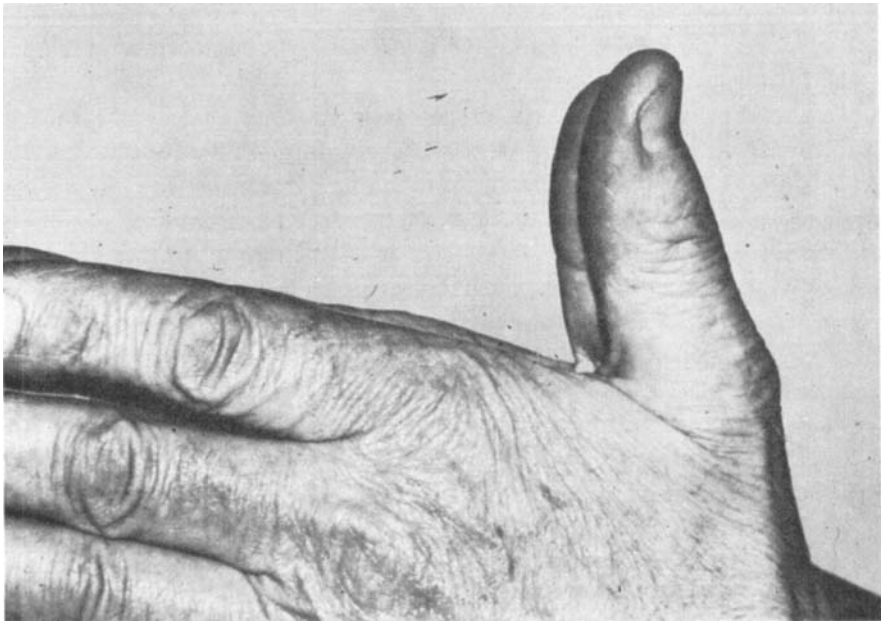

Figure 3. Measurements of radial abduction of thumb. Angle between thumb and radial border of hand compared on operated and non-operated hands. Right hand operated upon.

the operation. Pain on movement had disappeared from 15 hands and was less than before the operation in 9.

It is difficult to measure the range of basal thumb movements, and no generally accepted method or terminology is available.

In the present study the results of operation in this respect were therefore assessed from measurement of active flexion-adduction of the operated thumb and of radial abduction of the operated thumb, compared with the same movements of the non-operated thumb. The measuring methods are apparent from Figures 2 and 3.

At the review the active mobility of 11 operated thumbs was better than, or as good as, that of the contralateral non-operated thumbs, and the active mobility of the 2 thumbs of a patient operated upon bilaterally was better than before the operation. The active mobility of 9 thumbs at the review was less than that of the contralateral non-operated thumb. In one of the bilaterally operated patients the pre-operative mobility of the thumbs had not been recorded, but compared with the postoperative mobility of the other thumbs in the material

their postoperative mobility was regarded as satisfactory. In none of the cases was reduction of motion after the operation of any practical significance.

At the review the strength of the index/thumb pinch and that of the hand grip on the operated side were compared with those on the contralateral non-operated side, and in the bilaterally operated cases with the preoperative values. The pinch was measured with a Moberg ergometer and the grip of hand with a Collin dynamometer. Average values of three measurements were registered. The criteria of Frykman (1967) and Jorgensen (1969) for loss of strength in the non-dominant hand were used.

At the review the total number of hands whose strength was reduced, as judged from those criteria, was 7. Two of these patients reported a loss of strength which disturbed function, whereas the others found the post-operative strength to be satisfactory.

These results argue against the commonest objection raised against excision of the trapezium, *viz.* that the operation results in function-lowering loss of strength of practical significance.

None of the patients developed any disorders of sensibility or

Figure 4. 4 ½ years after excision of the left trapezium. Base of first left metacarpal articulates with the scaphoid and trapezoid.

neuromas in the scar, complications which have been reported in the literature (Murley 1960).

At the review, the first digital ray of the operated hand was shorter than that of the contralateral unoperated hand. This shortening was on the average 0.4 cm.

Roentgen examination at the review showed that on the operated side the base of the first metacarpal bone had migrated proximally and had formed a sort of articulation with the scaphoid and trapezoid bones (Figure 4).

At the review all the patients reported that they were satisfied with the result of the operation except one who was not satisfied at all, and another was satisfied with certain reservations. The former was a 57-year-old housewife. The interval between the operation and the review was 8 months. She reported that the operation had eliminated the preoperative resting pain and reduced pain on movement of the affected joint, but that the hand was still weaker than before the operation. She had applied for a sick pension because of *inter alia,* low back pain and sciatica, but her request had been refused. She had appealed against the decision and was now waiting for the result of the appeal. The other patient who was not quite satisfied was a 46-year-old housewife. She had been operated upon 6 months before the review. The reason why she was not satisfied was because the operated hand still felt somewhat weak. The preoperative resting pain had disappeared completely, and pain on movement at the time of the review was negligible.

None of the patients in the material had changed their occupation after the operation.

DISCUSSION

Two main methods are available for the surgical treatment of primary osteoarthritis of the first carpometacarpal joint, *viz.* arthrodesis and extirpation of the trapezium.

The purpose of the operation is to eliminate the pain and restore at least acceptable function of the joint in this preponderantly female, relatively elderly clientele.

According to the literature, arthrodesis restores stability and strength and is the operation of choice if reduction of strength of the hand is to be avoided. It is, however, clear from the literature that bony healing is difficult to obtain, and poor osseous fusion has been reported in up to 50 per cent (Mattsson 1969).

It has been postulated (Müller 1949, Eaton & Littler 1969, Mattsson 1969) that the loss of mobility of the fused first carpometacarpal joint is compensated postoperatively by an increase in the mobility between the trapezium and the carpus. But Mattsson (1969) found a decrease in the adduction of the thumb after arthrodesis and Eiken & Carstam (1970), in a series of 23 basal joint fusions of the thumb reviewed after a postoperative interval of 1–5 years, found that the average postoperative range of basal thumb motion was 10° for both palmar and radial abduction compared with, on the average, 40° for the opposite, non-operated, thumb.

Eiken & Carstam (1970) concluded that one should not count on compensatory increased movements of adjacent joints when arthrodesing the carpometacarpal joint of the thumb. They also reported that, despite healing of the arthrodesis, some of the patients had a weaker power of grip of the operated hand than contralaterally, pain in the thumb after heavy work, and clumsiness and fatigue of the index/thumb pinch.

Neither could Leach & Bolton (1968) demonstrate any postoperative increase in the motion of the joint between the trapezium and the scaphoid in cineroentgenographic studies of a series of 20 carpometacarpal arthrodeses of the thumb. On the other hand, they found an increase of the movement of the metacarpophalangeal joint of the thumb. Eiken & Carstam (1970) found that postoperative hyperextension of this joint caused pain in some cases.

It is thus clear from the literature that arthrodesis of the first carpometacarpal joint does not always produce a satisfactory result. In addition, arthrodesis requires immobilisation for up to 8 weeks (Mattsson 1969, Eiken & Carstam 1970), which in turn requires a relatively long period of rehabilitation.

Primary osteoarthritis of the first carpometacarpal joint is more common in women, particularly after the menopause, i.e. in patients for whom mobility may be more important than the strength of the joint, provided the operation gives relief of pain.

It has been contended in the literature that the drawback of excision of the trapezium is that it results in loss of strength of the hand.

In the present material the operation was followed by loss of strength of the hand, with a consequent impairment of practical significance in association with certain functions in 2 of the patients reviewed 6 and 8 months, respectively, after the operation. Reduction of strength of the hand was objectively recorded with certainty in 7 hands (*vide supra*).

At the review, none of the patients had any loss of practical importance of the mobility of the operated thumb. At the time of the review none of the patients had spontaneous local pain except one, in whom it was, however, less intense than before the operation.

In 15 hands there was no pain on movement and in 9 such pain was less than before the operation. No sensibility disorders occurred after the operation.

All the patients were satisfied with the result of the operation except 2, one of whom was also satisfied except for loss of strength of the joint.

The observations set forth above appear to warrant the conclusion that extirpation of the trapezium in cases of primary osteoarthritis of the first carpometacarpal joint satisfies the aforementioned objectives of the operation, *viz.* it eliminates or minimises the pain without a reduction of strength of the thumb that could be considered as disturbing by this category of patients. It permits immediate mobilisation and requires only a very short stay in hospital.

It can probably be used in the treatment of a large portion of patients with osteoarthritis of the first carpo-metacarpal joint when operation is indicated.

SUMMARY

The results of 24 of 27 excisions of the trapezium, because of osteoarthritis of the first carpometacarpal joint, were analysed at a review after an average postoperative period of 5.1 years.

At the review, 7 operated hands were definitely weaker, but only 2 of the patients reported that such loss of strength disturbed function, while the others found the postoperative strength to be satisfactory.

In 15 hands pain on movement had disappeared after the operation, and in the remaining 9 it had become less. Spontaneous pain had disappeared in all hands except one.

In none of the cases was reduction of motion after operation of any practical significance.

All the patients except 2 were satisfied with the results of the operation.

Excision of the trapezium usually gives relief of symptoms without a substantially disturbing loss of function, it allows immediate mobilisation, and requires only a very short stay in hospital.

It can probably be used in the treatment of a large portion of cases

of osteoarthritis of the first carpometacarpal joint, when operation is indicated .

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