Acta orthop. scand. *53*, 219–223, 1982

OSTEOARTHRITIS OF THE TRAPEZIO-METACARPAL JOINT

Results of Treatment with a Silicone Cap Implant

J. ENGEL, A. GANEL, H. PATISH* & M. KAMHIN

Hand Surgery Unit, Chaim Sheba Medical Center, affiliated to the Sackler School of Medicine, Tel Aviv University, Tel Hashomer, Israel

The results of surgical treatment for arthritis of the first carpometacarpal joint using Kessler's silicone implant were examined in a group of 23 patients. The mean follow-up period was 24 months. Pain relief was obtained in 18 patients (78 per cent), functional improvement in daily activities in 16 patients, and power of pinch and power of grasp were improved in 10 out of 13 patients. Limitation of abduction complicated surgery in 6 patients. A high incidence of subluxation was found without correlation to the subjective results. Most of our patients were satisfied with the functional end results.

Key words: arthropathy; cap arthroplasty; hand deformities; silicone implant

Accepted 7.vi.81

Various surgical procedures have been used for the treatment of osteoarthritis of the first carpometacarpal joint (CM_1). These procedures consist principally of arthrodesis of the joint or arthroplasty. CM_1 arthrodesis yields good stability and strength of the thumb (Eaton & Littler 1969, Weinman & Lipscomb 1967), but is associated with a decrease in thumb motions. Arthroplasty of the CM_1 has been widely performed using various techniques (Buck-Gramcko 1972, Crawford 1977, De La Caffiniere 1974, De La Caffiniere et al. 1975, Dickson 1976, Gervis 1973, Murley 1960, Swanson 1972, Weilby 1971) in an attempt to preserve motion of the thumb. Swanson's silicone prosthesis (Braun 1976, Eiken 1971, Haffajee 1977, Lister et al. 1977, Swanson 1972) has been extensively used with satisfactory results. The purpose of the present study is to report our experience with a silicone implant developed by Kessler (Kessler & Axer 1971, Kessler 1973, Kessler et al. 1976) for the treatment of CM_1 arthrosis.

* Part of a M.D. thesis submitted to the Sackler School of Medicine, Tel Aviv University.

PATIENTS AND METHODS

The present group includes 23 patients who underwent 25 operations for insertion of Kessler's implant during 1973–1978, utilizing Kessler's original operative technique. The joint is approached through its radial-volar aspect, preserving the cutaneous branches of the radial nerve. The periosteum of the first metacarpal bone and joint capsule are longitudinally split, the abductor pollicis longus tendon divided at its insertion and debridement of the joint performed. Following resection of the articular surface at the base of the metacarpal bone and reaming of the medullary canal the prosthesis is inserted. The joint capsule is tightly closed, and the abductor pollicis tendon advanced and resutured to the metacarpal bone.

There were 4 males and 19 females with an age range of 43 to 80 years (average 59.3 years). Two of them had bilateral involvement. The follow-up period ranged from 1 to 5 years (average 24 months). Most of the patients had primary osteoarthrosis, 3 had post-traumatic arthrosis and one suffered from severe

0001-6470/82/020219-05 $02.50/0

Table 1. Pre- and postoperative symptomatology and clinical findings

		Limitation of daily activities	Presence of pain	Decreased power of pinch	Decreased power of grasp	Limitation of "wringing"	Limited abduction range
Pre-op.		23	23	11	14	14	8
Post-op.	Improvement	16	18	10	13	12	4
	No change	4	2	1	1	2	4
	Aggravation	3	3	2*	1*	3*	6*

* Not limited preoperatively.

rheumatoid arthritis. The dominant hand was involved in 18 patients.

The patients were asked to report about pain and disability with respect to daily activity. Clinical examination included: testing for CM_1 subluxation, clinical assessment of the range of movements, and grind test to elicit pain at the CM_1 joint (Swanson 1972). Power of grasp and power of pinch were measured using a Preston Pinch Gauge and dynamometer.

Both the power of pinch and the power of grasp were compared with normal data. Normal values related to sex, age, dominance, occupation and ethnic origin in Israel, were obtained from another study based on the examination of 200 normal patients (400 hands) (Tamir & Ganel 1980).

The surgical end results were assessed by the patients and graded as excellent, good, fair or poor. The upper part of Table 1 summarizes the symptomatology and clinical findings prior to operation. As stated, pain was the major complaint contributing to the patient's disability; local tenderness and a positive grind test were also present in all of the patients. The radiographic findings preoperatively demonstrated 14 cases of degenerative changes, isolated to the CM_1, and 11 cases of pan-trapezial changes. We could not find any significant correlation between these findings and the degree of pain and disability.

RESULTS

The clinical results following surgery are summarized in the lower part of Table 1. Marked improvement in ability to carry out daily activities is noted. Pain relief was obtained in 18 out of 23 patients (78 per cent). Power of pinch improved in 90 per cent of the patients. This was established by comparing the preoperative manometric measurements with normal data in order to assess decreased power. Improvement in power of pinch was noted when the postoperative values were higher by 50 per cent or more than the preoperative values. The power of grasp, evaluated accordingly, improved in 93 per cent of the patients, with decreased power preoperatively.

The range of abduction improved in only half of the patients in whom this movement had been limited preoperatively. However, such limitation complicated surgery in 6 other patients. This limitation did not correlate with the patient's as-

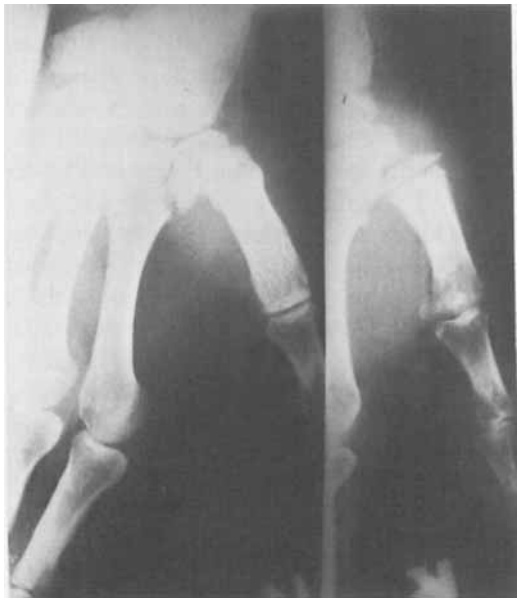

Figure 1. Osteoarthritis of the first carpo-metacarpal joint (right) treated by Kessler's implant (left). Good contact between prosthesis and trapezium is demonstrated.

Figure 2. Kessler's implant inserted into the base of the proximal phalanx. In abduction (left) there is good contact with the trapezium whereas in adduction (right) severe subluxation results.

Figure 3. Severe subluxation of the prosthesis, best demonstrated while the thumb is adducted.

sessment of the end results of surgery. According to the patients' own assessment 8 patients defined the result as excellent, 8 as good, 5 patients as fair and 4 as poor.

Radiographic evidence of first metacarpal subluxation was graded as mild (Figure 1) when less than one-third of the implant was not in contact with the trapezium and as severe (Figures 2 and 3) subluxation when more than one-third was not in contact. As seen in Figure 4, no significant correlation was found between the condition of subluxation and the subjective results. Pan-trapezial degenerative changes were present in 11 patients prior to operation. Such changes, demonstrating the progression of the degenerative process, were found postoperatively in 5 more patients in whom the disease was isolated to the CM_1 joint preoperatively. No correlation could be found between the appearance of such changes and the surgical end results.

Complications were observed in 3 cases. There was an injury to a superficial branch of the radial nerve in one case, a complete dislocation of the implant in another and wound infection in a third case. It should be noted that two of the patients in whom pain relief was not obtained were patients who suffered from the above complications. A third patient who did not show any pain relief suffered from severe and active rheumatoid arthritis.

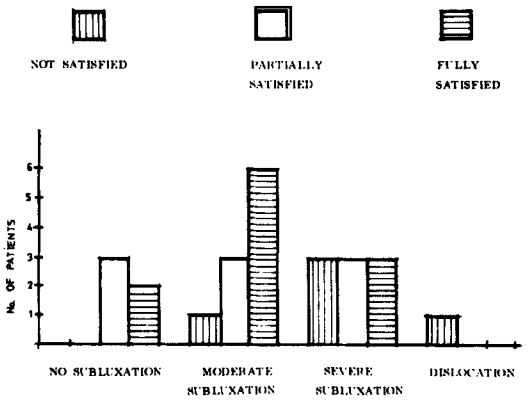

Figure 4. Correlation between radiological evidence of subluxation and patients' satisfaction with the operative results.

DISCUSSION

The first carpometacarpal joint of the thumb is a common site for the occurrence of osteoarthrosis, which can be either isolated to this joint or part of a generalized osteoarthrosis (Aune 1955, Carstam et al. 1968). Bilateral involvement is not uncommon (Lasserre et al. 1949). This condition usually affects post-menopausal women (Swanson 1972, Haffajee 1977, Kessler & Axer 1971, Pieron 1973) and is characterized by an insidious onset. Local pain at the base of the thumb, aggravated by motion, especially pinch and grasp, is the most common symptom (Weinman 1967, Pieron 1973). Clinical diagnosis is based on local swelling at the base of the thumb, local tenderness, crepitations on motion, positive grind test (Kessler 1971) and in advanced cases, subluxation of the first metacarpal bone associated with limitation of movements. Radiographic features are similar to those affecting other joints and include subchondral bone sclerosis and cyst formation, narrowing of the joint space, osteophyte formation and radial subluxation of the first metacarpal bone (Aune 1955, Pieron 1973).

In cases of severe pain and limitation of movements when conservative treatment is ineffective, surgery is indicated. A field study was performed in an attempt to evaluate the use of the Kessler's implant in cases of CM_1 osteoarthrosis.

As one can see from the above data the main cause of complaints in this series was pain. In most of the cases the limitation of movements could be attributed to pain, especially pinch and grasp. As pain relief was obtained in most cases, the operation achieved its primary goal. Following pain relief there was an improvement in the ability to grasp and wring. These activities are an essential part of the daily activities of housewives, who comprised most of our patients. The main problems complicating surgery were the high incidence of subluxations (19/25) and the limitation of abduction which appeared following surgery in 4 patients and had persisted in 4 others. However, the existence of such complications did not seem to affect the subjective satisfaction of the patients.

It is concluded that the replacement of the metacarpal articular surface of the first carpometacarpal joint with a silicone implant has given in our experience a high rate of pain relief and improvement in ability to carry out daily activities. The method is relatively simple and reliable and certainly deserves further application so that more experience in its use can be gained.

REFERENCES

Aune, S. (1955) Osteoarthritis in the first carpo-metacarpal joint: an investigation of 22 cases. *Acta Chir. Scand.* **109**, 449–456.

Braun, R. M. (1976) Stabilization of silastic implant arthroplasty at the trapezio-metacarpal joint. *Clin. Orthop.* **121**, 263–270.

Buck-Gramcko, D. (1972) Operative behandlung der sattelgelenksarthrose des daumens. *Handchirurgie,* **4**, 105–109.

Carstam, N., Eiken, O. & Andren, L. (1968) Osteoarthritis of the trapezio-scaphoid joint. *Acta Orthop. Scand.* **39**, 354–358.

Crawford, G. P. (1977) Interposition arthroplasty of the carpo-metacarpal joint of the thumb. *Hand* **9**, 130–134.

De La Caffiniere, J. Y. (1974) Prothese totale trapezo-metacarienne. *Rev. Chir. Orthop.* **60**, 299–308.

De La Caffiniere, J. Y., Mazas, F. & Achack, P. C. (1975) Main rhumatoide an stode des destructions articulaires. *Rev. Chir. Orthop.* **61**, 61–74.

Dickson, R. A. (1976) Arthritis of the carpometacarpal joint of the thumb – treatment by silicone sponge interposition arthroplasty. *Hand* **8**, 197–207.

Eaton, R. G. & Littler, J. W. (1969) A study of the basal joint of the thumb – treatment of its disabilities by fusion. *J. Bone Joint Surg.* **51**-A, 661–678.

Eiken, O. (1971) Prosthetic replacement of the trapezium. *Scand. J. Plast. Reconstr. Surg.* **5**, 131–135.

Gervis, W. H. (1973) A review of excision of the trapezium for osteoarthritis of the trapezio-metacarpal joint after 25 years. *J. Bone Joint Surg.* **55**-B, 56–57.

Haffajee, D. (1977) Endoprosthetic replacement of the trapezium for arthrosis in the carpo-metacarpal joint of the thumb. *J. Hand Surg.* **2**, 141–148.

Kessler, I. & Axer, A. (1971) Arthroplasty of the first carpometacarpal joint with a silicone implant. *Plast. Reconstr. Surg.* **47**, 252–257.

Kessler, I. (1973) Silicone arthroplasty of the trapezio-metacarpal joint. *J. Bone Joint Surg.* **55**-B, 285–291.

Kessler, I., Baruch, A., Hecht, O. & Amit, S. (1976) Osteoarthritis at the base of the thumb: The concept of monarticular reconstruction. *Acta Orthop. Scand.* **47**, 361–369.

Lasserre, C., Pauzdt, D. & Derennes, R. (1949) Osteoarthritis of the trapezio-metacarpal joint. *J. Bone Joint Surg.* **31-B**, 534–536.

Lister, G. D., Kleinert, H. E., Kutz, J. E. et al. (1977) Arthritis of the trapezial articulations treated by prosthetic replacement. *Hand* **9**, 117–129.

Murley, A. H. G. (1960) Excision of the trapezium in osteoarthritis of the first carpometacarpal joint. *J. Bone Joint Surg.* **42**-B, 502–507.

Pieron, A. P. (1973) The mechanism of the first carpo-metacarpal joint: an anatomical and mechanical analysis. *Acta Orthop. Scand.*, Suppl. 148.

Swanson, A. B. (1972) Disabling arthritis at the base of the thumb – treatment by resection of the trapezium and flexible (silicone) implant arthroplasty. *J. Bone Joint Surg.* **54**-A, 456–471.

Tamir, S. & Ganel, A. (1980) Evaluation of hand strength (personal communication).

Weilby, A. (1971) Surgical treatment of osteoarthritis of the carpo-metacarpal joint of the thumb. *Scand. J. Plast. Reconstr. Surg.* **5**, 136–141.

Weinman, D. T. & Lipscomb, P. R. (1967) Degenerative arthritis of the trapesio-metacarpal joint: Arthrodesis or excision? *Mayo Clin. Proc.* **42**, 276–287.

Correspondence to: J. Engel, M.D., Head, Hand Surgery Unit, Chaim Sheba Medical Center, Tel Hashomer, Israel.