

Arthrodesis of the first carpometacarpal joint

33 cases of arthrosis

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Thirty-three arthrodeses were performed for arthrosis of the first carpometacarpal joint in 29 patients. The patients were reexamined 5 (2-10) years after the operation. Twenty arthrodeses were clinically satisfactory, although two had failed to unite. Analysis of this group showed that a painless stiff carpometacarpal joint causes some functional impairment, considered negligible by most patients. The remaining 13 cases were unsatisfactory due to pain caused by arthrosis in the peritrapezoidal joints (7 cases), nonunion (4), radial nerve neuroma (1), and unknown reason (1).

Ideally, arthrodesis of the first carpometacarpal (CMC) joint makes the thumb painless and stable with good power (Weinman and Lipscomb 1967, Leach and Bolton 1968, Mattsson 1969, Carrol and Hill 1973, Stark et al. 1977, Cavallazzi and Spreafico 1986). However, a stiff thumb is inconvenient for many daily activities, and arthrodesis should therefore be used restrictively (Froimson 1970, Eiken and Carstam 1970, Dickson and Morrison 1979).

We report our results of arthrodesis of the first CMC joint for primary arthrosis. Special attention was paid to assessment of the functional impairment caused by fusion.

Material and methods

During a 10-year period (1976-1985), 34 arthrodeses of the CMC I-joint in 30 patients were performed at the Department of Hand Surgery at Sabbatsberg's Hospital in Stockholm (Table 1). The cases represented 10 percent of the operations performed for thumb-base arthrosis. All the patients in the study had painful primary arthrosis. The dominant hand was operated on in half of the cases. The mean age of the patients, half of whom were men, was 58 (41-84) years. One man died after 6 months, and was therefore excluded from the follow-up. The follow-up time for the remaining 33 hands was 5 (2-10) years. In 7 cases, radiographic signs of arthrosis in other carpal joints were evident preoperatively.

Fixation of the arthrodesis was achieved by K-wires (17 cases) or cerclage (16 cases). In 11 cases, a bone

graft was added. The immobilization time was 5-12 weeks. Rearthrodesis, including bone grafting, was performed in 3 cerclage cases and in 1 K-wire case after 1, 4, 8, and 9 months, respectively.

At follow-up, all the patients were questioned using a standardized form. All except 2 patients, who were reoperated on with interposition arthroplasty, were subjected to a clinical and radiographic examination.

The patients were classified into 2 groups with respect to pain and power: 1) *Satisfactory*: no pain at rest, no or minor pain at work, improved power. 2) *Unsatisfactory*: Some pain at rest or work, unchanged or decreased power.

Results

Twenty thumbs were satisfactory and 13 were unsatisfactory (Table 1). In the satisfactory group, all but two arthrodeses eventually united. Two patients had slight discomfort from arthrosis in the scaphotrapezoidal joint and first MP joint, respectively, and in 1 patient a radial nerve neuroma was found. All the patients in this group with a stable and almost painless thumb were asked if they had experienced any impairment in daily activities (Table 2). The majority had some difficulty with fine-motor control, but all of them had a good pinch grip.

In the unsatisfactory group, pain and impaired function were due to nonunion in 4 cases, 2 of which were reoperated on with tendon interposition arthroplasty. There was arthrosis in adjacent joints in 7 cases (Figure 1), and 1 patient suffered from a radial nerve neuroma. The reason for pain in the remaining cases was obscure.

In the satisfactory group, 19 of 20 patients returned to work compared with 3 of 13 in the unsatisfactory

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Table 1. Arthrodesis of the CMC I-joint, coded data

n	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	52	1	2	3	1	5	2	1	0	12,0	0	1	1	0
2	53	1	1	1	0	6	0	0	0	9,6	0	1	1	0
3	56	2	1	3	1	10	3	1	1	9,6	1	0	0	1
4	52	1	2	3	1	5	2	1	0	9,5	0	0	0	1
5	64	1	2	1	0	9	0	1	1	9,4	1	1	1	1
6	56	1	1	2	0	4	1	1	0	8,10	1	1	1	1
7	57	1	2	1	5	0	1	1	0	10,6	0	1	1	0
8	58	1	1	1	0	9	0	1	0	7,5	0	1	1	0
9	65	1	2	1	0	8	0	1	0	8,6	0	1	1	0
10	59	1	1	3	1	9	0	1	0	6,3	0	1	1	0
11	60	2	1	1	1	4	0	1	0	7,8	0	1	1	0
12	59	1	1	1	1	5	0	1	0	7,10	0	1	3	0
13	55	2	2	1	0	5	0	1	0	5,9	0	1	2	0
14	62	2	2	1	0	8	1	1	0	5,6	0	1	1	0
15	53	2	2	2	0	5	1	1	0	5,0	0	1	1	0
16	51	1	1	2	0	6	2	0	0	3,10	0	1	1	0
17	64	1	1	2	0	5								
18	59	2	1	2	1	5	0	1	0	3,3	0	1	1	0
19	51	1	2	3	0	12	3	1	1	2,10	1	1	1	0
20	60	2	1	3	0	7	2	1	0	2,6	0	1	1	0
21	53	2	1	3	0	4	2	0	0	1,8	0	0	9	1
22	62	2	2	3	0	8	2	1	1	4,3	1	1	1	0
23	70	1	2	2	0	9	2	1	0	4,3	0	1	1	0
24	56	2	1	3	0	8	4	0	0					1
25	54	2	2	3	1	6	2	1	0	2,2	0	0	0	1
26	50	1	2	3	1	6	2	1	1	2,1	1	0	0	1
27	57	2	1	3	0	8	1	1	0	2,0	1	0	0	1
28	60	1	1	1	1	6	0	1	0	2,0	0	1	1	0
29	63	1	2	1	1	5	0	0	0	1,11	0	1	1	1
30	67	2	1	3	0	8	2	1	1	1,11	1	1	1	1
31	56	2	2	3	0	8	2	1	0	1,3	0	1	1	0
32	64	2	2	3	0	8	3	1	1	1,3	1	1	1	1
33	41	2	1	3	0	9	2	3	0	1,4	0	1	1	0
34	84	2	2	3	0	8	4	0	0					1

- A Age at operation.
 B Sex. 1 male; 2 female.
 C Side. 1 dominant; 2 nondominant.
 D Surgical procedure. 1 cerclage; 2 cerclage and K-wire; 3 K-wire alone.
 E Bone graft. 0 no; 1 yes.
 F Time of fixation, weeks.
 G Reoperation. 0 no; 1 bone graft; 2 pin removal once; 3 pin removal twice or more; 4 interposition arthroplasty
 H Union. 0 no; 1 yes.
 I Preexisting arthrosis in adjacent joints. 0 no; 1 yes.
 J Time of follow-up. Years, months.
 K Arthrosis at follow-up. 0 no; 1 yes.
 L Satisfied with operation. 0 no; 1 yes.
 M In what respect. 0 not satisfied; 1 rest pain; 2 pain at work; 3 pinch strength.
 N Clinical assessment. 0 satisfactory group; 1 unsatisfactory group.

Table 2. Function with painless arthrodesis (n 20)

	Yes	No
Lift a 1-liter carton of milk	20	0
Manage buttons	11	9
Easily pick up small things	15	5
Put the hand into narrow spaces	16	4
Put the hand flat on the table	1	19
Reach all the finger tips with the tip of the thumb	19	1

group. No difference was found between satisfactory and unsatisfactory results regarding age distribution or dominant/nondominant hand operated on.

The union rate was the same whether fixation of the arthrodesis was obtained with K-wires or cerclage (Table 3). Among the 22 arthrodeses that did not have bone grafting at the initial operation, five did not unite and five went on to unite only after rearthrodesis with bone grafting. One of the 11 patients initially grafted had failure of bony union.

Discussion

In most studies the frequency of excellent and good results following arthrodesis of the first carpometacarpal joint for arthrosis has been more than 90 percent, with osseous healing in approximately 80 percent of the patients (Leach and Bolton 1968, Eaton and Littler 1969, Eiken and Carstam 1970, Weilby 1971, Carroll and Hill 1973, Stark et al. 1977, Cavalazzi and Spreafico 1986). The results from these and our studies do not agree with Mattsson's (1969) findings that the frequency of bone healing was only 50 percent even though the majority of the patients still showed a good clinical result. The studies referred to are, however, not strictly comparable, because no uniform system of classification of the results has been used.

In our series the clinical results were less satisfactory. This could be explained by the long follow-up time, which allows arthrosis to develop and produce symp-



Figure 1. Arthrodesis of the first CMC joint in a 74-year-old man. Bony union was achieved, but arthrosis in the ST joint led to an unsatisfactory result.

Table 3. Results from CMC I-arthrodesis in relation to operative technique (n 33)

	Bone grafting		No bone grafting	
	K-wires	Cerclage	K-wires	Cerclage
Union	5	5	9 ^a	8 ^b
Nonunion	0	1	3	2

^aOne united after reoperation with bone grafting.

^bThree united after reoperation with bone grafting.

toms from adjacent joints, or that arthrodesis was not appropriate as the method of treatment in every case. A high incidence of peritrapezoidal arthrosis has been reported (Swanson 1972, Stark et al. 1977, Nylén et al. 1987), and is a contraindication for arthrodesis (Swanson 1972, Carrol and Hill 1973). Arthrodesis was performed despite arthrosis being present preoperatively in 7 cases in our study. At follow-up, 5 of them were unsatisfactory. In another 3 cases, peritrapezoidal arthrosis was found at the radiographic follow-up. Our finding seems to contradict the opinion that preexisting or postoperatively developed arthrosis in adjacent joints is of little importance for the end result (Eaton and Littler 1969, Stark et al. 1977). Early ST-joint arthrosis may sometimes be first seen at operation when the joint is inspected. Such a finding should indicate arthroplasty instead of arthrodesis.

At operation the arthrodesis was stabilized by K-wires in all the series cited above except for Mattsson's (1969), in which a cerclage technique was used. Bone grafting was always used by Leach and Bolton (1968) and was added to the osteosynthesis in selected cases

by others (Eiken and Carstam 1970, Stark et al. 1977). In our material, bone grafting increased the bone healing rate. Cerclage, although technically more demanding than K-wire fixation, was associated with fewer reoperations.

Some authors have studied to what extent a painfree and stable arthrodesis of the CMC I-joint causes impairment of activities of daily living (Leach and Bolton 1968, Eaton and Littler 1969, Eiken and Carstam 1970, Braun 1976, Stark et al. 1977, Dickson and Morrison 1979).

Analysis of the functional impairment due to CMC I-arthrodesis in our study showed that the functional loss experienced by the patients was considered negligible as compared with the disability caused by preoperative pain. Difficulties in picking up small objects, doing up buttons, and putting on gloves were the most common complaints. None, with the exception of 1 patient, could put their hand flat on a table, which is a natural effect of the operation. Positioning of the thumb should perhaps be more individually discussed with the patient before surgery. A more volar and abducted position is likely to increase the ability to pick up small objects, but makes it more difficult to put the hand into narrow spaces and vice versa.

Weinman and Lipscomb (1967) stated that arthrodesis of the CMC I-joint for arthrosis is a good method for men who have to use their thumb for a strong pinch grip. The results from our material, which has a higher proportion of men than is reflected by the natural sex difference of the disease, supports Weinman and Lipscomb's (1967) statement provided that there is no arthrosis in adjacent joints.

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