

Abductor pollicis longus tendon interposition for arthrosis in the first carpometacarpal joint

55 thumbs reviewed after 3 (1–5) years

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ABSTRACT – We have performed an interposition arthroplasty using the abductor pollicis longus (APL) tendon for arthrosis in the basal joint of the thumb in our department since 1995. Before this, we had been using an interposition with the flexor carpi radialis (FCR) tendon. We re-examined 47 patients (55 thumbs) after a median follow-up of 41 (16–60) months. The pain relief was excellent in 32 thumbs, and 25 patients improved their ability to perform daily tasks. Mobility was well preserved. Key pinch and grip strengths averaged 78% and 89%, respectively, of those in unaffected hands. An excellent general result was reported by 34 patients, while 4 patients would not have consented to the operation if they had known the outcome in advance.

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Several interposition techniques have been described for surgical treatment of arthrosis in the first carpometacarpal joint. Some years ago we reported our results with an interposition using the flexor carpi radialis (FCR) tendon (Kleven et al. 1996). We then changed to a procedure using the abductor pollicis longus (APL) tendon because it permits shorter immobilization and does not require Kirschner wire fixation (Sigfusson and Lundborg 1991). In this retrospective study, we reviewed our medium-term results with this procedure and compared them with those obtained with the FCR interposition.

Patients and methods

During a 4-year (1996–1999) period we operated on 52 patients. At the time of review 41 (16–60) months after surgery, 1 patient was seriously ill, and one was abroad. 3 other patients failed to return for follow-up. The remaining 47 patients (3 men), with 55 thumbs operated on during the study period, constitute the study group. Their mean age was 58 (44–73) years at the time of surgery.

The entire trapezium was excised through a dorsoradial incision and a distally-based strip consisting of the radial part of the abductor pollicis longus tendon was prepared. The strip was used to twist the FCR and APL tendons together, securing the volar and ulnar aspects of the first metacarpal bone. The hand was immobilized in plaster of Paris for 4–5 weeks postoperatively (Sigfusson and Lundborg 1991).

The procedure used to review our FCR patients was followed as closely as possible (Kleven et al. 1996). The patients' subjective estimation of pain and satisfaction with the cosmetic and general results was evaluated on visual analogue scales (VAS) converted to a 100-point score, where 0 indicates no pain or a best imaginable result, while 100 represents the worst imaginable outcome. VAS scores of 15 or less were arbitrarily assumed to indicate an excellent result.

The patients were interviewed regarding their ability to participate in various activities of daily living before the operation and at follow-up, and they completed the Disability of the arm, shoulder and hand (DASH) questionnaire (Atroshi et al.

2000). This questionnaire was also completed by 21 patients on our waiting list. The DASH is a self-administered region-specific outcome instrument developed to measure upper extremity disability and symptoms. The main part of the DASH is a 30-item disability/symptom-scale concerning the patient's state of health during the preceding week. It also contains a 4-item scale concerning the ability to work. The replies to each scale are used to calculate a score ranging from 0 (no disability) to 100 (severest disability).

We recorded the mobility of the thumb and wrist and the sensation of all operated hands. The mobility and strength of the operated hand was compared to the unaffected hand of the 21 patients which had not been operated on or had no known arthrosis. Grip and pinch strength were measured with Jamar (J.A. Preston Corp., Clifton, NJ, USA) dynamometers. Three measurements were made and the median value noted. No correction was made for the non-dominant hand.

15 patients (17 hands) were arbitrarily chosen for a radiographic examination at review. Radiographs were taken without key pinch stress and the distance between the base of the first metacarpal and the scaphoid was measured.

Results

1 patient had the flexor carpi radialis tendon accidentally cut during the procedure. The tendon was sutured. Her clinical results were similar to the average of other results at review. The median immobilization time in plaster was 37 (21–51) days. There were no postoperative hematomas or infections. Of the 27 patients who were employed at the time of operation, 18 returned to work. The median time away from work was 134 (30–1427) days, although a few of them had a prolonged sick leave due to other illnesses.

The median VAS score for pain was 11 (0–85), and 26 patients (32 thumbs) had an excellent result (VAS 15 or less). The median VAS score for the cosmetic result was 5 (0–100), and 33 patients (37 thumbs) were rated as excellent. An excellent gen-

Table 1. Subjective evaluation of activities of daily living before operation and at follow-up

	Preoperative		At follow-up		
	Yes	No	Same	Better	Worse
Open car door	42	13	42	11	2
Use a key	45	10	47	7	2
Open jar of jam	13	42	36	14	5
Wring a cloth	25	30	30	21	4
Total number of patients			14	25	8

Better – unable before surgery, able at follow-up.
Worse – able before surgery, unable at follow-up.

eral result was obtained in 34 patients (40 thumbs) and the median VAS was 5 (0–100).

The activities of daily living improved in 25 patients (Table 1). 8 patients reported some loss of function after surgery and 16 reported no difference in any daily activities. The DASH questionnaires were completed by 45 patients. The median DASH scores for the disability/symptom and work scales were 28 (0–84) and 28 (0–88), respectively. Corresponding DASH values for the 21 patients on our waiting list were 44 (11–78) and 47 (0–81). 4 patients would not have consented to the operation if they had known the outcome in advance.

8 patients had some loss of sensation on the dorsal aspect of the first ray, 4 of them with discomfort. The mean radial abduction of the first ray was 51 degrees in all the operated hands. The distal phalanx of the 5th finger could be reached by 52 of the 55 operated hands. In the 21 patients with unaffected opposite hands, the mean mobility of the operated hands was slightly less than that of the unaffected side (Table 2). Average key pinch and grip strengths of the operated hands were moderately reduced, key pinch being most affected (Table 3).

Table 2. Average mobility (degrees) of the operated and unoperated hand in 21 patients with no contralateral operation on the latter or known arthrosis

Mobility	Operated	Unoperated
Thumb radial abduction	51	57
Wrist extension	62	66
Wrist flexion	68	73
Ulnar deviation	36	38
Radial deviation	21	23

Table 3. Median strength (kg) of the operated and unoperated hand in 21 patients with no operation on the latter or known arthrosis

Strength	Operated	Unoperated	Difference
Grip	20	23	11%
Key pinch	3.6	4.6	22%

The median distance between the scaphoid and the first metacarpal was 11 (8–14) mm on the preoperative and 5 (1–11) mm on the postoperative radiographs. We found no obvious correlation between the gap and the clinical results.

Discussion

We had fewer complications with the APL interposition than the FCR interposition plasty. This may be partly due to not requiring a Kirschner wire. Moreover, the shorter immobilization time allowed the patient to resume daily activities early. In our previous study, the median time away from work was 6 months after the FCR procedure (Kleven et al. 1996)—i.e., 6 weeks longer than in the present study.

In total, 32/55 hands were rated as excellent, about the same proportion as in our FCR study. In a study using the APL procedure in 21 hands, 8 cases obtained complete relief of pain (Sigfusson and Lundborg 1991). Among reports using an FCR interposition, Burton and Pelligrini (1986) noted excellent pain relief in 23/25 of their patients, but only 15/25 of Eaton and coworkers' patients (1985) had no pain after the operation.

We found less marked improvement in the ability to perform daily tasks in the present review than in our report on the FCR procedure. Fewer patients reported improved ADL at follow-up, and more patients felt they were worse. However, the patients in the present study had a better preoperative ability to perform ADL and consequently less to gain from the operation. The DASH scores at review seem to indicate that their condition was significantly better than that of the patients on our waiting list. Atroshi and co-workers (2000) reported similar preoperative values in 7 patients.

Mobility of the thumb and wrist were well pre-

served after the operation and was only slightly reduced compared to the unaffected hand. The mean radial abduction in the present study was considerably greater than in our FCR study.

Average grip and key pinch strengths were similar to those reported by others (Kleinman and Eckenrode 1991, Tomaino et al. 1995, Kleven et al. 1996). All found that key pinch was most affected. Values between 18 kg and 28 kg have been noted for mean grip strength, and 4.3 kg to 5.1 kg for mean key pinch strength. Although the mean grip strength of 20 kg in our study is within this range, the mean key pinch strength of 3.6 kg is slightly lower. However, when compared with the unaffected side, grip strength and key pinch of 89% and 78% of normal, respectively, seem satisfactory. The average key pinch strength after our APL interposition plasty was considerably better than after our previous FCR operations.

All patients showed a decreased postoperative gap between the scaphoid and the metacarpal base on radiographic examination. Other investigators have found similar average values after APL interposition (Weilby 1988, Robinson et al. 1991, Sigfusson and Lundborg 1991). We conclude that in general, the results after the APL interposition plasty are satisfactory. Mobility and strength are somewhat better preserved than after FCR interposition, while the opposite is true for activities of daily living. Most patients obtain pain relief after both methods.

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