

# Tendon interposition arthroplasty for basal joint arthrosis

## 38 thumbs followed for 4 years

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We reviewed 38 thumbs (35 patients) operated with a modified Burton procedure for basal joint arthrosis. There were 3 pintrack infections and 9 patients reported severe discomfort during the postoperative period in a plaster of Paris. After a follow-up of 4 (1–7) years, 28 patients rated the overall result as excellent, while 1 would not have consented to the opera-

tion if she had known the result in advance. Activities of daily living were markedly improved. Compared to the nonoperated hand, the key pinch was moderately reduced and grip strength was almost the same. The postoperative scaphometacarpal gap was 6 mm.

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We have treated most patients with disabling idiopathic arthrosis of the basal joint of the thumb with tendon interposition arthroplasty, using a modification of the procedure described by Burton (Tomaino et al. 1995, Burton 1986, Burton and Pellegrini 1986). The purpose of this retrospective study is to evaluate the medium-term results of this operation.

### Patients and methods

37 patients with idiopathic arthrosis of the basal joint of the thumb were operated on. 2 of them could not be located for follow-up. 3 patients were operated on bilaterally, and thus 38 operated hands in 35 patients were evaluated 4 (1–7) years postoperatively. There were 6 men and 29 women, mean age 58 (44–79) years at the time of operation. At surgery, the entire trapezium was excised through a dorsoradial incision with careful preservation of the radial nerve branches. An approximately 15-cm long tendon slip consisting of one half of the flexor carpi radialis was detached proximally and passed as a sling through a hole in the base of the metacarpal and sutured back to itself and to the deep capsule. The remainder of the tendon slip was folded and placed as a spacer in the defect. The first metacarpal was secured in a corrected position with a Kirschner wire and the hand was immobilized in plaster. After 6 weeks the plaster and wire were removed; the patients had hand therapy until optimal function was regained.

The patients' subjective estimates of pain and satisfaction with the cosmetic and general results were measured on visual analogue scales (VAS) which were converted to a 100 point-scale, where 0 indicated no pain or a best imaginable result, while 100 represented the worst imaginable outcome. VAS values of 15 and below were arbitrarily taken to indicate an excellent result. Furthermore, the patients were interviewed with regard to ability to manage a set of activities of daily living before operation and at follow-up.

Grip and key-pinch strength were measured with Jamar (J.A. Preston Corp., Clifton, NJ, USA) dynamometers. 3 repeated measurements were made and the middle value was recorded.

Mobility of the thumb was evaluated by determining which phalanx of the little finger could be reached by the thumb and by measuring the angle between the lines drawn between Lister's tubercle and the head of the first and second metacarpal heads.

Statistical evaluation was performed with the paired and unpaired Wilcoxon nonparametric tests. P-values below 0.05 were considered significant.

### Results

There were 3 pintrack infections, which healed after pin removal. A further 9 patients had severe discomfort or pain during the plaster immobilization.

At follow-up, 4 patients complained of some discomfort in the wrist, and 9 had impaired volar wrist

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

	Pre-op		At follow-up <sup>a</sup>		
	Yes	No	Better	Worse	Same
Open car door	20	18	15	1	23
Use a key	15	21	18	2	16
Open jar of jam	1	37	18	0	20
Wring a cloth	3	35	29	0	9

<sup>a</sup> Better: Unable before surgery, able at follow-up.  
Worse: Able before surgery, unable at follow-up

Table 2. Median values (kg) for key pinch and grip strength in the whole group (all), in patients without known involvement of the contralateral thumb (unaffected), and in patients with untreated contralateral arthrosis (arthrosis)

		Operated	Contralateral	P-value
All	Key pinch	4.5	5.5	0.03
	Grip	24	25	n.s.
Unaffected	Key pinch	4.3	6.4	0.01
	Grip	27.5	31	n.s.
Arthrosis	Key pinch	4.5	5.5	0.01
	Grip	22	23	0.04

Table 3. Median wrist mobility (degrees) in 30 patients with nonoperated contralateral wrists

	Op. wrist	Nonop. wrist	P-value
Extension	60	60	n.s.
Flexion	50	60	0.008
Ulnar deviation	35	40	n.s.
Radial deviation	16.5	20	0.0005

flexion. 19 noted an area of absent, reduced or changed sensibility on the dorsum of the first ray. The median VAS score for general satisfaction was 3 (CI<sub>95%</sub> 0-9) and 28 hands were rated as excellent. Only 1 patient would not have undergone the operation if she had known the result in advance.

The median VAS score for pain when loading the thumb was 7 (CI<sub>95%</sub> 0-19) and 24 hands were rated as excellent in this respect.

The median VAS rating of the cosmetic result was 0 (CI<sub>95%</sub> 0-1) and 32 rated the cosmesis as excellent.

Hand function was improved after surgery (Table 1), particularly with regard to activities requiring simultaneous twisting and grasping. Only 2 patients said they had lost some specific activities after the operation. The operated thumb could reach the middle phalanx of the little finger in 2 cases, the distal

phalanx in 32 and the fourth finger in 2. The median web angle was 39 degrees (CI<sub>95%</sub> 35-40) on the operated side, compared to 34 degrees (CI<sub>95%</sub> 32-36) on the contralateral hand.

23 patients were gainfully employed before surgery, 16 of whom had returned to work after a median of 6 (2-24) months.

At follow-up, the contralateral hand showed untreated basal joint arthrosis in 20 cases, a silastic prosthesis in 2 and no arthrosis in 10. Overall, the key pinch strength was moderately reduced, compared to the contralateral hands but grip strength was hardly affected (Table 2). The difference in key pinch strength between operated and opposite hands was most pronounced in patients with unaffected contralateral basal joints.

Evaluation of the 30 patients with nonoperated contralateral hands showed that wrist flexion and radial deviation were statistically significantly reduced on the operated side, but not to a degree likely to be of any clinical importance (Table 3).

The median distance between the scaphoid and the first metacarpal was 13 (10-16) mm in the 19 available preoperative radiographs. At follow-up, radiographs showed a median gap between the scaphoid and metacarpal base of 6 (2-10) mm. There was no statistically significant correlation between this measurement and the time since operation ( $r = -0.26$ ;  $p = 0.1$ ).

## Discussion

Our results, like those in most other studies of the outcome of ligament interposition arthroplasty of the basal joint of the thumb, are gratifying. There were few complications and most of the patients were happy with the final outcome. As noted by others (Burton and Pellegrini 1986, Kleinman and Eckenrode 1991, Robinson et al. 1991), our patients also reported that it took about 1 year before the full benefit of the operation was achieved. Weilby (1988) found that strength improved during the first 2 years and Tomaino et al. (1995) until 6 years after the operation.

In basal joint arthrosis the comparison of strength between the operated and opposite hands is difficult because the condition is so often bilateral. Strength of grasp and key pinch in the contralateral hands of our patients without bilateral involvement was in the same order of magnitude as the normal values reported by Mathiowetz and co-workers (1985). In those with bilateral involvement, the side-to-side difference was small, and presumably accounted for by the more advanced disease in the hand which had required op-

eration. Other authors report unchanged or slightly improved strength after similar arthroplasties (Burton and Pellegrini 1986, Kleinman and Eckenrode 1991, Uriburu et al. 1992, Tomaino et al. 1995). It is now our policy to consider arthrodesis as an option only in patients without arthrosis in other carpal joints who, in addition to pain, complain of a reduction of strength that interferes with work or activities of daily living.

Radial abduction of the ray was satisfactory at follow-up, but adduction was less than that reported in other studies (Sigfusson and Lundborg 1991, Eaton et al. 1984, Eaton et al. 1985, Burton and Pellegrini 1986). This could be due to the longer immobilization period than that used by these authors. No patient reported that limitation of mobility had been a problem after operation.

We found no indication that the scaphometacarpal gap decreases with time and jeopardizes the good medium-term results in our patients. This agrees with other studies of arthroplasties, which include a tendon sling to stabilize the first metacarpal (Kleinman and Eckenrode 1991, Robinson et al. 1991, Sigfusson and Lundborg 1991, Uriburu et al. 1992, Necking and Eiken 1986, Weilby 1988). Burton and Pellegrini (1986) found only an 11% reduction of the scaphometacarpal space between operation and follow-up. A space of 5-7 mm is described by most authors at follow-up, whether a ball of tendon ("anchovy") is placed in the space or not.

A great deal of ingenuity is demonstrated by the large number of ligament reconstruction interposition arthroplasties that have been devised for basal joint arthrosis. All those that include a tendon sling to stabilize the first metacarpal are convincingly reported to give very satisfactory results.

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