



Results of the treatment of first carpometacarpal joint osteoarthritis: trapeziectomy alone versus trapeziectomy associated with suspensionplasty

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Abstract

Backgrounds The goal of this study was to compare trapeziectomy alone to trapeziectomy associated with a technique of suspensionplasty using the *abductor pollicis longus* with a minimum of 6 years of follow-up in the treatment of osteoarthritis of the first carpometacarpal joint.

Methods Our series included 46 trapeziectomies in 35 patients, aged 69 years in average, among which 27 were women. In 27 cases group I, a trapeziectomy alone was performed, and in 19 cases group II, a trapeziectomy associated with an *abductor pollicis longus* suspensionplasty was performed.

Results At the last follow-up, the difference between pre- and postoperative Quick DASH was -36.104 in average in group I and -38.877 in average in group II $p=0.7717$. The difference between pre- and postoperative pain was -3.926 in average in group I and -4.368 in average in group II $p=0.35$. The difference of pre- and postoperative thumb opposition was 0.630 in group I and 0.421 in group II $p=0.3033$. The average difference of pre- and postoperative key pinch was 0.389 in group I and 0.842 in group II $p=0.3303$. No complication was reported.

Conclusions Our results suggest that it is unnecessary to perform a ligamentoplasty when a trapeziectomy is indicated.

Keywords Trapeziectomy · Suspensionplasty · Interposition · *Abductor pollicis longus*

Introduction

Many articles have been published reporting numerous techniques for the surgical treatment of osteoarthritis of the first carpometacarpal joint [1, 2]. Most authors compare trapeziectomy to prosthetic implants [3, 4]. Some compare different techniques of ligamentoplasties associated with trapeziectomy [5]. Other authors compare trapeziectomy alone compared to a technique of suspensionplasty of the *flexor carpi radialis* [6] or interposition of the *palmaris longus* [7]. Only one study compared trapeziectomy alone

to trapeziectomy associated with a tendon interposition of the *abductor pollicis longus* but with a short follow-up of 13 months in average [8]. The goal of this study was to compare trapeziectomy alone to a technique of *abductor pollicis longus* tendon interposition with a minimum follow-up of 6 years.

The primary hypothesis of this study was that the improvement in the Quick DASH after trapeziectomy alone for the surgical treatment of osteoarthritis of the first carpometacarpal joint was at least as good as after trapeziectomy associated with a tendon interposition of *abductor pollicis longus*. Secondary hypotheses were that the improvement in pain, Kapandji thumb opposition score and key pinch after trapeziectomy alone for the surgical treatment of osteoarthritis of the first carpometacarpal joint were at least as good as after trapeziectomy associated with an *abductor pollicis longus* suspensionplasty.

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Methods

All medical records of patients treated in our department for osteoarthritis of the first carpometacarpal joint between 2007 and 2010 were studied. Were excluded patients under 18, pregnant women, patients treated by prosthetic implant or osteotomy of the trapezium, patients with chronic systemic illnesses. All patients treated by trapeziectomy alone or associated with an *abductor pollicis longus* suspensionplasty were included. Our series included 46 trapeziectomies in 35 patients aged 69 years in average ranging from 45 years old to 90 years old, among which 27 were women and 8 were men. Eleven trapeziectomies were performed on both sides (Tables 1 and 2).

All patients were operated under locoregional anesthesia in outpatient surgery using a dorsal approach as described by Cantero. In 27 cases group I, a trapeziectomy alone was performed (Fig. 1). In 19 cases group II, a trapeziectomy associated with an *abductor pollicis longus* suspensionplasty was performed as described by Thompson [9] (Fig. 2). An immobilization by a commisural splint was left in place for 1 month in both groups and followed by self-rehabilitation.

The method of evaluation consisted in measuring the preoperative and at the last follow-up Quick DASH ranging from 0 normal function of the upper limb to 100 severe dysfunction of the upper limb, the pain on a numeric analogic scale ranging from 0 no pain to 10 worst imaginable

Table 1 Characteristics of 27 trapeziectomies alone operated in 20 patients

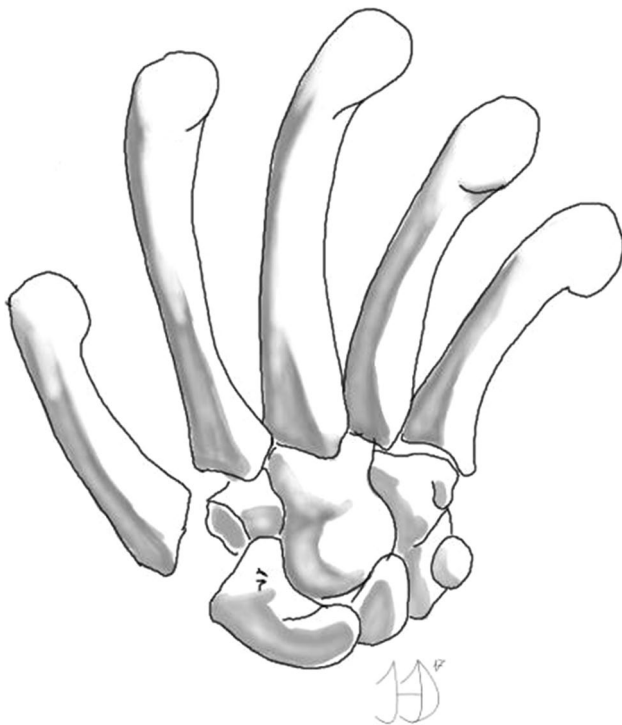
Patient (n)	Age (an)	Gender (M/F)	Dominance (D/G)	Injured side (D/G)	Dell stage (0–4)	Crosby stage (0–3)
1a	71	F	R	L	3	1
1b	71	F	R	R	3	0
2	75	M	R	L	3	1
3	80	F	R	R	3	1
4	72	F	R	L	3	1
5a	59	M	R	L	3	1
5b	59	M	R	R	3	0
6	66	F	R	L	3	1
7	59	F	R	R	3	0
8a	67	M	R	L	2	0
8b	67	M	R	R	2	0
9a	66	F	R	L	3	1
9b	66	F	R	R	2	1
10	63	F	R	R	2	1
11	45	F	R	R	2	0
12	70	F	R	R	3	1
13	53	F	R	R	2	1
14	67	M	L	L	3	1
15	77	F	R	R	2	1
16	83	F	R	L	2	1
17a	75	M	R	R	4	0
17b	75	M	R	R	3	0
18a	66	F	L	L	2	0
18b	66	F	L	R	2	1
19	70	F	R	L	3	1
20a	65	F	R	L	3	1
20b	65	F	R	R	2	1

M male, F female, R right, L left

Table 2 Characteristics of 19 trapeziectomies associated with an *abductor pollicis longus* suspensionplasty operated in 15 patients

Patient (n)	Age (an)	Gender (M/F)	Dominance (D/G)	Injured side (D/G)	Dell stage (0–4)	Crosby stage (0–3)
1	64	F	R	R	3	1
2	85	F	R	R	3	1
3a	76	F	R	L	3	1
3b	76	F	R	R	3	0
4a	75	F	R	L	3	0
4b	75	F	R	R	3	0
5	61	F	L	L	4	1
6	58	F	R	R	3	0
7	78	F	R	L	4	0
8	65	F	R	L	3	1
9	81	F	R	L	4	1
10	60	F	L	L	2	0
11	73	F	R	L	4	1
12	90	F	R	R	4	1
13a	65	F	R	L	4	1
13b	65	F	R	R	3	1
14a	60	F	R	L	4	1
14b	60	F	R	R	3	0
15	67	F	R	L	3	1

M male, F female, R right, L left

**Fig. 1** Illustration of a trapeziectomy alone

pain, Kapandji thumb opposition score ranging from 0 to 10 [10], key pinch strength in Kg. Complications were reported.

The statistical analysis consisted in comparing four quantitative, matched variables in the two groups. Tests of normality Shapiro–Wilk, Kolmogorov–Smirnov have demonstrated that the distribution of the two groups was normal. A Mann–Whitney *U* test was used to compare the averages in both groups with a threshold of significance at 0.05.

Results

The results are presented in Tables 3 and 4.

At the last follow-up, the average Quick DASH was 27.016/100 standard deviation = 10.334 in group I and 15.19/100 standard deviation = 18.282 in group II. The difference was not significant with $p=0.055$. The difference between pre- and postoperative Quick DASH was -36.104 standard deviation = 30.847 in average in group I and -38.877 standard deviation = 15.853 in group II. The difference was not significant with $p=0.7717$.

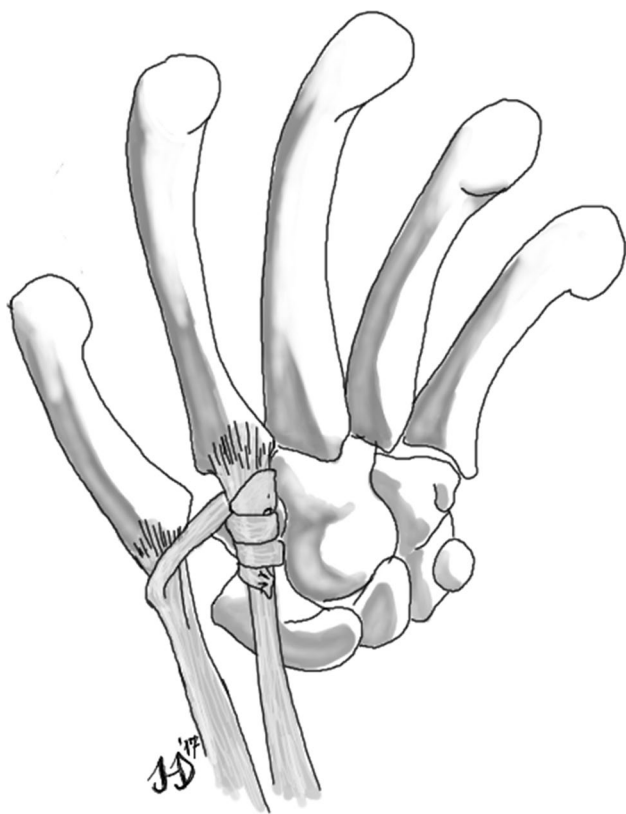


Fig. 2 Illustration of a trapeziectomy associated with an *abductor pollicis longus* suspensionplasty as described by Thompson. After harvesting a strip of *abductor pollicis longus*, the strip is wrapped around the *flexor carpi radialis* and sutured to itself and to the capsule to limit the ascension of the first metacarpal

The average pain was 2.481/10 standard deviation = 1.528 in group I and 2.157/10 standard deviation = 1.883 in group II. The difference was not significant with $p=0.503$. The difference between pre- and postoperative pain was -3.926 standard deviation = 2.630 in average in group I and -4.368 standard deviation = 2.006 in average, in group II. The difference was not significant with $p=0.35$.

The average thumb opposition score was 9.555/10 standard deviation = 0.8 in group I and 9.263/10 standard deviation = 1.194 in group II. The difference was not significant with $p=0.501$. The difference between pre- and postoperative thumb opposition score was 0.630 standard deviation = 1.079 in average, in group I, and 0.421 standard deviation = 0.961 in average, in group II. The difference was not statistically significant with $p=0.3033$.

The average key pinch was 4.25 kg standard deviation = 1.943 in group I and 4 kg standard deviation = 1.309 in group II. The difference was not statistically significant with $p=0.239$. The difference between pre- and postoperative key pinch was 0.389 standard deviation = 2.367 in average, in group I, and 0.842 standard deviation = 2.977 in average, in group II. The difference was not statistically significant with $p=0.3303$.

No complication or surgical revision was reported in either groups.

Discussion

Although some authors report excellent results using prosthetic implants for the surgical treatment of the osteoarthritis of the first carpometacarpal joint [11, 12], others report poor results with surgical revisions occurring from 7 to 35% of cases [13, 14]. In the light of those controversies, trapeziectomy remains the technique of Ref. [2]. The debate about trapeziectomy relies on the association of a suspensionplasty or interposition.

The main argument of the supporters of suspensionplasty or interposition is to preserve the scaphometacarpal space [15, 16]. Some authors have demonstrated that suspension and interposition techniques did not enable to maintain the scaphometacarpal space in the long term [17]. Others have shown that long-term results of suspensionplasties of *flexor carpi radialis* did preserve a larger scaphometacarpal space compared to a trapeziectomy alone, but that clinical results were not influenced by the height of the scaphometacarpal place [18]. A meta-analysis comparing trapeziectomy alone to trapeziectomy associated with ligamentoplasty or suspensionplasty did not show significant results in terms of pain, thumb opposition score and key pinch [19]. It has been demonstrated that patients operated using a trapeziectomy alone are less prone to complications than those operated with a technique associating a suspensionplasty [19]. Trapeziectomy alone should remain the preferred technique for the surgical treatment of osteoarthritis of the first carpometacarpal joint after failure of a well-conducted medical treatment [20]. Under these conditions, the goal of our study was to evaluate the relevance of techniques of suspensionplasty by comparing trapeziectomy alone compared to a technique of *abductor pollicis longus* suspensionplasty.

Table 3 Results of 27 trapeziectomies alone operated in 20 patients

Patient (n)	Follow-up (months)	Quick DASH		Pain		Kapandji score		Pinch	
		Pre-op (0–100)	Post-op (0–100)	Pre-op (0–10)	Post-op (0–10)	Pre-op (0–10)	Post-op (0–10)	Pre-op (kg)	Post-op (kg)
1a	122	77.27	13.64	5	2	8	10	2	5
1b	110	68.18	6.82	5	1	8	10	2.5	4.5
2	108	34.09	27.27	2	0	8	8	6	5
3	119	60.08	6.82	7	1	9	9	1	2.5
4	110	85.09	63.64	8	6	9	10	5	3
5a	108	70.45	18.16	8	2	9	7	5.5	3
5b	98	84.09	13.64	8	2	9	8	2.5	2
6	107	77.27	34.05	7	3	10	10	3.5	7
7	96	56.82	20.45	6	1	10	10	3	5
8a	93	68.18	18.18	5	2	9	10	5	4
8b	81	63.65	4.55	5	1	9	10	5	5.5
9a	102	65.91	9.09	7	3	9	10	6	5
9b	92	50	6.82	6	1	10	10	8	6
10	90	38.64	31.82	7	4	10	10	1	1
11	89	88.64	11.36	8	3	10	10	2.5	6.5
12	78	15.91	45.45	5	5	9	9	4	6
13	77	54.55	50	2	4	10	10	5.5	2
14	81	56.82	36.36	6	1	6	9	6	3
15	80	77.27	43.18	7	4	9	9	3	7
16	75	45.45	4.55	6	2	9	9	1	1
17a	85	40.91	13.64	5	2	8	10	4.5	8.5
17b	75	61.36	52.27	7	4	9	10	5.5	6.5
18a	102	90.91	11.36	10	0	8	10	10	7
18b	90	34.05	6.82	6	0	8	10	5	6
19	95	77.27	4.55	8	1	9	10	3	3
20a	85	54.55	52.27	7	3	9	10	1	4.5
20b	81	40.91	18.16	6	0	10	10	6	4

Our results have proven that regardless of the clinical criteria, Quick DASH, pain, range of motion and key pinch, no statistically significant difference was found between the two techniques. The weaknesses of our study are the limited number of cases and the fact that we compared only one type of suspensionplasty to trapeziectomy alone. The strength of this study is that the follow-up is over 6 years and that the groups of patients are homogenous.

The main hypothesis of this study was verified as there was no statistically significant difference of Quick DASH after trapeziectomy alone compared to trapeziectomy associated with an *abductor pollicis longus* suspensionplasty. Our secondary hypotheses were verified as there were no significant differences between the two techniques in terms of improvement in pain, thumb opposition and key pinch.

Our results therefore suggest that the association of a suspensionplasty to a trapeziectomy is irrelevant.

Table 4 Results of 19 trapeziectomies associated with an *abductor pollicis longus* suspensionplasty in 15 patients

Patient (n)	Follow-up (months)	Quick DASH		Pain		Kapandji score		Pinch	
		Pre-op (0–100)	Post-op (0–100)	Pre-op (0–10)	Post-op (0–10)	Pre-op (0–10)	Post-op (0–10)	Pre-op (kg)	Post-op (kg)
1	119	63.64	18.16	8	2	7	9	1.5	2.5
2	92	75	22.73	6	3	10	10	4	4
3a	88	47.73	11.36	10	5	6	8	2	4
3b	82	40.91	2.27	10	3	9	8	2	5
4a	93	63.64	29.55	6	1	9	10	2	6.5
4b	87	59.03	9.09	5	1	10	10	0.5	6.5
5	87	31.82	2.27	6	0	9	10	5	6
6	88	45.45	9.09	5	1	10	10	1	2
7	76	52.27	0	6	0	10	10	0.5	2.5
8	75	29.55	11.36	5	0	9	9	2.5	3
9	83	34.09	22.73	3	2	10	10	5	3
10	74	86.36	11.36	9	2	7	10	2.5	5
11	81	70.45	31.82	8	4	6	6	1.5	2.5
12	76	65.91	11.36	6	4	10	10	0.5	2.5
13a	84	40.91	22.73	5	3	7	7	10	3.5
13b	78	45.45	13.64	5	1	10	10	10	4.5
14a	76	52.27	0	7	0	10	10	4	5.5
14b	70	61.36	5.55	7	1	10	10	2	4.5
15	103	63.64	20.45	6	5	9	9	3	2.5

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Compliance with ethical standards

Conflict of interest Philippe Liverneaux has conflicts of interest with Newclip Technics, Argomedical, Biomedex, Zimmer Biomet. Louis Barthel, Juan José Hidalgo Diaz, Paul Vernet, Stéphanie Gouzou, Sybille Facca and Yuka Igeta have no conflicts of interest.

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