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Original article

Touch® double mobility arthroplasty for trapeziometacarpal osteoarthritis: outcomes for 92 prostheses

Prothèse Touch® à double mobilité dans le traitement de l'arthrose trapézo-métacarpienne: résultats de 92 implants

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ABSTRACT

Trapeziometacarpal prostheses have been used in the treatment of first carpometacarpal joint osteoarthritis for many years. No studies have demonstrated statistical superiority over gold-standard trapeziectomy, but they have been proved to enable shorter convalescence, better pain relief and faster functional recovery. The aims of the present study were to report functional results in a large cohort treated with the Touch® new-generation dual mobility trapeziometacarpal prosthesis, with comparison to results in the literature. A retrospective study included 92 Touch® prostheses. Assessment comprised pre- and post-operative pain, QuickDASH score and satisfaction rate. Mean follow-up was 1.33 ± 0.4 years. Pain significantly improved after surgery. Functional QuickDASH scores did not significantly differ from those reported in the age-matched general population. Return to work was fast, at 2.6 months. Satisfaction scores were high. There were no major complications such as dislocation, fracture or loosening, but the rate of De Quervain's tenosynovitis was higher than in other studies. The Touch® prosthesis appeared to be a safe and stable implant, providing good satisfaction and very good functional scores and fast return to work and leisure activity. Considering the high rate of postoperative De Quervain's tenosynovitis, we suggest opening the first sheath of the extensors tendons while positioning the prosthesis.

Mots-clés:
Articulation trapézo-métacarpienne
Prothèse
Résultats
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RÉSUMÉ

Les prothèses trapézo-métacarpiennes sont utilisées depuis plusieurs années pour le traitement de l'arthrose carpo-métacarpienne du premier rayon. Bien qu'aucune étude n'ait démontré la supériorité statistique de la prothèse par rapport à la trapézectomie, il a été prouvé que la prothèse trapézo-métacarpienne apporte un meilleur soulagement de la douleur et une convalescence et une récupération de la fonction plus rapides. Les buts de cette étude étaient d'évaluer les résultats fonctionnels d'une large cohorte de patients traités avec la dernière génération de prothèse trapézo-métacarpiennes à double mobilité Touch® et de les comparer à ceux disponibles dans la littérature. Il s'agissait d'une étude rétrospective à propos de 92 prothèses Touch®. La douleur pré- et postopératoire, le score QuickDASH et la satisfaction ont été étudiés. Le suivi moyen était de 1,33 ± 0,4 ans. La douleur était significativement améliorée après la chirurgie. Le score QuickDASH post-opératoire n'est pas différent du score rapporté dans une population moyenne au même âge. Le retour au travail était rapide (2,6 mois). Le taux de satisfaction était élevé. Nous n'avons observé aucune complication majeure comme la luxation, la fracture du trapèze ou le descellement, mais nous avons observé un taux de ténosynovite de De Quervain plus élevé que ceux rapportés dans la littérature. La prothèse trapézo-métacarpienne Touch® paraît être un implant sûr et stable. On observe un bon taux de satisfaction et de très bons scores fonctionnels et un retour rapide au travail et aux

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activités de loisirs. Vu le haut taux de ténosynovite de De Quervain observé en postopératoire, nous suggérons d'ouvrir le premier compartiment des extenseurs pendant la mise en place de la prothèse.

Introduction

Osteoarthritis of the first carpometacarpal (CMC) joint is an invalidating disease, with high prevalence of up to 70% in the general population [1]. It is most commonly found in women and affects 25% of post-menopausal women [2]. Trapeziectomy and prosthesis are the two most commonly used surgical options to treat first CMC osteoarthritis when conservative treatments have failed. Which treatment is best remains open to debate. No treatment has yet shown statistical superiority [3] as no randomized controlled studies have compared trapeziometacarpal (TMC) prosthesis versus trapeziectomy. However, several comparative studies [4–6] showed that patients with prosthesis achieved faster recovery, faster and better pain relief, stronger grip function and better range of motion than those with trapeziectomy and tendon interposition, and that there were fewer complications in prosthesis groups. A recent updated systematic review by Remy et al. [7] confirmed that TMC prosthesis provides rapid reduction in pain and a rapid improvement in function that is stable over time.

De La Caffinière described the first prosthesis in 1973 [8] and, since then, many different models have been developed. Over the years, the design changed, in terms of material and surface properties and of primary fixation mode (cemented, non-cemented) and modularity. The two main complications of the prosthesis are reported to be aseptic loosening and dislocation [9]. To prevent these, the dual mobility concept, first developed for the hip by Bousquet et al. in the 1970s, was adapted for TMC prostheses. Dual mobility prostheses are the latest implants, on the market since 2012 [10]. Currently, there are few studies of large series with dual mobility TMC prostheses, all concerning the Moovis® implant, which was the first on the market.

Our study aimed to report functional results in a large cohort treated with the Touch® dual mobility TMC prosthesis and to compare results with those available in the literature.

Patients and method

This was a retrospective, single-center, single-surgeon study. Patients underwent CMC joint replacement by Touch® prosthesis, between July 2018 and March 2020. All showed Dell stage 3–4 on preoperative X-ray.

Prosthesis

Touch® is the dual mobility TMC prosthesis manufactured by Kerimedical. It was introduced in November 2012. The anatomic metacarpal stem is available in six sizes and is composed of titanium covered by porous titanium and hydroxyapatite (HA). The trapezial component is available in two designs: spherical or conical. There are two sizes (9 and 10 mm) composed of stainless steel covered by porous titanium + HA. There are two types of neck: straight or offset (15°) and three lengths (6, 8 and 10 mm). Head diameter is 4 mm. The insert is in polyethylene. Altogether, there are 144 possible combinations, to enable optimal fit with the patient's anatomy (Figs. 1 and 2).

Surgical technique

The operation was performed by an expert level 5 surgeon [11], under regional anesthesia with a tourniquet on the arm (250 mmHg). The dorsolateral approach centered on the TMC joint was used. We did not release the abductor pollicis longus (APL). First, the TMC joint capsule was opened and, after removal of osteophytes, the joint was released. Then, a guide was used to cut the proximal metacarpal with an oscillating saw. The metacarpal section should be 5 mm maximum. Next, a hole was made in the medullary canal with a reamer and was progressively enlarged with larger sized rasps until the appropriate size was achieved. The final metacarpal implant was then positioned. Osteophytes and calcifications were then resected from the trapezium. The metacarpal base was dislocated palmarly to get a clear view and access to the trapezium and its geometrical center without any fluoroscopic control. The trapezium was prepared with curettes and then reamers, and a trial cup was inserted. The trial head and necks were also inserted and the joint was reduced. Mobility and the presence of a piston were checked and stability assessed. Thumb column tension was also used to determine the appropriate neck length with trial implants. Finally, definitive implants were inserted and the joint was reduced and reassessed. The capsule was then closed, and soft tissue and skin were closed with non-absorbable suture. A thick bandage and plaster were applied for seven days. An orthosis was used for three weeks, during which the thumb could be gently mobilized (Figs. 3 and 4).

Assessment

Patients filled out a standard questionnaire. Occupational status was recorded. A visual analogue scale (VAS) was used to rate pre- and post-operative pain. Satisfaction with surgery was graded 1–10 and patients were asked whether they would recommend this surgery to their friends or family and undergo the procedure on the other hand. The Quick Disabilities of the Arm, Shoulder and Hand questionnaire (QuickDASH) [12] was completed: a score of 0 points indicates no disability and a score of 100 points indicates maximum disability.

Statistical analysis

The statistical analyses were performed using SPSS SigmaPlot 13 software.

Quantitative variables were reported as median and interquartile range, and qualitative variables as numbers and percentages. Multivariable analyses were performed. A Wilcoxon test was used to compare pre-versus post-operative pain. Spearman's rank correlation was assessed between occupational status and De Quervain's disease and between gender and satisfaction/QuickDASH.

Results

The cohort comprised 104 procedures with dual mobility prostheses. Twelve patients were lost to follow-up and excluded from analysis. Patients were predominantly women (91%); mean age was 62.24 years (±7.9). Mean follow-up was 1.33 years (±0.4). The prosthesis was in the dominant hand in 44 patients (47.8%).

Twenty-eight patients were still working and 64 were retired. All active patients were able to return to work after surgery, except one auxiliary nurse, at a mean 2.6 months (±1.5). Fifty-four (58.6%) patients had manual hobbies (sewing, fishing, gardening, music), which only 2 could not resume (guitar and piano playing).

Fig. 1. Touch® prosthesis (spherical cup).

Fig. 2. Touch® prosthesis (conical cup).

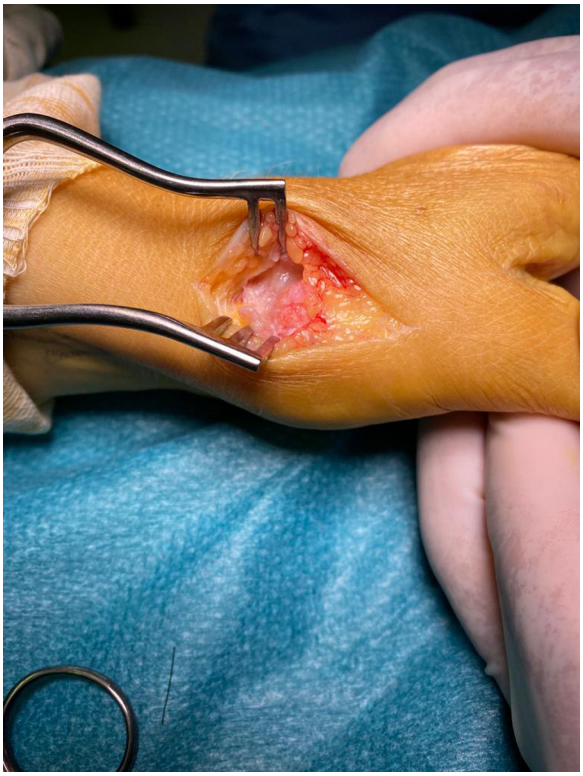

Fig. 3. Intraoperative view—surgical approach.

Fig. 4. Postoperative X-ray.

Before surgery, pain was rated at 9 (range, 8–9.75) on 1–10 VAS, and postoperatively at (range, 0–2.75).

Satisfaction on a 1–10 scale was rated at 9.87; 94.5% of the patients would recommend the surgery to a friend or a relative and 83 (90.2%) would be willing to undergo the procedure on the other hand if they had to.

Mean postoperative QuickDASH score was 6.82 (range, 0.57–22.15) (Table 1).

The complications rate was 16.3%: 9 cases (9.7%) of De Quervain's tenosynovitis, 5 of CRPS (5.4%) and 1 (1%) superficial wound infection treated 10 days' antibiotics treatment and not requiring revision surgery (Table 2). Two patients with De Quervain's tenosynovitis underwent release surgery and the others were treated conservatively by splint and injections.

Occupationally active patients were 4 times more likely to suffer from De Quervain's tenosynovitis than retired patients (Table 4). Patients with non-dominant hand surgery were 1.3 times more likely to develop De Quervain's disease (Table 3).

Men were more satisfied than women, and QuickDASH score was higher in female patients (Table 4).

Table 1
Clinical characteristics.

Characteristics	n	p-Value
Female (%)	84 (91)	
Male (%)	8 (9)	
Age. mean (SD). (years)	62.24 (7.9)	
Dominant hand n (%)	44 (47.8)	
In work n(%)	28 (30.4)	
Retired n (%)	64 (69.6)	
Follow-up. mean (SD)	1.33 (0.4)	
QuickDASH. median [Q1–Q3]	6.82 [0.57-22.15]	
Preoperative pain on NPRS. median [Q1–Q3]	9 [8-9.75]	<0.00001
Postoperative pain on NPRS. median [Q1–Q3]	0 [0-2.75]	<0.00001
Satisfaction score	9 [8–10]	
Would recommend to friend/relative n (%)	87 (94.5)	
Would do the other hand, if necessary, n (%)	83 (90.2)	
Return to work. mean (SD) (months)	2.6 (1.5)	

NPRS: numeric pain rating scale.

Discussion

In this study, pain was significantly reduced after the surgical procedure. Functional QuickDASH scores were satisfactory, being not significantly different from those in an age-matched general population [13]. Return to work was fast and almost all patients could return to work or manual hobbies. The global satisfaction was high.

We report a very low rate of major complications: 1 case of superficial infection and none of dislocation, trapezium fracture or implant loosening at the tile of writing, with a mean follow-up of 1.33 years. Dremstrup et al. [14] reported 9 cases of intraoperative

Table 2
Postoperative events.

Complications	n (%)
Dislocation	0
Loosening	0
Trapezium fracture	0
Infection	1 (1)
CRPS	5 (5.4)
De Quervain's tenosynovitis	9 (9.7)

CRPS: complex regional pain syndrome.

Table 3
Association between De Quervain's tenosynovitis and various outcomes (multivariate analysis expressed as odds ratios and 95% confidence interval).

	Odds ratios	Lower 95% CI	Upper 95% CI
Age	1.037	0.928	1.159
Follow-up	0.388	0.0447	3.361
In work/retired	4.461	0.787	25.276
Non-dominant hand	1.378	0.326	5.825

Table 4
Correlation coefficient (Spearman's rank correlation)

	ρ	p-Value
DQ tenosynovitis working vs retired	0.18	0.08
Gender satisfaction	-0.201	0.05
Gender QuickDASH	0.228	0.03

DQ: De Quervain; *QuickDASH*: Quick Disabilities of the Arm, Shoulder and Hand questionnaire.

trapezium fracture. The present very low rate of dislocation is as previously reported for dual mobility prostheses by Dreant et al. [15], Tchurukdichian et al. [16] in 2019 and Martins et al. in 2020 [17]: dual mobility seems to provide better stability.

The present incidence of De Quervain's tenosynovitis was higher than for Martins et al. (7.3%) [17] or Tchurukdichian et al. (4.3%) [16] but lower than for Goubau et al. (17%) [18]. In the literature, there is only one article [18] about De Quervain's disease after TMC arthroplasty. The epidemiology of De Quervain's disease in the general population is not well established [19]. A French article in 2006 reported prevalence 0.7% in men and 2.1% in women [20]. Goubau et al. found that pre- to post-operative length change in the thumb column was not a causal factor for the development of De Quervain's tenosynovitis. Goubau et al. suggested that APL release and reinsertion at end of procedure could be a trigger for De Quervain's disease. However, we did not use this technique, as mentioned above.

Conclusion

It now seems that the TOUCH® dual mobility prosthesis is a safe and reliable implant that gives high satisfaction with functional scores comparable to those of the general population. It also allows fast return to work and leisure activities. Dual mobility ensures better stability than previous designs. The present study needs further follow-up to assess the long-term complications such as implant loosening. Considering the high rate of De Quervain's tenosynovitis, we suggest opening the first extensor compartment and releasing the abductor pollicis longus and extensor pollicis brevis to prevent the occurrence of De Quervain's tenosynovitis, as it is a debilitating disease that jeopardizes the success of TMC surgery.

Human and animal rights

The authors declare that the work described has not involved experimentation on humans or animals.

Informed consent and patient details

The authors declare that this report does not contain any personal information that could lead to the identification of the patient(s) and/or volunteers.

Disclosure of interest

The authors declare that they have no competing interest.

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Author contributions

All authors attest that they meet the current International Committee of Medical Journal Editors (ICMJE) criteria for Authorship.

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