



Effect of splint on pain, function and quality of life in trapeziometacarpal osteoarthritis patients?

C. GABRIEL, O. BARBIER, M. DAVID, J. MANON, C. DETREMBLEUR, X. LIBOUTON

From the Cliniques universitaires Saint-Luc, Service d'orthopédie et de traumatologie de l'appareil locomoteur, Brussels, Belgium

Trapeziometacarpal (TM) Osteoarthritis is one of the most common osteoarthritis. It causes pain, loss of mobility and strength and affected function in daily life. Splint is one of the conservative treatments proposed to patients.

The purpose of this study was to assess the effect of this conservative treatment on pain, function and quality of life at long-term.

We sent 193 questionnaires to patients who received a CMC splint for their TM osteoarthritis. The CMC splint immobilizes only the TM joint and leaves free the interphalangeal joint of the thumb and the wrist. First, we computed how many patients had finally undergone surgical treatment. On the non-operated patients, we analyzed the pain (VAS), the function (QuickDASH score) and the quality of life (SF-12). We compared the results to literature and norms.

Finally, 186 people could be included in the study, 115 we answered and 28 were operated on (24%). After 4 years (3.8±1.7 yrs) of conservative treatment, The VAS and QuickDASH scores were significantly worse comparatively to a cohort of healthy patients, trapezectomy and arthrodesis patients. The SF-12 scores were reduced from 20% comparative to norms. In conclusion, few patients had surgery after splinting as a conservative treatment. However, these non-operated patients do not provide good results.

Keywords: TM osteoarthritis; CMC splint; VAS; QuickDASH; SF-12.

INTRODUCTION

The trapeziometacarpal (TMC) joint osteoarthritis (AO) is like any other osteoarthritis, a chronic condition that causes progressive degeneration of the cartilage of the joint (1, 2).

This osteoarthritis is not an uncommon condition, particularly in post-menopausal women (2). The radiological prevalence of isolated carpometacarpal and scapho-trapezoidal osteoarthritis were 25% and 2% respectively. The prevalence of combined carpometacarpal and scapho-trapezoidal osteoarthritis was 8% (3).

Other conditions can cause this type of osteoarthritis such as acute or chronic trauma, overuse of the hand, hormonal factors and genetic influences (4).

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- C. Gabriel CM.D.¹
 - O. Barbier M.D.^{1,2}, Ph.D.^{1,2},
 - M. David M.D.¹,
 - M. Manon M.D.¹,
 - C. Detrembleur Ph.D.²
 - X. Libouton M.D.

¹Cliniques universitaires Saint-Luc, Service d'orthopédie et de traumatologie de l'appareil locomoteur, Brussels, Belgium

²Université catholique de Louvain, Secteur des Sciences de la Santé, Institut de Recherche Expérimentale et Clinique, Neuro Musculo Skeletal Lab (NMSK), Brussels, Belgium.

Correspondence : C Gabriel, M.D., Cliniques universitaires Saint-Luc, Service d'orthopédie et de traumatologie de l'appareil locomoteur, Avenue Hippocrate 10, B-1200 Brussels, Belgium.

Email: gabriel_charlotte@yahoo.fr

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This disorder can have among other consequences; pain, stiffness, loss of mobility, and a decrease in grip strength (4). Therefore resulting in an altered hand function in daily life activities and in work. This disorder can affect the quality of life.

A set of treatment has been proposed to relieve pain and improve the function, but no treatment can stop the evolution of this disorder (5).

The first step of the patient care is the conservative treatment based on pain management, anti-inflammatory intake, wearing an immobilization splint, physiotherapy and the RICE protocol. It consist of putting the joint to rest with ice on it, compression with a bandage or a splint, and elevating the limb (6, 7).

This protocol is an integral part of our conservative treatment. Other types of non-surgical treatments have been proposed such as intra-articular steroid injections, analgesic or hyaluronic acid injections (2, 7). Surgical treatments are often offered after a failure of conservative treatments. There is a large variety in these surgical treatments. The most used treatments are trapeziectomy with or without plasty or interposition, arthrodesis and arthroplasty, which is a more recent technique (8, 9).

In the literature we find conclusive results for conservative treatment. Indeed, it allows to reduce pain and increase the grip strength at least in the short term (4). There is also evidence that conservative treatments are more effective in the early stages of osteoarthritis (10). The longest evaluation of conservative treatments found in the literature is 18 months (11).

The purpose of our study is to evaluate in the long-term (4 years) the effects of conservative treatments on pain, the function and the quality of life.

First, we computed the number of patients who decided to have surgery over a period of 4 years. We therefore considered this percentage of patient as a failure of conservative treatments, which was our first hypothesis.

Our second hypothesis was that patients who who did not have surgery performed well in their daily life with conservative treatments, without experiencing lots of pain, or loss off strength and enjoyed a correct quality of life. We then compared their results with VAS score, QUICK DASH and SF-12 compared to literature data for patients who

underwent either a trapeziectomy, osteotomy or arthroplasty and also for healthy subjects.

MATERIAL AND METHODS

We selected 193 patients who had been referred to a CMC splint for osteoarthritis TM in our clinical database. We sent questionnaires by post. If the patients did not answer within two weeks, we phoned them maximum twice.

Only patients who received a CMC splint for a minimum of 1 year and a maximum of 6 years were included in the study. This splint was to be prescribed as part of a TM osteoarthritis. To confirm this diagnosis patients had either to have a thumb x-ray showing signs of osteoarthritis or a complete positive clinical examination for this disorder. The age of the patients range from 25 to 85 years old. We included both males and females.

Exclusion criteria were patients who received this splint for another pathology, such as Quervain tendonopathy.

The splint is a CMC splint. It immobilizes only the TM joint leaving the interphalangeal joint and the wrist free. This splint was not made to measure and was delivered only by our orthopaedic technician.

Patients could keep this splint day or night or only during painful activities.

Most patients have also been prescribed physiotherapy, rest and analgesics.

In our study we considered that intra-articular injections were part of the conservative treatments.

We used three scores to assess the pain, hand function and impact of the disorder on the general and mental health of the patient.

These scores are the VAS score, the QuickDASH score and the SF-12.

The VAS score is an analog scale of pain assessing that of 0 to 100 representing no pain and 100 unimaginable pain. This pain scale has been validated in the literature to quantify the pain of a patient with upper extremity pathology (12).

The QuickDASH has also been validated in the literature for evaluation of the upper limb.

This score makes it possible to take into account the different aspects that a pathology of the upper limb can have on the patient such as his symptoms,

his functionality, and the impact on his social activities and daily life (12, 14).

The SF-12 is also a short test of another SF-36 test. These two scores make it possible to see the impact of a given pathology on the physical health (PC) of a patient as well as his mental health (MC) (15).

Statistical analyses were performed using the Sigmaplot 14.0 software of SPSS. The significance level was fixed at 0.05. A descriptive statistic was used to define our sample (mean \pm standard deviation and range).

We used a one-Way ANOVA to compare our results to literature. We compared our conservative treatments (splint) to a cohort of patients operated by a trapeziectomy, arthrodesis and arthroplasty (15) and to norms matched in age (16, 17). We selected the scores of operated patients' group at long term only (between 1 to 6 years).

We used a spearman correlation to study the relation between our scores and age, gender, duration of treatment and affected side. The coefficients rated as: 0-0.30 = little to no correlation, 0.30-0.5 = fair, 0.5-0.70 = moderate and 0.70-1 = high correlation (18).

RESULTS

193 questionnaires were sent to patients who received a CMC splint for their TM osteoarthritis.

7 were excluded. In total, 186 people could be included in the study. 115 answered and 28 were operated on (24%) (Figure 1).

In the non-operated patients (n=87-table I), we observed a ratio of three women for a man, the average age was 59.8 years old. The follow-up is located between 1 to 6 years with an average of 3.7 years. The mean scores were respectively 32.4 for VAS, 40.8 for QuickDASH, 40.2% for SF12-PC and 44% for SF12-MC (Table I).

The table 2 showed VAS and QuickDash scores. We compared scores at long term between patients with splint and operated patients (Table II).

The mean VAS score of our patients was 32.4 ± 17.2 . This score compared to data from the literature after trapeziectomy, arthrodesis and arthroplasty was significantly greater (2 times greater). The average QuickDASH score in our patient cohort was significantly worse than QuickDASH scores undergoing a trapeziectomy and arthrodesis (2 times worse). The QuickDASH score of patients operated by arthroplasty was not different from our cohort.

The table III showed QuickDash and SF-12 scores. We compared scores to norms matched in age (Table III).

The QuickDASH score of our non-operated patients is worse than people with no upper limb pathology (2 times greater). The SF12-PC and MC

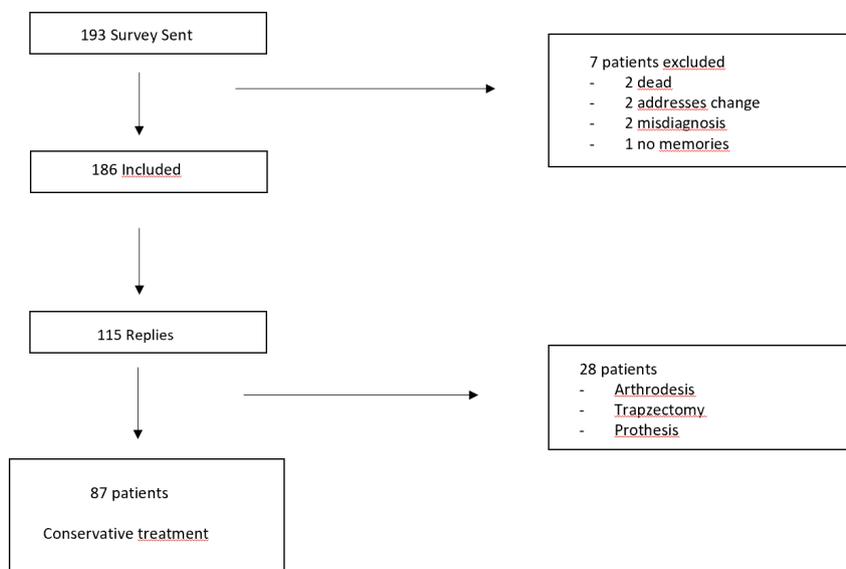


Figure 1.

Table 1 : Descriptive statistic of patients after conservative treatment

Conservative (n=87)	Mean \pm SD	Range (min-max)
F/M	73/14	
Age (years)	59.83 \pm 9.2	29-83
Duration of conservative treatment (years)	3.81 \pm 1.7	1.3-6.1
VAS (/100)	32.4 \pm 17.2	0-80.0
QuickDASH	40.80 \pm 22.6	2.1-81.8
SF12 PC	40.17 \pm 8.9	23.4-64.3
SF12 MC	44.03 \pm 10.5	21.1-63.3

F=female; M=male

SD:standard deviation

PC:physical component – MC mental component

Table 2 : Results of ANOVA on VAS and QuickDash scores compared to literature

	VAS MEAN \pm SD	QuickDASH MEAN \pm SD
Arthroplasty (n=22)	13.0 \pm 1.0*	45.6 \pm 1.0
Trapezectomy (n=965)	17.3 \pm 9.9*	28.6 \pm 4.9*
Arthrodeses (n=38)	17.9 \pm 2.8*	27.3 \pm 9.4*
Conservative (n=87)	32.4 \pm 17.2	40.8 \pm 22.6
Pvalue	<0.001	<0.001

* **significant difference**

SD= standard deviation

Table 3 : Results of ANOVA on scores compared to norms

	QuickDASH MEAN \pm SD	SF12 PC MEAN \pm SD	SF12 MC MEAN \pm SD
Norms (n=130)	18.0 \pm 18.5*	50.7 \pm 9.1*	50.9 \pm 8.9
Conservative (n=87)	40.8 \pm 22.6	40.17 \pm 8.9	44.0 \pm 10.5
Pvalue	<0.001	<0.001	<0.001

SD= standard deviation

Table 4 : Spearman correlation

	Age	Affected side	Gender	Duration of treatment	VAS
Affected side	0.19				
Gender	-0.22	-0.11			
Duration	0.22	0.38	0.01		
VAS	-0.15	-0.30	0.07	-0.15	
QuickDASH	-0.04	-0.30	0.14	-0.18	0.35
SF12-PC	-0.08	0.11	-0.02	0.04	-0.31
SF12-MC	0.03	-0.02	-0.02	0.01	-0.04

Significant values are in bold

scores were also significantly worse (from 10 % and 7% respectively).

The table IV showed the correlations between scores and demographic data. We showed that only the affected side (dominant, not dominant or bilateral) was correlated to VAS and QuickDASH scores. The patient with bilateral splints had the worse scores (Table IV).

DISCUSSION

The first question our study asked, was to see in the 4 years after the implementation of a conservative treatment how many patients would resort to surgery. This change in treatment could be seen as a failure of conservative treatment at least initially. Only 24% of our patients surveyed had surgery. This represents a low rate. We could deduce that conservative treatment based on the placement of a CMC splint, anti-pain with or without intra-articular injection and physiotherapy sessions was an appropriate treatment for osteoarthritis TM.

However, when questioning the cohort of non-operated patients, their results in the various questionnaires were not conclusive.

Indeed, our non-operated patients expressed significant pain despite our conservative treatment. The results of our patients with VAS score are worse compared to operated patients regardless of surgical technique. Hand function results in daily life were also not as good as one would like.

Indeed, the results at the VAS score of our patients (32.4 ± 17.2) is almost half as good as the results at VAS score of operated patients; trapeziectomy (17.3 ± 9.9), arthroplasty (13.0 ± 1.0) and arthrodesis (17.9 ± 2.8). The best result of VAS is after arthroplasty. In addition to our average VAS scale, which is higher, so is our standard deviation. This could highlight a discrepancy of the results within our patient's cohort. One of the explanations for this discrepancy may be the fact that we do not differentiate according to the osteoarthritis stage of our patients.

When analyzing patients' results at the QuickDASH score, one would expect that patients who had a joint replacement performed better than the others given their VAS score results. But it is quite the opposite with their average of 45.6

± 1.0 compared to the trapeziectomy (28.6 ± 4.9), arthrodesis (27.3 ± 9.4) and finally our conservative treatment (40.8 ± 22.6). Regardless of our choice of treatment, surgical treatment or conservative treatment, when we compare the QuickDASH results to the norm (18.0 ± 18.5), we are less efficient.

None of our treatment allows the patient to recover a full function of his upper limb or the one before the beginning of this disorder.

We did not find articles in the literature that took into account the SF-12 or the SF-36 of the operated patients of a trapeziectomy, arthrodesis or arthroplasty. Therefore, we decided to compare our results to a healthy cohort of the healthy population with no problem in the upper limb.

This allowed us to see what impact such a pathology could have on health in general. We can see a slight difference in the SF-12 scores compared to the different results obtained for the QuickDASH or the VAS scores with even our similar standard deviation. We can then understand by its results that the implication in the general health of this pathology is less than its implication in the functionality of the upper limb or maybe that the patients have learned to live with this pathology.

One can ask why patients do not get surgery faster if their pain is not relieved by conservative treatments. Are patients afraid to have surgery or are surgeons not offering the surgical option quickly enough? It is true that any surgical procedure can lead to complications. These risks must also be weighed in the choice to continue conservative treatment or to switch to surgical treatment. In addition, there are many different surgical techniques all with their advantages and disadvantages (8, 9, 16, 17, 19).

The choice of the technique must take into account the surgeon's skills and the patient's expectations.

For some patients conservative treatment may be a good treatment while waiting for surgical management.

In fact, there are 17 patients (20%) who are in the standards for the QuickDash (20). There are 63 patients (72%) who are in the standard for SF12-PC and 47 patients (54%) who are in the norm (21).

Most of the conservative treatment studies for OA are short-term studies with a maximum follow-up at one year. The results of these studies from VAS and

QuickDASH scores are more convincing than in our study. However, we have a longer follow up with an average of 3.81 ± 1.7 years (11, 22). This finding gives even more value to our first hypothesis that conservative treatment is a good waiting treatment.

Our study included only patients who received exactly the same type of splint, allowing for a certain homogeneity in our conservative treatment. However, different studies showed that the splint style has very little impact on different results at VAS or DASH score (22, 24).

Some studies showed that conservative treatment is more effective in the early stages of osteoarthritis. One of our limitation is that we did not take into account the stage of osteoarthritis that could potentially affect the results (4, 10).

Another limitation of our study is that we have no results at VAS, DASH score and SF-12 when implementing our conservative treatment. Then, we cannot compare the evolution of our own patients, we compared them with the results of other studies.

Our cohort of patients is much smaller than those found in literature reviews especially for surgical technique such as trapeziectomy. This difference may lead to a sizeable bias.

CONCLUSION

Our study was able to highlight different aspects of conservative treatments. At first, only a small number of patients went through the surgical option during our follow-up. The rest of the patients did not score well on the various tests.

Another question raised by this study is trying to understand why people who have such bad results especially at VAS score and QuickDASH score do not resort to surgery more quickly? Especially that the results found in the literature are rather encouraging for some surgeries. Are patients afraid of the surgery? Or don't surgeons have enough information about the satisfactory results of various surgeries?

The fact that our standard deviations are relatively large especially VAS score and QuickDASH highlight non-homogeneity of our results, which means that some patients are very satisfied with conservative treatment and others not at all. If we

could highlight a prognostic criterion of failure of conservative treatment and thus offer more timely surgery adapted to these patients, then we could then have a more optimal management of osteoarthritis TM.

Finally, the results at the SF-12 score are certainly worse than for a cohort of patients. However, proportionally to the other tests, these are better. Can we conclude that in a way OA TM has little impact on the overall health of our patients whether physically or mentally?

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