

Trapeziometacarpal joint osteoarthritis: a prospective trial on two widespread conservative therapies

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Summary

Introduction: The trapeziometacarpal (TMC) joint osteoarthritis (OA) is at the origin of important secondary functional disability to pinch as well as a painful grip. Several conservative therapies are often considered in the early stages of TMC OA to decrease pain, recover function and slow the evolution of OA. They include massage therapy, heat applications, stretching of the first web span and assisted mobilization of the TMC joint. However, as with other arthritic joints, many physicians often suggest administering intra-articular corticosteroids.

The aim of this study was to assess the effect of 10 sessions of physiotherapy *versus* a single corticoid intra-articular injection. Both treatments were associated with TMC splinting.

Methods: Two groups of twenty-five patients received either physiotherapy or a corticoid injection. They were followed over a one-year period. All of them were assessed for pain, function, strength at 2, 6 and 12 months and overall satisfaction at the

end of the study.

Results: With the infiltrative therapy, the parameters improve more quickly, whereas patients treated with physiotherapy show longer persistence regarding remission of pain. The final functional evaluation scores at one year are similar to pre-treatment scores.

Conclusion: In early stages of TMC OA, corticosteroids articular injections and physiotherapy treatments can improve the painful symptoms but treatment with corticosteroids is faster. Although hand functions return to average scores similar to those of pre-treatment, physiotherapy program is associated with a longer remission of pain.

KEY WORDS: osteoarthritis, physiotherapy, steroid injection, trapeziometacarpal joint.

Introduction

The trapeziometacarpal (TMC) joint osteoarthritis (OA), or basal joint arthritis of the thumb, is the second most common degenerative joint disease of the hand¹⁻³. Middle-aged and elderly post-menopausal women are the most affected⁴. Primary OA is usually idiopathic, however jobs involving repetitive use of the thumb are more often associated with TMC OA^{5,6} and less frequently associated with rheumatoid arthritis or trauma⁷. The possible role of obesity in hand OA is also well-known and it must be included in the list of risk factors^{8,9}.

TMC OA is often a disabling condition because of the pain and the adduction contracture with the narrowing of the first web space which compromise pinch and grasp. Being instrumental to thumb opposition, TMC joint OA impairs both the kinematics of the first digital ray as well as the overall hand functioning. Differing degrees of OA and pain intensity help the physician decide whether to opt for a conservative or a surgical treatment¹⁰⁻¹². Conservative therapy of TMC OA aims at relieving pain while restoring thumb strength and is generally prescribed in patients suffering from early stages of basal joint arthritis or prior to surgical reconstruction of the joint, indicated in more advanced arthritic stages^{1,10}. Management of TMC joint OA can be developed in different ways with local application of heat, motion exercises and muscles strengthening among these. Many physicians also suggest intra-articular injections of drugs such as corticosteroids, hyaluronic acid or PRP^{13,14}. Splinting of the joint has

also been proposed as an important part of conservative management of TMC joint OA¹⁵⁻¹⁷.

This study intended comparing two groups of patients affected by early stages of TMC joint OA treated with either physiotherapy or a corticoid intra-articular injection. Both treatments were followed by a period of joint splinting. The Authors report the clinical results, to support and verify nonsurgical treatments for the management of this frequent degenerative hand disease.

Materials and methods

This is an open-label trial approved by the local ethical committee conducted between January 2015 and March 2016. The study was conducted according to international standards and as required by the journal, meeting the ethical standards requested¹⁸.

Inclusion criteria

Patients presenting a primary TMC joint OA with a radiographic Eaton-Littler stage 1 to 2 and pain were considered for this study. As well known, Eaton-Littler classification¹ is a radiographic rating used to define the severity of basal joint arthritis.

Patients selection was based on clinical evaluation including isolated pain at the base of the first metacarpal, tenderness over the TMC joint, a positive grind test result and a radiographic assessment including antero-posterior and lateral views of the TMC joint documented with recent radiographs (<6 months

before). Patients suffering from rheumatoid arthritis or from the sequelae of trauma were excluded from the study; patients that underwent any recent treatment for trapeziometacarpal OA and subjects that received previous injections were also excluded.

Population of the study

Patients were examined in the out-patient Orthopaedics & Hand Surgery department of The Catholic University School of Medicine, Rome, Italy. All the potential candidates, affected by pain on the radial side of carpus, suggesting a TMC joint AO, were referred to and examined by a hand surgeon. If the patients fulfilled the criteria previously stipulated, they were selected for the study. Sixty-nine patients were recruited consecutively in one year. All of them presented painful primary TMC OA with a radiographic Eaton-Littler stage 1 to 2. Patients were proposed two kinds of treatment: ten sessions of physiotherapy followed by four weeks of joint protection by splinting, or a corticosteroid intra-articular injection, followed by four weeks of splinting. Of the initial group, 40 patients chose the physiotherapy program, 29 the joint injection treatment. The first consecutive 25 patients who chose the physiotherapy were selected for the study as group *P*, the first consecutive 25 patients which chose the corticoid injection were selected as group *C*. The remaining patients also received treatment, but they were not included in the study. Three cases (2 from group *P* and 1 from group *C*) lost to follow-up and replaced by three more consecutive cases (Fig. 1).

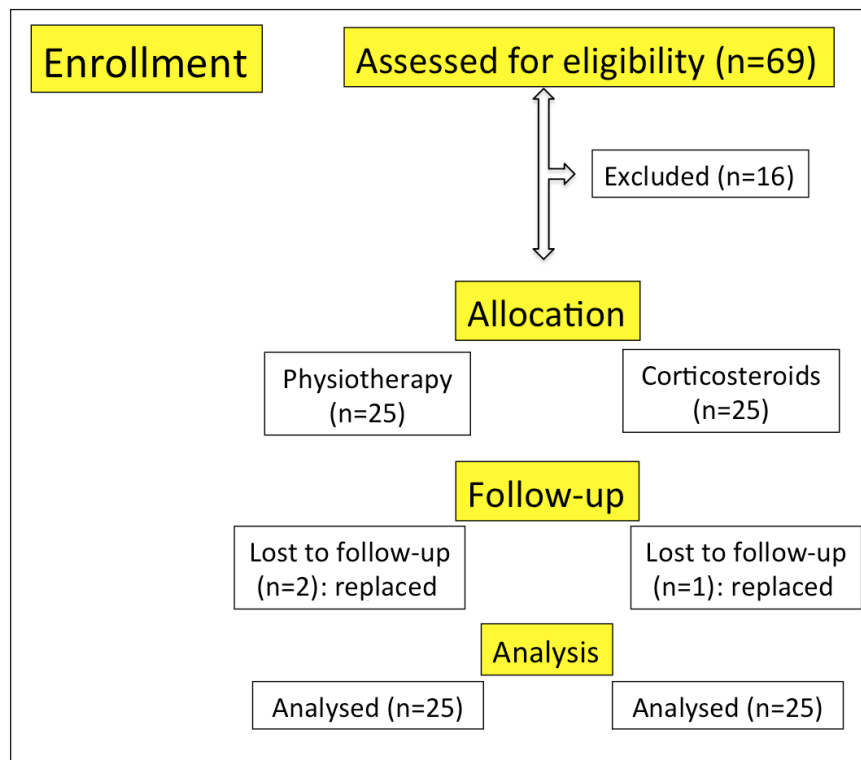


Figure 1. Patients enrollment.

Upon first examination, among the 50 selected for the study, 19 patients presented an Eaton-Littler stage 1 and 31 patients a stage 2. In 21 cases the TMC joint OA affected both hands, but pain was more intense on the dominant side. The onset of symptoms ranged between 5 and 26 months prior to treatment (with a mean period of 9 +/- 22 SD months). Women prevailed in sex distribution (41 women versus 9 men). The mean age was 62 years +/- 6 SD (range 44-76) (Table I). All patients signed a written informed consent to participate at the study.

Treatment

Group P: The care plan included 10 physical therapy sessions with a hand therapist, monday to friday for two weeks. A physical therapy session (30-40 minutes each) included both physical agent application and therapeutic exercise. The application of heat (paraffin wax and hot pack) was followed by passive and active mobilization of the TMC joint, massage therapy and stretching of the first web span. A thermoplastic custom-made thumb modified spica splint¹⁹ (with first metacarpal positioned in slight abduction and free thumb metacarpal-phalangeal and inter-phalangeal joint), was applied during the initial visit (Fig. 2).

Group C: Patients were treated in an out-patient surgery. Hand skin was disinfected with betadine (10% povidone-iodine) topical antiseptics solution. The patients' TMC joint thumbs were manipulated manually. The injection was given with a 25-gauge needle, dorsal to the abductor pollicis longus- extensor pollicis brevis tendons. The needle was placed so as to slip down to the base of the first metacarpal and advanced to pierce the joint capsule (Fig. 3). The same physician (the first Author L.R.) performed all the injections. The methylprednisolone acetate (40 mg/1 mL) (that is the commonly used corticosteroid in our hospital for these pathologies) and lidocaine (10 mg) solution was injected until the joint was full. The hand was then placed in an analogous custom-made thermoplastic splint.

Post-treatment care

Patients were instructed to keep full-time splinting for four weeks so as to avoid mechanical stresses to the TMC joint and to promote the resolution of the inflammation and pain. After this period, they were instructed regarding hand activities which needed avoiding so as to preclude relapse of pain in the TMC joint; these included strong grasping, imbalance between joint movement and rest, exposure of the finger joints to vibrations and using the joint in an unstable plane²⁰.

Functional assessment

Each patient received a subjective assessment for: 1. TMC joint pain and restriction of activities to four degrees: a. no pain or restriction, b. mild pain with use and some restriction, c. pain at rest with some restriction, d. pain at rest with severe restriction; 2. function in daily living activities, by a questionnaire for arm, shoulder and hand disabilities (DASH)²¹; 3. overall

Table I. Demographic characteristics of the study population.

Patients	Sex	Eaton-Littler	Age	Group	Onset (months)
1	f	1	44	p	6
2	f	2	51	p	12
3	f	1	56	c	5
4	f	2	60	p	6
5	m	2	62	c	7
6	f	1	68	c	7
7	f	1	65	c	5
8	f	2	57	c	9
9	m	2	67	c	8
10	m	2	54	p	12
11	f	1	70	p	6
12	f	1	54	c	9
13	f	2	66	p	12
14	m	2	68	c	6
15	f	2	68	c	6
16	f	2	72	p	9
17	f	2	69	p	6
18	m	2	73	c	10
19	m	2	66	c	12
20	f	1	57	p	6
21	f	2	62	p	12
22	f	1	68	p	8
23	f	2	71	c	9
24	m	2	67	p	7
25	f	2	50	p	10
26	f	1	62	p	6
27	f	2	47	c	12
28	f	2	60	p	26
29	f	1	58	c	12
30	f	1	67	p	8
31	f	1	54	c	10
32	f	2	68	c	9
33	m	2	62	c	6
34	f	1	59	p	6
35	f	2	76	c	9
36	f	1	57	c	24
37	f	2	60	p	8
38	f	1	70	c	8
39	f	2	59	p	6
40	f	2	64	p	13
41	f	1	64	c	6
42	f	1	57	p	5
43	f	1	54	c	7
44	f	2	68	c	8
45	f	2	55	c	9
46	f	2	53	p	6
47	f	2	72	p	14
48	m	2	66	c	12
49	f	2	60	p	14
50	f	1	66	p	10



Figure 2. Splint limiting the TMC joint stress while allowing the MCP joint motion.

treatment satisfaction, on a scale of 1 to 10 (1=totally dissatisfied and 10=completely satisfied) at 12 months.

An objective assessment was made to evaluate key pinch strength, recorded in kilograms by a Preston pinch meter (Fig. 4).

Assessments were performed in four stages: just prior to treatment, then at 2, 6 and 12 months. The same physicians (the second Author A.M.) took care about all these assessments. The complications following therapies were also recorded.

Statistical analysis

All data were initially entered into an Excel database (Microsoft, Redmond, Washington-United States) and the analysis was performed using the Statistical Package for the Social Sciences Windows, version 13.0 (SPSS, Chicago, Illinois, USA). Descriptive statistics consisted of the mean \pm standard deviation (SD) for parameter with gaussian distributions (after confirmation with histograms and the Kolmogorov-Smirnov test). Comparison variables in time (pre-treatment, 2 months, 6 months, 12 months) was performed with the ANOVA for repeated measures or Kruskal-Wallis (groups >2) or Mann-Whitney (groups =2) for non-parametric variables and the Chi-Square test or Fisher's exact test (if cells<5) for categorical variables. *p* value of <0.05 was considered statistically significant.



Figure 3. TMC joint injection.



Figure 4. Preston pinch meter.

Results

Pain (Tab. II, panel A)

Group P: Prior to treatment 21 patients were recorded with mild pain with use and 4 patients with pain at rest and functional restriction. Between two and six months, 16 patients reported no pain or restriction. One year after treatment, only one patient complained of pain at rest while 14 reported occasional mild pain causing limited restriction. In 10 cases pain was still absent at one year: this value is statistically significant compared to group C ($p < 0.05$).

Group C: Prior to treatment 18 patients reported mild pain with use and 7 reported pain at rest and functional restriction. At two months, 20 patients reported no pain or restriction. Result decreased at six months and, at one year, 17 patients reported some restriction due to pain with use and 6 patients complained of pain at rest.

Function in activities of daily living (Tab. II, panel B)

Group P: Subjective assessment of functional disability in daily living activities at pre-treatment amounted to a mean DASH score of 8.2. Six months after therapy, mean DASH score progressively decreased to 4.1 then, at one year, increased to 7.2 (Fig. 5).

Group C: The group scored a mean DASH of 10.8 pre-treatment. Two months post-treatment with corticoid injection and splinting, mean DASH score lowered in statistically significant way ($p < 0.05$) to 3.8; then increased to 5.3 at six months and 8.6 one year post-treatment.

Overall satisfaction at one year

Group P: The group totaled a mean score 8,2 in overall satisfaction.

Group C: The group totaled a mean score 6,8 in overall satisfaction.

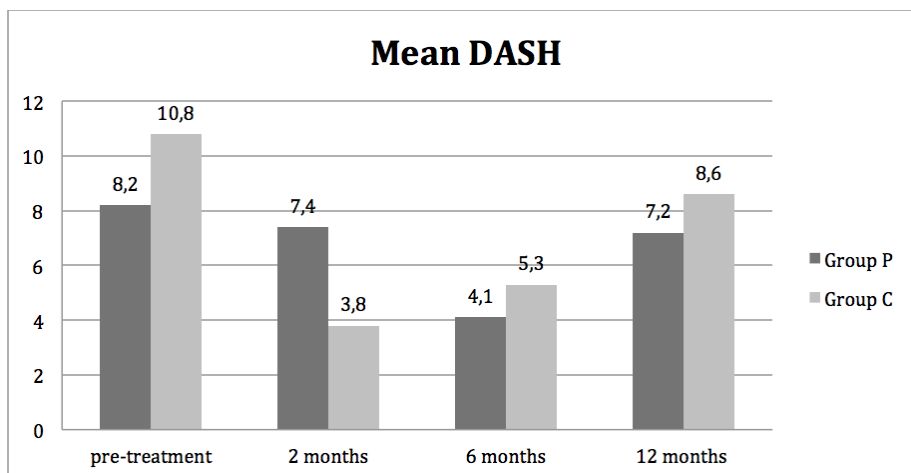


Figure 5. Mean DASH.

Table II. Outcomes.

panel A. PAIN AND FUNCTIONAL RESTRICTION		pre-treatment	2 months	6 months	12 months
<i>no pain or restriction</i>	Group P	0	16	16	10 [†]
	Group C	0	20	14	2
<i>mild pain under use: some restriction</i>	Group P	21	9	8	14
	Group C	18	4	10	17
<i>pain score at rest: some restriction</i>	Group P	4	0	1	1
	Group C	7	1	1	6
<i>pain at rest: severe restriction</i>	Group P	0	0	0	0
	Group C	0	0	0	0

panel B. DASH SCORE AND SATISFACTION		pre-treatment	2 months	6 months	12 months
<i>mean DASH ± SD score</i>	Group P	8,2 ± 1,2	7,4 ^(^) ± 1,6	4,1 ± 1,4	7,2 ± 2,8
	Group C	10,8 ± 2,0	3,8 ^(*) ± 1,0	5,3 ± 0,6	8,6 ± 0,6
<i>Overall satisfaction</i>	Group P				8,2 ± 1,8
	Group C				6,8 ± 1,4

panel C.		pre-treatment	2 months	6 months	12 months
<i>Mean Key Pinch strenght (kg)</i>	Group P	4,6 ± 2,2	5,0 ± 3,4	5,8 ± 2,5	5,2 ± 2,2
	Group C	4,3 ± 1,6	5,4 ± 0,4	5,2 ± 1,6	4,8 ± 1,8

(†) $p < 0,05$; to 2 months Group P vs Group C; (*) $p < 0,05$ pre-treatment vs 2 months; (^) $p < 0,05$; to 2 months Group P vs Group C

Pinch strength (Tab. II, panel C)

Group P: The group improved from a mean value of 4.6 kg to a top result of 5.8 kg at six months, to a final report of 5.2 kg at one year.

Group C: The group improved from a mean value of 4.3 kg to a top result of 5.4 kg at two months, to 4.8 kg at one year (Fig. 6).

Complications

Group P: No complications were recorded.
Group C: In six cases, episodes of temporary acute lo-

cal pain and inflammation were recorded. They started between 1 to 6 hours after the injection and resolved spontaneously, after one-to-two days. Patients were cautioned on this possibility and were instructed to apply a cold pack over the joint when necessary.

Discussion

This study compares prospectively the benefits of physiotherapy treatment, including application of heat

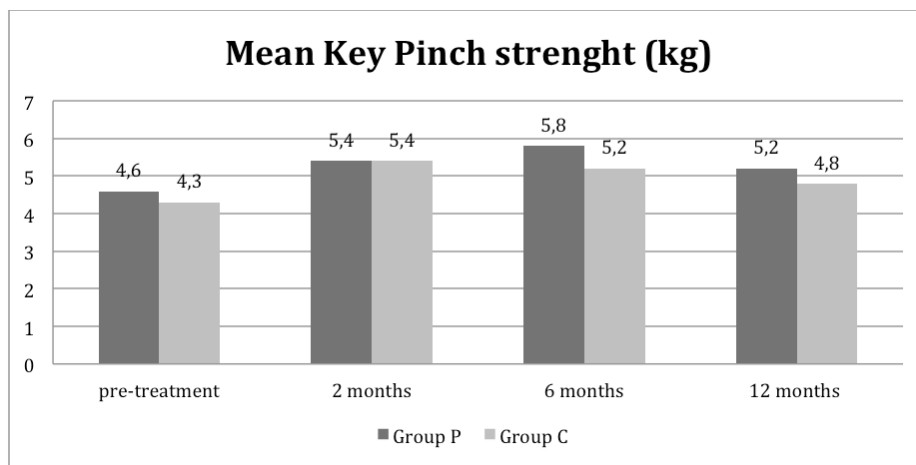


Figure 6. Mean Key Pinch Strenght.

and kinesiotherapy, to intra-articular corticosteroid injection. The study group consists of patients with early stages of arthritis of the TMC joint (Eaton stages 1-2). Two months post-treatment, both groups showed an improvement of the considered parameters (pain, function, strength) with total remission of pain in the majority of patients (group *P*: 16/25; group *C*: 20/25). Group *C* patients treated with corticosteroid injection showed a statistically significant improvement ($p < 0.05$) of DASH score compared to both pre-treatment clinical conditions and the group treated with physical therapy.

In treating OA, the benefits of treatment by intra-articular corticosteroid are already known, although Coblyn et al.²² have recently demonstrated that many steroid injections for knee OA (injections were performed several times every three months), might hasten cartilage loss. Day et al.²³ reported a study on 30 patients with a mean age similar to our study group (61 years old), suffering from TMC osteoarthritis, treated with corticosteroid infiltration and temporary splinting. A remission of pain for more than 18 months was observed in 6 out of 7 cases with Eaton stage 1 and in 40% of cases with Eaton stage 2-3.

At the onset of a TMC degenerative disease and the painful symptoms that it causes, work activity factors an important role. Moreover, some occupations such as tailors, milliners, sewers, embroiderers and jobs requiring hand positions such as tip, lateral, palmar or forceful pinch causing high pressure patterns in the TMC joint are frequently associated with the development of OA in the TMC joint⁶.

From a functional point of view, physiotherapy treatment shows less evident results in the early stages. However, on final inspection, a significantly greater number of patients ($p < 0.05$) in group *P* (10/25) showed persistence of painful symptomatology remission compared to patients in group *C*.

In a large systematic review of the literature Valdes and Marik¹⁶ outlined moderate evidence in scientific literature upholding the effectiveness of the application of heat, hand exercises, adaptive equipment, the use of carpometacarpal orthotics for pain relief, restoration of the joint articulation and hand function.

The longer duration of time spent by the physiotherapist with the patient, and the stronger therapeutic relationship this brought about, in comparison to the joint infiltration therapy, may have improved the patients' knowledge regarding the conditions which determine pain recurrence^{24,25}. On this aspect, Berggreen et al.²⁶ in a seven year prospective study, suggest patients with OA of the TMC joint should be offered access to splints preoperatively, as well as occupational therapy.

This is a first study regarding two among the many possibilities of conservative treatments available for patients with OA of TMC joint. When interpreting the data of this study, two limitations must be taken into account: the lack of knowledge regarding the work performed by the patients and the lack of a control group to distinguish the effects of the application of the orthosis from the effects of other therapies. More-

over, the continuous application of an orthosis for the reduction of painful symptoms is known to be effective.

Conclusion

The results obtained in this study suggest that both measures are effective as temporary treatments for the TMC OA. Patient satisfaction was rated good after both procedures. The goals were to provide a temporary mobility and pain-free thumb and these were achieved in both groups.

The study has therefore shown that patients treated with corticosteroid injection achieved, on average, rapid improvement of pain and strength although these results were short-lived and group *C* patients returned to pre-treatment levels after one year. On the other hand, patients treated by application of heat, passive and active mobilization of the arthritic joint, massage therapy and stretching experienced a more gradual improvement of symptoms. However, although these group *P* patients scored a final DASH similar to those treated with infiltration, their pain relief, on average, lasted longer.

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Unicompartmental knee replacement in patients aged 70 years and older

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Summary

Introduction: The management of isolated unicompartmental osteoarthritis in the patient aged 70 years and older is an issue of debate. The purpose of the present study was to retrospectively evaluate the outcomes of patients aged over 70 years who underwent unicompartmental knee replacement (UKR) for the treatment of isolated unicompartmental osteoarthritis. The hypothesis was that this represents a safe and viable procedure leading to improved functional outcome in elderly patients affected by isolated unicompartmental osteoarthritis.

Methods: 22 consecutive medial compartment UKRs performed between 1998 and 2008 were retrospectively evaluated. Mean age was 74 years (range 70-93 years). Patients were evaluated preoperatively and after an average follow-up of 6.2 years (range 2 to 8). Assessment included KOOS score, WOMAC score, Knee Society Score. Standard X-rays were performed prior to surgery and at follow-up.

Results: Twenty patients showed a statistically significant improvement in all parameters. One patient who was 93 years old at the time of surgery died for unrelated causes. One patient required conversion to a total knee arthroplasty.

Discussion: UKR is a safe and clinically effective

procedure, which has been proven valuable for the treatment of elderly patients with isolated unicompartmental osteoarthritis and with initial degenerative signs in the other compartments.

Conclusion: Age more than 70 does not appear to be a contraindication to the procedure.

Level of evidence: IV (case series).

KEY WORDS: unicompartmental osteoarthritis, medial knee osteoarthritis, unycondilar knee replacement, elderly people.

Introduction

Unicompartmental knee replacement (UKR) is being used increasingly for the treatment of end stage arthritis affecting one compartment in the knee and it is considered an attractive alternative to osteotomy or total knee replacement (TKR) in patients with isolated unicompartmental osteoarthritis¹. This is because clinical studies have shown that, if appropriate indications and techniques are used, UKR tends to give a quicker recovery, reduced invasiveness and blood loss lower costs, fewer and less severe complications and better knee kinematics than a total knee replacement (TKR)²⁻⁶. In fact, compared with TKR, UKR has shorter inpatient stays, lower mortality, lower incidence of major complications such as infection and better outcome scores, although adjusted change scores are similar⁷.

Absolute contraindications to UKR include multiple compartmental osteoarthritis, rheumatic diseases, varus/valgus malalignment, flexion deformity, and instability⁸.

There is, however, debate about relative contraindications for UKR, in particular whether UKR should be offered to patients with a high body mass index (BMI) and in elderly patients.

As TKR in older age is related to worse function (particularly among women)⁹, UKR in the patient aged 70 years and older is an issue of debate. However, surprisingly little data regarding this type of procedure in the elderly patients is available¹⁰.

The purpose of the present study was to retrospectively evaluate the clinical outcomes and medium to long-term survival of fixed-bearing UKR in patients aged 70 years and older. The hypothesis was that this represents a safe and viable procedure leading to improved functional outcome in elderly patients affected by isolated unicompartmental osteoarthritis.