



Original Article

Is arthrodesis still a good indication for non-inflammatory arthrosis of the wrist?☆



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ABSTRACT

Objective: The aim of this study was to objectively and subjectively evaluate wrist function after total arthrodesis, among patients with sequelae of non-inflammatory arthritis who were treated with rigid internal fixation using a DCP plate.

Methods: Thirty-two patients with sequelae of non-inflammatory degenerative arthritis were treated using total arthrodesis of the wrist. Of these, two patients were treated with Kirschner wires and four discontinued the treatment, thus leaving 26 patients. The indication for arthrodesis of the wrist was the presence of intracarpal pathological conditions: eight wrists presented sequelae from fractures of the distal radius; 13 had sequelae from fractures of the scaphoid; and five had sequelae from Kienbock's disease. The cases were evaluated using the visual analogue scale (VAS), the muscle strength test, the Jebsen-Taylor functional test and the Buck-Gramcko test.

Results: It was observed that there were no significant differences at the level of 5%, in the variables of grip strength, VAS, Jebsen-Taylor functional test or Buck-Gramcko/Lohmann test, between the pathological conditions.

Conclusion: Total arthrodesis of the wrist using a plate in the dorsal region was shown to be a safe and efficient technique for patients with different types of pathological arthrosis of the wrist, since it did not cause any important functional incapacity and brought great pain relief.

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Artrodese ainda é uma boa indicação na artrose não inflamatória do punho?

R E S U M O

Palavras-chave:

Artrose
Punho
Artrodese do punho

Objetivo: Avaliar objetiva e subjetivamente a função do punho, após artrodese total, em pacientes com sequelas de artrite não inflamatória tratados com fixação interna rígida com placa tipo DCP.

Métodos: Foram tratados 32 pacientes com sequelas de artrite degenerativa não inflamatória com artrodese total do punho. Desses, dois foram tratados com fios de Kirschner e quatro descontinuaram o tratamento. Restaram 26. As indicações para a artrodese do punho foram pacientes com patologias intracarpais. Oito punhos apresentavam sequela de fratura radiodistal, 13 sequelas de fratura do escafoide e cinco sequelas de doença de Kienbock. Foram usados para a avaliação a escala visual analógica (EVA), o teste de força muscular, o teste funcional de Jebsen-Taylor e o teste de Buck-Gramcko.

Resultados: Observou-se não existir entre as patologias diferença significativa, no nível de 5%, nas variáveis da força de preensão, EVA, teste funcional de Jebsen-Taylor e de Buck-Gramcko/Lohmann.

Conclusão: A artrodese total de punho, com placa na região dorsal, demonstrou ser uma técnica eficiente e segura para os pacientes com diferentes tipos de patologias de artrose de punho, por não causar incapacidade funcional importante e trazer um grande alívio da dor.

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Introduction

Total arthrodesis of the wrist has become a standard procedure for degenerative wrist arthritis.^{1,2} Traditionally, wrist arthrodesis is the treatment for wrist arthritis that does not respond to anti-inflammatory medications, immobilizers and corticosteroid injections, even though it substantially diminishes the functioning of this joint.³

Arthritis in this joint has several causes, including the following: sequelae of intra-articular fractures, skewed consolidation subsequent to distal fracturing of the radius, tearing of the interosseous ligaments, avascular necrosis, inflammatory diseases and congenital diseases.² In cases of non-inflammatory diseases, wrist arthrodesis provides pain relief and increases the grip strength of the hand.

Many techniques have been used to perform wrist arthrodesis, such as use of crossed Kirschner wires, intramedullary pins, and plates and screws with or without associated use of bone grafts.^{4,5} Rigid internal fixation with different types of plates not only reduces the pain and enables the return to work, but also makes osteosynthesis easy and safe. Through using dorsal plates, consolidation rates of between 93 and 100% have been achieved, with low complication rates.^{1,2,6-9}

The aim of the present study was to evaluate limb function after total wrist arthrodesis in patients with sequelae of non-inflammatory arthritis that was treated by means of rigid internal fixation with a DCP plate in the dorsal region of the wrist.

Material and methods

Between October 21, 2010, and January 2014, 32 patients with sequelae of non-inflammatory degenerative arthritis were

treated by means of total wrist arthrodesis. The procedure was firstly approved by the hospital's ethics committee. Among these, two were treated with Kirschner wires and four discontinued the treatment. Thus, 26 patients remained. The inclusion factors were that the patients would have sequelae of intra-articular wrist fractures, skewed consolidation subsequent to distal fracturing of the radius and restrictive carpal pathological conditions (such as Kienbock's disease). The exclusion factors were the presence of inflammatory degenerative diseases and extracarpal pathological conditions (such as neuromuscular diseases, lesions of periarticular soft tissues, tumor resections and sequelae of nerve injuries). All the patients were treated by means of rigid internal fixation with a DCP plate in the dorsal region of the wrist. Sex, age, side and dominance are presented in [Table 1](#).

The indications for wrist arthrodesis were cases of patients with intracarpal pathological condition. Eight wrists presented sequelae of radiodistal fractures, 13 had sequelae of fractures of the scaphoid and five had sequelae of Kienbock's disease.

Table 1 – General description of the sample.

Characteristic	Description	Quantity	Percentage
Sex	Male	20	77%
	Female	6	23%
Side	Right	17	65%
	Left	9	35%
Dominance	Yes	17	65%
	No	9	35%

Source: Files of the hospital service.

Mean age of 50.38 years with a standard deviation of 11.44 years.

Surgical technique

All the patients were operated under general anesthesia, complemented with blocking of the brachial plexus and pneumatic ischemia of the limb affected. The longitudinal dorsal access route was opened above the third metacarpal. The retinaculum of the extensors was opened between the third and fourth tunnels. The tendon of the long extensor of the thumb was moved away radially, and the extensor of the index finger and the common extensor of the fingers were moved toward the ulna. Neurectomy of the end branch of the posterior interosseous nerve was performed in a routine manner. The joint capsule was opened as two U-shaped flaps with their bases at the radius and ulna. The cartilage of the radiocarpal and intercarpal joints was removed as far as the subchondral bone, and at Lister's tubercle. We chose to perform curettage of the dorsal face of the capitate and the distal border of the radius. We applied temporary dressings and released the pneumatic tourniquet. A rectangular bone graft was removed from the ipsilateral region, along with spongy bone. We again applied pneumatic ischemia to the limb and removed the temporary dressing. The spongy bone graft was placed in the radiocarpal and intercarpal joints. The DCP plate for small fragments was modeled with a mean angle of 10° in extension and osteosynthesis was performed using the principles of the AO technique, with six cortical grafts in the third metacarpal and between six and eight in the radius, under radioscopic control. In the space between the capitate and the plate, we placed a bone block from the iliac crest, under pressure. Thus, no fixation screws were used in the carpus. The joint capsule was closed when possible. In all the cases, we closed the retinaculum of the extensors and sutured the skin using simple stitches. We did not use any drains or any immobilization with splints, and only used compressive dressings. The patients were instructed to actively mobilize their fingers during the immediate postoperative period. They were assessed in the first, third and sixth weeks and thereafter every two months until the sixth postoperative month.

Subjective evaluation

The patients were asked to make a subjective evaluation of their postoperative pain using a visual analogue scale (VAS).¹⁰ The VAS is an efficient instrument for measuring the intensity of the pain and it has been used in research and clinical trials. It consists of a horizontal line measuring 10 cm. One end is labeled "no pain" and the other, "worst pain possible". The patient is asked to mark on this line the point corresponding to the pain intensity level that he is experiencing at that moment.

Objective evaluation

Radiographs in anteroposterior and lateral views on all the patients were analyzed in order to determine the wrist fixation position and the time taken for consolidation to be achieved.

The functional evaluation included a muscle strength test in which a dynamometer was used to measure hand grip; and the functional test of Jebsen et al.,¹¹ which is composed of manipulative tasks similar to those performed in day-to-day

Table 2 – Buck-Gramcko/Lohmann scores.

Criteria	Score
<i>Range of motion of the fingers and forearm</i>	
Extension of the metacarpophalangeal normal or with slight deficit	3
Deficit of extension of the metacarpophalangeal	-1
Deficit of finger flexion	-1
Deficit of pronosupination	-1
<i>Use of hand</i>	
Complete	2
Limited in relation to special use	1
Limited in relation to activities of daily living	0
<i>Pain</i>	
No pain	2
Pain during heavy work	1
Pain during all activities	0
<i>Grip</i>	
75–100% of the normal side	2
50–75%	1
<50%	0
<i>Subjective evaluation</i>	
Improved	1
Worsened	-2
Excellent, 9–10; Good, 7–8; Satisfactory, 5–6; Poor, <5.	

activities and is divided into seven subtests: (1) writing; (2) simulation of the task of turning cards over; (3) lifting up small objects; (4) simulation of using a spoon for eating; (5) piling up blocks (i.e. using pieces from the game of draughts/checkers); (6) lifting up large light objects; and (7) lifting up large heavy objects. The percentage score is obtained from case-control standardized values produced by this author. In addition, the Buck-Gramcko test,¹² which is specific for arthrodesis, was used as an objective assessment for arthrodesis, as shown in Table 2.

Statistical methodology

The descriptive analysis presented the observed data in the form of tables. The data were expressed as means, standard deviations, medians, minimums and maximums for numerical data and as frequencies (*n*) and percentages (%) for categorical data (qualitative).

The comparative analysis on the variables of grip strength, VAS, Jebsen-Taylor functional test and Buck-Gramcko/Lohmann test between the three pathological conditions (sequelae of scaphoid fractures, sequelae of radiodistal fractures and Kienbock's disease) was defined using the Kruskal-Wallis ANOVA test (for numerical variables) and Fisher's exact test (for categorical variables).

Non-parametric tests were used because the variables did not present normal (Gaussian) distribution, given that the hypothesis of normality according to the Shapiro-Wilks test was rejected. The criterion used to determine significance was the level of 5%. The statistical analysis was processed using the SAS 6.11 software (SAS Institute, Inc., Cary, NC, USA).

Table 3 – Description of the variables in the whole sample.

Variable	n	Mean	SD	Median	Minimum	Maximum
Grip strength – wrist with arthrodesis (kg)	26	17.6	11.2	14.7	1.7	42.8
Grip strength – wrist without arthrodesis (kg)	26	31.3	10.0	32.8	10.2	46.9
Delta for grip strength (kg)	26	-13.7	12.5	-13.8	-39.8	7.4
Relative delta for grip strength (%)	26	-41.7	36.8	-47.7	-90.7	32.7
VAS – before (points)	26	8.9	1.4	10	4	10
VAS – after (points)	26	3.2	2.9	3	0	10
Delta for VAS (points)	26	-5.7	3.0	-5.5	-10.0	1.0
Relative delta for VAS (%)	26	-64.2	31.3	-63.3	-100.0	11.1
Total time – wrist with arthrodesis (s)	26	115.0	76.8	86.9	56.6	351.4
Total time – wrist without arthrodesis (s)	26	90.6	23.1	89.3	48.5	139.8
Delta for total time (s)	26	24.4	67.5	3.4	-27.2	247.7
Relative delta for total time (%)	26	24.3	63.0	4.2	-25.4	238.8
Buck-Gramcko/Lohmann (points)	26	5.3	3.2	5.5	0	10

Source: Files of the hospital service.
SD, standard deviation.

Results

The mean time take for consolidation to be achieved for the entire sample was 10.8 weeks. For the cases of sequelae of scaphoid fractures, the mean time was 10.4 weeks (range: 6–20). For the cases of sequelae of radiodistal fractures, the mean time was 9.4 weeks (range: 5–24). For the cases of sequelae of Kienbock's disease, the mean time was 11.6 weeks (range: 8–18). It is important to emphasize that no cases of pseudarthrosis occurred. The total length of follow-up for the sample was 18.5 months.

Characterization of the study sample

This study had the aim of outlining the profile of 26 patients subsequent to wrist arthrodesis.

The absolute delta is the difference in measurements between the wrist with arthrodesis and the wrist without arthrodesis. In this study, a negative delta expresses the number of kg/point/second less than in the wrist without arthrodesis.

The relative delta is the percentage difference between the two wrists in relation to the wrist without arthrodesis. In this study, a negative relative delta expresses the percentage kg/point/second less than in the wrist without arthrodesis.

Tables 3–6 present the mean, standard deviation (SD), median, minimum and maximum of the variables in the whole sample and in the different pathological conditions: sequelae of scaphoid fractures, sequelae of radiodistal fractures and Kienbock's disease, respectively.

Table 7 presents the frequencies (n) and percentages (%) of the categorical variables in the whole sample and in the different pathological conditions.

The next objective was to ascertain whether there was any significant difference in the variables (grip strength, VAS score, Jebsen–Taylor functional test and Buck–Gramcko test), between the pathological conditions.

Table 8 presents the mean, standard deviation (SD) and median of the variables of grip strength, VAS score, Jebsen–Taylor functional test and Buck–Gramcko test, according to the pathological condition (sequelae of scaphoid fractures, sequelae of radiodistal fractures and Kienbock's

Table 4 – Description of the variables for the cases of sequelae of scaphoid fractures.

Variable	n	Mean	SD	Median	Minimum	Maximum
Grip strength – wrist with arthrodesis (kg)	13	20.2	12.2	14.0	5.4	42.8
Grip strength – wrist without arthrodesis (kg)	13	35.5	6.8	35.8	22.6	46.9
Delta for grip strength (kg)	13	-15.2	12.9	-17.7	-36.2	7.4
Relative delta for grip strength (%)	13	-41.8	37.4	-57.5	-83.5	32.7
VAS – before (points)	13	8.5	1.7	9	4	10
VAS – after (points)	13	2.9	2.6	3	0	7
Delta for VAS (points)	13	-5.5	2.5	-5.0	-10.0	-3.0
Relative delta for VAS (%)	13	-67.2	28.5	-70.0	-100.0	-30.0
Total time – wrist with arthrodesis (s)	13	106.3	79.2	71.9	56.6	351.4
Total time – wrist without arthrodesis (s)	13	84.6	22.2	82.4	48.5	111.3
Delta for total time (s)	13	21.7	70.2	2.1	-25.9	247.7
Relative delta for total time (%)	13	21.8	68.1	2.0	-25.4	238.8
Buck-Gramcko/Lohmann (points)	13	5.6	2.6	6.0	1	10

Source: Files of the hospital service.
SD, standard deviation.

Table 5 – Description of the variables for the cases of sequelae of radiodistal fractures.

Variable	n	Mean	SD	Median	Minimum	Maximum
Grip strength – wrist with arthrodesis (kg)	8	15.2	10.2	15.7	3.9	30.0
Grip strength – wrist without arthrodesis (kg)	8	30.8	9.9	27.3	19.3	44.0
Delta for grip strength (kg)	8	-15.7	14.2	-15.7	-39.8	3.4
Relative delta for grip strength (%)	8	-47.3	38.8	-53.8	-90.7	15.4
VAS – before (points)	8	9.1	1.2	10	7	10
VAS – after (points)	8	3.1	2.6	4	0	8
Delta for VAS (points)	8	-6.0	3.0	-5.0	-10.0	-2.0
Relative delta for VAS (%)	8	-64.6	27.3	-58.6	-100.0	-20.0
Total time – wrist with arthrodesis (s)	8	102.5	30.0	97.9	61.0	147.0
Total time – wrist without arthrodesis (s)	8	93.6	15.6	95.4	72.3	118.7
Delta for total time (s)	8	8.9	31.8	0.7	-17.6	74.7
Relative delta for total time (%)	8	12.0	41.0	0.9	-18.3	103.2
Buck-Gramcko/Lohmann (points)	8	5.4	3.7	5.0	0	10

Source: Files of the hospital service.
SD, standard deviation.

Table 6 – Description of the variables for the cases of sequelae of Kienbock's disease.

Variable	n	Mean	SD	Median	Minimum	Maximum
Grip strength – wrist with arthrodesis (kg)	5	14.7	10.3	11.8	1.7	26.5
Grip strength – wrist without arthrodesis (kg)	5	21.3	11.6	21.6	10.2	39.0
Delta for grip strength (kg)	5	-6.6	7.0	-10.1	-12.5	2.2
Relative delta for grip strength (%)	5	-32.5	38.1	-32.1	-85.6	10.2
VAS – before (points)	5	9.8	0.4	10	9	10
VAS – after (points)	5	4.2	4.4	4	0	10
Delta for VAS (points)	5	-5.6	4.7	-6.0	-10.0	1.0
Relative delta for VAS (%)	5	-55.8	47.6	-60.0	-100.0	11.1
Total time – wrist with arthrodesis (s)	5	157.7	116.8	112.5	65.8	350.7
Total time – wrist without arthrodesis (s)	5	101.5	33.6	81.8	73.9	139.8
Delta for total time (s)	5	56.3	100.9	4.7	-27.2	214.1
Relative delta for total time (%)	5	50.5	82.4	6.3	-19.5	156.8
Buck-Gramcko/Lohmann (points)	5	4.6	4.2	3.0	0	10

Source: Files of the hospital service.
SD, standard deviation.

disease) and the corresponding descriptive level (*p* value) from the Kruskal-Wallis ANOVA test (nonparametric).

It was observed that there were no significant differences between the pathological conditions at the 5% level,

with regard to the variables of grip strength, VAS score, Jebsen-Taylor functional test and Buck-Gramcko test.

Table 9 presents the frequencies (*n*) and percentages (%) relating to the side with arthrodesis, dominant side and

Table 7 – Description of the variables in the whole sample and in the different pathological conditions.

Variable	Total (n = 26)		Scaphoid (n = 13)		Radiodistal (n = 8)		Kienbock (n = 5)	
	n	%	n	%	n	%	n	%
<i>Side with arthrodesis</i>								
Right	17	65.4	9	69.2	6	75	2	40
Left	9	34.6	4	30.8	2	25	3	60
<i>Dominant side</i>								
Right	17	65.4	9	69.2	6	75	2	40
Left	9	34.6	4	30.8	2	25	3	60
<i>Result</i>								
Excellent	5	19.2	2	15.4	2	25	1	20
Good	4	15.4	2	15.4	1	12.5	1	20
Satisfactory	5	19.2	4	30.8	1	12.5	0	0
Poor	12	46.2	5	38.5	4	50	3	60

Source: Files of the hospital service.

Table 8 – Comparative analysis between the different pathological conditions.

Variable	Sequelae of scaphoid fractures			Sequelae radiodistal fractures			Kienbock's disease			p value ^a
	Mean	SD	Med	Mean	SD	Med	Mean	SD	Med	
	Grip strength – wrist with arthrodesis (kg)	20.2	± 12.2	14.0	15.2	± 10.2	15.7	14.7	± 10.3	
Grip strength – wrist without arthrodesis (kg)	35.5	± 68	35.8	30.8	± 9.9	27.3	21.3	± 11.6	21.6	0.060
Delta for grip strength (kg)	-15.2	± 12.9	-17.7	-15.7	± 14.2	-15.7	-6.6	± 7.0	-10.1	0.28
Relative delta for grip strength (%)	-41.8	± 37.4	-57.5	-47.3	± 38.8	-53.8	-32.5	± 38.1	-32.1	0.71
VAS – before (points)	8.5	± 1.7	9	9.1	± 1.2	10	9.8	± 0.4	10	0.14
VAS – after (points)	2.9	± 2.6	3	3.1	± 2.6	4	4.2	± 4.4	4	0.88
Delta for VAS (points)	-5.5	± 2.5	-5.0	-6.0	± 3.0	-5.0	-5.6	± 4.7	-6.0	0.91
Relative delta for VAS (%)	-67.2	± 28.5	-70.0	-64.6	± 27.3	-58.6	-55.8	± 47.6	-60.0	0.91
Total time – wrist with arthrodesis (s)	106.3	± 79.2	71.9	102.5	± 30.0	97.9	157.7	± 116.8	112.5	0.40
Total time – wrist without arthrodesis (s)	84.6	± 22.2	82.4	93.6	± 15.6	95.4	101.5	± 33.6	81.8	0.59
Delta for total time (s)	21.7	± 70.2	2.1	8.9	± 31.8	0.66	56.3	± 100.9	4.7	0.91
Relative delta for total time (%)	21.8	± 68.1	2.0	12.0	± 41.0	0.9	50.5	± 82.4	6.3	0.85
Buck-Gramcko/Lohmann (points)	5.6	± 2.6	6	5.4	± 3.7	5	4.6	± 4.2	3	0.79

Source: Files of the hospital service.

SD, standard deviation.

^a Kruskal-Wallis ANOVA.

Buck-Gramcko classification, according to the different pathological conditions (sequelae of scaphoid fractures, sequelae of radiodistal fractures and Kienbock's disease) and the corresponding descriptive level (*p* value) from Fisher's exact test.

It was observed that there were no significant differences between the pathological conditions at the 5% level, with regard to the side with arthrodesis, dominant side and Buck-Gramcko classification.

Discussion

When orthopedic surgeons are faced with patients presenting non-inflammatory wrist arthritis who are candidates for surgery, wrist arthrodesis should be avoided whenever possible. Nevertheless, this reconstruction procedure is well established and has been proven to have great value for many pathological conditions. Historically, it has presented satisfactory postoperative results, since the incapacity that arthrodesis produces can be compensated for, provided that the patient's shoulder, elbow, forearm and hand are normal.¹³⁻¹⁵ Although several techniques for treating wrist arthrosis exist, the introduction of dynamic compression plates by the AO group,¹⁶ used in association with bone grafts, has led to high rates of good results from arthrodesis, which has made it the most popular method.^{16,17}

According to the literature, the consolidation rates subsequent to the procedure have been 98–100%, with good results regarding pain relief and improvement grip strength, and satisfaction rates of between 80 and 100%. The patients report that they would like to have undergone this procedure before other techniques. Arthrodesis has little or no repercussion in relation to loss of mobility and long-term complications.^{1,18,19}

In the present study, in comparing the sides with and without arthrodesis, the grip strength of the hand was lower on the side with arthrodesis in all the groups evaluated: 57.5% in the cases of sequelae from scaphoid fractures; 53.8% in the cases of sequelae from radiodistal fractures; and 32.1% in the cases of Kienbock's disease, without presenting any significant difference. This demonstrated that diminution of muscle strength occurred both in pathological conditions of sequelae of intra-articular fractures of the wrist and in situations of skewed consolidation after distal fracturing of the radius and under restrictive carpal pathological conditions.

In analyzing the state of pain using the VAS, the wrists with and without arthrodesis were compared. Complete pain relief after wrist arthrodesis should be expected in the majority of patients.²⁰ In the present study, the patients reported improvements in pain levels in all the groups evaluated: 70% improvement or a decrease of five points on the VAS scale in the cases of sequelae from scaphoid fractures; 58.6% or five points in the cases of sequelae from radiodistal fractures; and 60% or six points in the cases of Kienbock's disease, without presenting any significant difference. It was observed that over these patients' follow-up period, most of them did not report any pain or need any regular analgesia.

The Jebsen-Taylor functional test, which is composed of manipulative tasks similar to those of day-to-day life, did

Table 9 – Comparative analysis between the pathological conditions.

Variable	Scaphoid (n = 13)		Radiodistal (n = 8)		Kienbock (n = 5)		p value
	n	%	n	%	n	%	
<i>Side with arthrodesis</i>							
Right	9	69.2	6	75	2	40	0.48
Left	4	30.8	2	25	3	60	
<i>Dominant side</i>							
Right	9	69.2	6	75	2	40	0.48
Left	4	30.8	2	25	3	60	
<i>Result</i>							
Excellent/Good	4	30.8	3	37.5	2	40	0.77
Satisfactory	4	30.8	1	12.5	0	0	
Poor	5	38.4	4	50	3	60	

Source: Files of the hospital service.

not demonstrate any significant incapacity from arthrodesis, in comparing the wrists with and without arthrodesis. In observing the results, the tasks were carried out more slowly on the side with arthrodesis, by differences of 2.1 s among the patients with sequelae from scaphoid fractures, 0.9 s among those with sequelae from radiodistal fractures and 6.3 s among those with Kienbock's disease, in comparison with the side without arthrodesis. These results may suggest that patients with sequelae from Kienbock's disease present a greater tendency toward functional incapacity. However, our limited number of cases does not allow us to reach this conclusion.

In this study, the Buck-Gramcko test, which is specific for arthrodesis and consists of an objective assessment of arthrodesis, demonstrated that the patients presented results ranging from good to satisfactory. The mean scores were six points for sequelae of scaphoid fractures, five for sequelae of radiodistal fractures and three for Kienbock's disease.

The strong point of this study was that it analyzed the results from three different pathological conditions of wrist arthrosis after the arthrodesis procedure. Through this, the indications for using this type of procedure can be considered. The weak point was the unsatisfactory number of patients, given that wrist arthrodesis is an uncommon procedure, which prevented us from reaching a conclusion of greater precision. Another point was the lack of comparison of pain among the patients before and after the procedure.

The most frequent complications were tendinitis of the extensors, in eight patients, and the need to remove the plate in six. Other complications included one case of contracture of the extensors, one case of superficial infection that was resolved through antibiotic therapy and one case of loosening of the synthesis material.

Conclusion

Total arthrodesis of the wrist using a plate in the dorsal region was shown to be a safe and efficient technique for patients with different pathological conditions of wrist arthrosis, since it did not cause any significant functional incapacity and gave rise to great pain relief.

Conflicts of interest

The authors declare no conflicts of interest.

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