

Acute Fractures of the Carpal Scaphoid-Literature Review

Abstract

Background/Methods: Scaphoid fracture is the most common fracture in carpal bone of the wrist and represents 11% of all upper extremity fractures and between 70% and 80% of all carpal fractures. In most cases, the mechanism of injury is a fall with an outstretched hand. Although closed treatment of stable fractures of the scaphoid is associated with a high rate of healing, this method requires prolonged cast immobilization, which may lead to muscle atrophy, possible joint contracture, disuse osteopenia, and potential financial hardship. Because of this, internal fixation of fractures of the scaphoid has become popular.

The purpose of this review was to assess the current evidence supporting operative fixation versus casting for acute scaphoid fractures through a systematic review of the literature. Also assess if the final recommendations could be extrapolate to amateur or professional athletes.

Results: Our search yielded 69 articles that met our inclusion criteria with ten studies achieving level of evidence 1 according to Oxford Center for Evidence-based Medicine, 2 achieving level 2, and 57 levels 3 and 4.

Conclusion: This systematic review reveals that significant weaknesses exist in the literature with respect to the level of evidence and quality of published studies on this topic. Currently, there is insufficient evidence to support the most effective treatment for acute scaphoid fractures. We do not find randomized control trials about treatment of acute scaphoid fractures in athletes. Therefore, it is not possible to report treatment recommendations with adequate evidence-based support.

Keywords: Scaphoid fractures; Treatment; Sports; Injuries

Research Article

Volume 5 Issue 5 - 2016

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Received: August 12, 2016 | **Published:** September 16, 2016

Summary

Introduction/Methods: Scaphoid fractures are the most common fractures of the carpal bones of the wrist, and represent 11% of all fractures of the upper extremity and between 70% and 80% of all carpal fractures. In most cases, the mechanism of injury is a fall with the wrist extended. Although conservative treatment of stable fractures of the carpal scaphoid associated with a high rate of consolidation, this method requires prolonged immobilization in a cast or brace, which generates muscular atrophy, possible muscle spasms, osteopenia disuse, as well as higher economic costs. Therefore, the internal fixation of fractures of the scaphoid has become popular. The aim of this study is to establish the current evidence supporting surgical treatment versus conservative in acute fractures of the carpal scaphoid, through a literature review of the literature. In addition consider whether treatment recommendations population can be extrapolated to amateur athletes and / or professionals.

Results: Our search found 69 articles that met the inclusion criteria, 10 articles were considered belonging to the group level of evidence 1 Oxford Center for Evidence-based Medicine, 2 items to the group of evidence 2 and 57 items to groups evidence 3 and 4.

Conclusion: Currently there is insufficient evidence about the indications and effectiveness of conservative versus surgical

treatment of acute fractures carpal scaphoid. There are no controlled clinical studies in only athlete population, so they cannot be made treatment recommendations based on the evidence in this subpopulation.

Introduction

The importance of fracture of carpal scaphoid lies in the fact that the bone most commonly injured carpal is difficult to diagnose in many cases, and requires immobilization for long periods due in part to its peculiar vascularization [1].

This type of fracture evolves with symptoms and clinical signs often confusing, which make the patient not seek immediate medical assistance; and when it does, this type of fracture may be missed on plain radiographs up to four weeks after the initial injury [2].

Stable, minimally displaced or incomplete fractures can be treated conservatively, and generally the consolidation rate is high. But this method requires prolonged immobilization, which can cause muscle atrophy, joint stiffness, disuse osteopenia, as well as sports and prolonged sick leave [3].

Because of these factors, internal fixation of minimally displaced fractures of the carpal scaphoid has become popular in recent years. There is general consensus on the treatment of fractures of the proximal pole of the scaphoid and delays of

consolidation and nonunion, entities are treated surgically [4-6].

The main objective of this study is to establish the current evidence supporting surgical treatment versus conservative immobilization in acute fractures of the carpal scaphoid, through a literature review of the literature. Secondly, to analyze whether these therapeutic recommendations can be extrapolated to populations of amateur athletes and / or professionals.

Material and Method

The databases used for literature search were MEDLINE (PubMed-NCBI), Cochrane Library, MEDES (Medicine in Spanish), IME (Spanish Medical Index), and directories eBook as Virtual Health Library (VHL) Biblioteca Virtual Miguel de Cervantes and Project Gutenberg.

Within search strategies, the following keywords were used in databases in Castilian:

- "acute fractures" AND "scaphoid"
- "acute fractures" AND "navicular" AND "Deport *"
- "acute fractures" AND "navicular" AND "treatment".

In the databases in English, the keywords used were:

- "acute fractures" AND "scaphoid"
- "acute fractures" AND "scaphoid" AND "sport *"
- "acute fractures" AND "scaphoid" AND "treatment"

To refine the search up several filters were applied. A time limit was established to focus the search between January 2001 and December 2011. The original language of accepted papers was

limited to English and Spanish. Also only the search was limited to items which were human sample (not animal). The boolean AND operator was used.

For the selection of useful items for the purpose of the study, the parameters of the Oxford Centre for Evidence-based Medicine (OCEBM) [7] were used, and these should meet the following criteria:

- Type of study: level 1 to 4 OCEBM: randomized controlled studies, prospective studies, retrospective studies, systematic reviews, meta-analysis and case series.
- Type of fracture: isolated carpal scaphoid fractures.
- Patient type: skeletally mature.
- Type of treatment: primary treatment.
- Date of the articles published between 2001 and 2011.

The exclusion criteria applied were:

- Type of study: OCEBM level 5 (expert opinions).
- Type of fracture: scaphoid fractures associated with fractures of other bones of the carpus or wrist, nonunion.
- Patient type: skeletally immature.
- Type of treatment: treatment of scaphoid nonunion, revision surgery of acute scaphoid fractures

All work and selected items were classified in laboratory studies, descriptive epidemiological studies, intervention, case studies and literature reviews, according to the criteria of OCEBM (Table 1). The categories of types of studies are:

Table 1: Levels of evidence for the research question. Types of studies.

	Therapeutic Studies: Research Treatment Outcomes	Prognostic Studies: Research the Effect of a Patient Characteristic in the Outcome of a Disease	Diagnostic studies: research of a diagnostic test	Economic Analysis of Decision-Making: Development of an Economic Model of Decision-Making
Level 1	Controlled clinical trial (ECC) High quality with statistically significant difference or without it but with narrow confidence intervals. systematic review and meta-analysis of ECC Level 1	High quality prospective studies (all patients were enrolled in the same point in the course of the disease, with follow-up > 80%). Systematic review of studies Level 1	Test previously developed diagnostic criteria in consecutive patients (with application of an ideal reference standard). Systematic review of studies Level 1	Costs and sensitive alternatives; values obtained from many studies; with multiple sensitivity analyzes. Systematic review of studies Level 1
Level 2	ECC lower quality (eg.: <80% follow-up, unblinded, inadequate random selection. Comparative prospective study. systematic review of studies of Level 2 or Level 1 with inconsistent results	Retrospective study. Untreated controls an ECC. Prospective study of lower quality (eg. Patients enrolled in different point in the course of the disease or tracking <80%). Systematic review of studies Level 2.	Development of diagnostic criteria previously developed in consecutive patients (with application of an ideal reference standard). Systematic review of studies Level 2	Costs and sensitive alternatives; values obtained from a limited number of studies; with multiple sensitivity analyzes. Systematic review of studies Level 2
	Retrospective and comparative studies. Systematic review of studies Level 3		Systematic review of studies Level 3	Systematic review of studies Level 3
Level 4	Series cases	Case Series	Cases and controls study. Standard reference Poor	Analysis without sensitivity analysis
Level 5	Expert opinion	Expert opinion	Expert opinion	Expert opinion

- A. Laboratory study: Prospective, analytical and experimental study that generated primary data is obtained in a laboratory environment.
- B. Descriptive epidemiological study: study (transverse or longitudinal) describing the frequency of carpal scaphoid fractures in a cohort or subgroup cohort.
- C. Intervention study: study the cause-effect relationship in a population to intervent and change the course causal factor of the injury, then measuring the effect of the change.
- D. Case Study: detailed of a person or group that shares a particular injury or disease analysis.
- E. Book review: detailed records of all previous investigations on a particular subject structural analysis.

The following data were evaluated for each item: sample size, type of treatment performed, complications reported, consolidation percentage, percentage of nonunion, and number of weeks for consolidation.

These variables were chosen because they were the most frequently mentioned in most of the items selected in this study. Unfortunately, data such as scale analog pain of patients, measurements of grip strength, joint range of motion, time to return to sports or work, economic cost effective direct or indirect sequel of fractures were not collected because they are inconsistently reported in the articles studied.

Results

After the search in the various databases, 1016 items in total, set out in the following table they were found.

- i) 69 articles that met the inclusion criteria for analysis were selected.
- ii) Those articles that met the agreed exclusion criteria were discarded.
- iii) Only 10 items were considered belonging to the group 1 level of evidence OCEBM [8-17]
- iv) Two items were classified in the group of evidence level 2 [18,19]
- v) 57 items were considered belonging to groups 3 and 4 evidence [1, 4-6, 20-74].

Epidemiological data on carpal scaphoid fractures of the studies were inconsistent. Data such as patient age, dominant hand, occupation, sports habits, psychosocial habits (such as smoking), concurrent diseases, many of the items are not mentioned, or do so incompletely.

In those articles reporting the mechanism of injury, fall on the extended wrist was the most frequently mentioned. Carpal scaphoid fractures occurred predominantly in male patients (about 80% of cases).

Summary of studies loe 1

A total of 10 items were considered belonging to the level of evidence 1 (Table 2). Of these, 6 are articles consisting of controlled clinical trials [8-10,13,14,17] and 4 correspond to

systematic reviews (meta-analysis) of randomized controlled trials [11,12,15,16].

Table 2: Results of literature search for Databases.

Source	Result	selected
NCBI-PubMed	987	55
Cochrane library	4	0
Spanish Medicine (MEDES)	0	0
EMI Biomedicine	1	0
Virtual Health Library	24	14
Biblioteca Virtual Miguel de Cervantes	0	0
Project Gutenberg	0	0
Total	1016	69

Controlled clinical trials (CCTs): Bond et al. [9] conducted a prospective controlled clinical trial where the results of 25 consecutive acute fractures of the carpal scaphoid in physical and athletically active military personnel were analyzed. They were randomly assigned to a group that underwent surgery with percutaneous cannulated screw by Acutrak (11 patients) or immobilized with antebrachiopalmar cast (14 patients). Variables such as time of fracture healing, range of motion of the wrist, grip strength, return to their work and sports activities, and the degree of satisfaction with the final results obtained were evaluated.

The fracture healing was obtained in an average of 7 weeks in the operated group and 12 weeks in the group treated with plaster casts ($p = 0.0003$) group.

The average time for return to work or sport was 8 weeks in the group operated, and 15 weeks in the non-operated ($p = 0.0001$).

They found no significant differences in variables such as grip strength and joint range of motion two years after the injury.

The satisfaction rate was elevated with both procedures. Adolfsson et al. [8] treated 53 patients with undisplaced fractures of the carpal scaphoid, acute (less than 14 days duration). The cases were randomized into two groups: 28 were immobilized with a below the elbow plaster cast for 10 weeks, and 25 were surgically treated by percutaneous insertion of a screw Acutrak.

They found no statistically significant differences between treatment groups in relation to the rate of fracture healing or part-time consolidation of the same. There were no differences in grip strength of the affected hand, although those who had surgery had greater range of joint motion, assessed at week 16 of treatment. The authors concluded that percutaneous internal fixation of acute displaced fractures of the scaphoid using screws Acutrak allows early mobilization without adverse effects on fracture healing.

Vinnars et al [10] studied 83 patients with acute non-displaced fracture or minimally displaced scaphoid between 1992 and 1997. Patients were randomized into two groups: one immobilized with short cast below the elbow and another operated with Herbert screw osteosynthesis. An average of ten years after the initial injury, 75 (93%) of the patients were re-evaluated both clinically and radiologically.

The authors found that all fractures had consolidated. In the group that had surgery, there was a significantly higher prevalence of osteoarthritis between the trapezium and scaphoid joint. There were no differences regarding subjective symptoms between the two groups, and both grip strength of the hand and the range of joint movement were higher in the group not operated (but this difference was not significant from a statistical standpoint).

The authors found that there are no real long-term benefits of internal fixation compared with conservative treatment of these fractures and the long-term risks of internal fixation of acute fractures undisplaced or minimally displaced scaphoid should be considered and explained properly to patients when surgical treatment is recommended.

Dias et al [13] studied 88 patients with acute fractures of the carpal scaphoid, and distributed randomly into two groups: 44 treated by immobilization with short cast below the elbow and free thumb and another group of 44 treated with internal fixation with Herbert screw. Patients were evaluated at weeks 2, 8, 12, 26 and 52 of evolution; severity of pain, edema, wrist mobility, grip strength, and related symptoms. In addition, radiographs each monitoring visits were made. They found that in the corresponding week 8 review, the range of joint mobility and grip strength were higher in the group operated, although it was on this visit when patients treated with plaster group were removed it.

Patients in both groups returned to their work or sports activities between weeks 5 and 6. In control of week 12, grip strength was greater in the group of operated cases. No significant differences between the two groups regarding the variables studied in the other control dates found. 10 patients in the treatment group with immobilization not consolidated in week 12, so the treatment was changed and underwent surgery. There were complications in 13 of the surgically treated, 10 of which was minors and related to surgical scar.

The study authors conclude that is not clearly demonstrates that early internal fixation of acute scaphoid fractures exceeds plaster fixation in the first 12 weeks. They believe that the strategy of internal fixation of minimally displaced scaphoid fractures or not displaced, which will also consolidate if are immobilized with a cast, will lead to an excessive number of surgery cases, exposing these patients to unnecessary risks.

So they advocated the treatment "aggressive conservative", which begins with treatment with immobilization short cast and serial radiological controls (including computerized tomography) are performed until week 6 to 8. In patients with no radiographic signs consolidation treatment is changed for internal fracture fixation (with or without bone grafts). With this behavior they achieved consolidation rates higher than 95% in these patients.

Dias et al. [14], in an article published in 2008, described the outcome after 93 months of treatment of 71 patients with an acute fracture of the scaphoid who were randomly assigned to a group of conservative treatment with plaster below the elbow (36 cases) or a group that underwent surgery with Herbert screw (35 cases).

These patients were the same as discussed in the previous article [25], but now followed long term.

Radiographs were obtained in 59 patients. Osteoarthritis changes were found between the trapezium and scaphoid joint and radioscaphoid joints in 8 (13.5%) of those treated surgically, and in 6 (10.2%) treated conservatively. 3 patients had radiolucent images around the screw, but were asymptomatic. One patient in the conservative group had nonunion and avascular necrosis of the scaphoid.

The authors conclude that in the medium term (93-month follow-up) no statistically significant differences in the clinical and radiological outcome between the two groups of patients. Schaedel Hopfner et al. (17) conducted a prospective, multicenter clinical study with 94 patients with acute, stable, middle third of the scaphoid fracture. Patients were randomly assigned to a group that was operated with a cannulated screw or group immobilized with a short cast below the elbow. 6 months follow up in both groups of patients was performed.

The authors found that at 15 weeks of evolution, patients who underwent surgery returned earlier to their regular work activities or sports than those immobilized in cast. They also had significantly better functional outcome, less pain and were generally more satisfied with the results.

They conclude that early surgical treatment facilitates return to previous activity level of patients with better functional outcome, less pain, achieving a higher level of satisfaction with low complication rates.

Systematic reviews and meta-analysis of controlled clinical trials (MA) reviews: We found 4 systematic reviews and meta-analysis of controlled clinical trials revisions. Suh et al. [11] performed in 2010 a systematic review and meta-analysis trying to establish the evidence for surgical or conservative treatment of acute fractures carpal scaphoid. They found 59 items in total that met their inclusion criteria, of which only 4 studies Sackett level 1 were considered.

After performing the meta-analysis, where 115 patients treated surgically and other 112 treated conservatively were included, they conclude that there is insufficient evidence to advocate the benefits of one treatment over another. The same results were obtained in the remaining 55 items classified as evidence levels 2 to 4.

Buijze et al. [12] conducted a systematic review of the literature between 1966 and 2009. They selected eight controlled trials comparing conservative and surgical treatment for acute scaphoid fractures in adults carpal. In the meta-analysis they included 419 patients in total, of which 207 were treated surgically and 212 with conservative methods.

They found mixed results favorable to the surgical option when measured variables such as satisfaction rates, grip strength, speed consolidation, labor and sports return. They found no significant differences between the groups of operated and treated conservatively when analyzing variables such as the presence of pain, range of motion of the wrist, nonunion, or treatment costs.

The complication rate was higher in the surgically (23.7%) compared with treated conservatively treated (9.1%) group, although the difference was not considered statistically

significant. The authors conclude that surgical treatment of these fractures provides superior results to conservative treatment on parameters such as satisfaction with the results, grip strength, return rates to work and sports. However, the presence of complications related to surgical treatment should be carefully weighed during clinical evaluation.

Doornberg et al. [15] conducted a systematic review of the literature between 1966 and 2010, and selected 4 items comparing different types of conservative treatment for acute fractures carpal scaphoid.

In total 523 patients were included. Two studies compared casts below the elbow against casts above the elbow. A study compared a cast below the elbow including the thumb versus a cast below the elbow excluding the thumb. Another study compared a cast below the elbow with wrist flexion of 20° against cast below the elbow with wrist extension of 20°.

After analyzing all the data, the authors conclude that there is no significant evidence regarding consolidation rates, grip strength, joint range of motion of the wrist, pain, nonunion or a vascular necrosis with different methods of conservative treatment studied.

Ibrahim et al. [16] conducted a systematic review of the literature from 1990 to 2009, and after evaluating 67 items, selected 6 controlled clinical studies, with a total of 363 patients with acute fractures including carpal scaphoid.

After the meta-analysis carried out, they found open and internal fixation of the fracture osteosynthesis with a Herbert screw had a probability of 0.73 of being the best available treatment, compared with percutaneous osteosynthesis, below the elbow plaster with or without inclusion of the thumb. The authors conclude that although Herbert screw osteosynthesis increases the rate of fracture healing in their meta-analysis, its superiority over other therapeutic alternatives is not significant from a statistical standpoint. Due to the higher rate of complications related to surgical treatment, recommend a pattern of aggressive conservative treatment.

Summary of studies loe 2

In our literature review two studies classified at the level of evidence 2 OCEBM were found.

McQueen et al. [18] studied 60 patients with fracture of the middle third of the scaphoid, which were randomly assigned to two groups. The first was treated by percutaneous internal fixation with a Acutrak screw and the second immobilized with below the elbow cast.

They studied variables such as grip strength, joint range of motion of the wrist, return to work or sport, functional recovery rate (by test Green / O'Brien), in addition to performing radiological studies in each follow-up visit. Patients were evaluated for 1 year. They found that patients in the surgical group had a rate of bone consolidation significantly greater than those treated conservatively (9.2 weeks vs 13.9 weeks, $p < 0.001$). There was a higher rate of nonunion in conservatively treated.

Patients treated with internal fixation reintegrated more quickly to their sport and to their regular work. They found a very low rate of complications in both groups. The authors recommend that all active athletes and patients should be operated by a percutaneous internal fixation of scaphoid fracture.

Saeden et al. [19] compared the long-term results of 61 patients (62 fractures of the carpal scaphoid) treated conservatively or surgically. They randomly assigned 30 fractures to the group of conservative treatment with plaster below the elbow, and 32 fractures underwent surgical treatment using osteosynthesis with Herbert screw.

They found no statistically significant differences between the two groups to study variables as a function of the wrist, radiological fracture union, or carpal arthrosis after a follow-up period of 12 years. Surgically treated patients showed signs of osteoarthritis in the joint between trapezium and scaphoid more frequently, but these findings were not correlated with subjective symptoms. The authors conclude that surgical treatment of acute scaphoid fractures lead to a faster return to previous sports or work levels, and should be considered in patients for whom prolonged cast immobilization is not acceptable, as athletes.

Summary of studies loe 3 And 4

A total of 57 studies were classified between levels of evidence 3 and 4 of the OCEBM [1,4-6,20-69,75-78].

In these studies, they used all treatment methods mentioned above.

The consolidation rate obtained in different studies of series of cases in which treatment was surgical internal fixation was 96%, significantly higher than in those groups treated conservatively (90%).

The difference in the rate of consolidation was not significant from a statistical standpoint between groups treated surgically or conservatively. Nor was there any significant between different types of casts or different surgical techniques or materials used.

The most common complications reported among patients treated conservatively were carpal osteoarthritis and pain. The most frequent complications in the group underwent surgery were related to discomfort with osteosynthesis material, pain, infections in the surgical wound, dysesthesia in radial nerve, complex regional pain syndrome (reflex sympathetic dystrophy syndrome), carpal osteoarthritis distal, among other less frequent complications.

Due to the large number of studies covered, immobilization protocols, surgical approaches, and osteosynthesis materials were highly variable the postoperative care. The conclusions and recommendations were also highly variable. Many articles advise internal fixation of these fractures as they allow a faster sport and return to work with lower social and economic cost with few complications, without providing data to support these claims.

Discussion

Our literature review covers a decade, we analyzed a total of

69 studies published between 2001 and 2011 articles that met our criteria for inclusion and exclusion. Of these items, only 10 were described as belonging to the group of level 1 evidence, of which 6 are controlled clinical trials [8-10,13,14,17] and 4 are studies review and meta-analysis [11,12,15,16].

Therefore, there is little high quality literature on which to base appropriate treatment recommendations.

In articles where sports or work habits of the patients were described, usually athletes were included with sedentary patients in the same group. And in other articles the sport habits in patients was not described. Therefore there is no specific data regards athlete population in carpal scaphoid fractures.

A key aspect in all these studies is to define what each group of authors considers the consolidation of the scaphoid fracture, which varies from one study to another. For this reason, compare rates of fracture healing described in several studies may be inaccurate, since similar fractures can be interpreted as consolidated in a study or delayed union in another.

Dias et al. used conventional radiographs to establish bone fracture healing, reserving the use of computed tomography only for those cases in which a space between the fracture fragments in plain radiography after 16 weeks of treatment was observed. So they classified five fractures in the conservative treatment group as established nonunion, when later shown that consolidation finally occurs.

We believe the use of CT it is important when classifying fractures that are to be included in a study, as displaced fractures (they have a lower rate of bone healing). In studies like McQueen et al., both displaced fractures and non-displaced fractures were classified together in one group, possibly altering the final results. The results found in controlled clinical studies of group level 1evidence have shown that patients undergoing surgery have achieved a higher rate of consolidation, and these data are statistically significant.

Surgical interventions made and osteosynthesis material used was different in each case. There was no consensus on the final recommendations of the authors, as some advocate internal fixation and internal fixation of fractures while others defend a conservative treatment, surgical intervention only in the absence of consolidation.

The results of the studies classified as evidence level 2 showed that there is no statistically significant difference between scaphoid fractures treated surgically or conservatively. McQueen et al. [18] certainly they describe a statistically significant difference over time consolidation, reporting faster in cases operated, but their results were based on a small number of patients that were operated by several surgeons. In addition, consolidation is determined based on plain radiographs, CT scans was not performed in these cases. And the authors mixed cases of displaced fractures with non-displaced fractures.

The results of the studies classified as Level 3 and 4 were highly variable and sometimes difficult to understand because they used very diverse data and in many case series there was no

control group. For this reason the final recommendations of the authors of these studies were dismissed.

Based on our review of the medical literature it is not possible to establish a consensus on the appropriate treatment of acute fractures carpal scaphoid. We found that there is insufficient evidence in

the literature to support the trend to surgical treatment. In fact, the surgical treatment of these fractures is associated with postoperative complications. Therefore, in certain cases it may be more convenient conservative treatment (sedentary workers, non-athletes, etc.).

Our findings are consistent with studies review and meta-analysis recently [11,12,15,16] published.

These authors have examined several controlled clinical studies of evidence level 1 (also included in our study), and its final conclusions state that the surgical treatment of acute non-displaced or minimally displaced scaphoid fractures has not proven to be superior to conservative treatment with immobilization in different variants.

The parameters studied were the rate of fracture healing, which are consistently described in all articles. Information concerning the grip strength, joint range of motion, pain, time to return to sport or work, patient satisfaction, were established in an inconsistent or incomplete manner.

Moreover, in these studies it is highlighted that surgical treatment is associated with complications such as osteoarthritis between the trapezium and scaphoid joint. Therefore, there is currently not enough evidence about the indications and the effectiveness of surgical versus conservative treatment of acute fractures carpal scaphoid.

Future studies should use a multicenter controlled clinical trial, to avoid the limitations of studies with few cases. A study should also be conducted in athletes population to assess the evidence of treatment in this special group. In addition, computed tomography should be used instead of plain radiographs to establish the types of scaphoid fracture and progression of bone consolidation.

Conclusion

Currently there is no evidence in the scientific literature to support the indication and the effectiveness of surgical versus conservative treatment of acute fractures carpal scaphoid. There are no controlled clinical studies that indicate the type of treatment to be applied in athletes.

Early surgical treatment of carpal scaphoid fractures is supported by a small number of studies of variable level of evidence, and is associated with complications such as trapezium and scaphoid joint osteoarthritis. We recommend that all studies in the future consist in a multicenter controlled clinical trial, avoiding the limitations of studies with few cases. In addition, we recommend conducting a controlled clinical study in athlete's population to delineate the therapeutic indications in these patients.

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