

Type III acromioclavicular dislocation and persistence of pain in the surgical versus conservative approach: a systematic review

Luxación acromioclavicular de tipo III y persistencia del dolor en el abordaje quirúrgico frente al conservador: una revisión sistemática

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ABSTRACT. Type III acromioclavicular dislocation is characterized by the complete rupture of the acromioclavicular and coracoclavicular ligaments. The approach to acute type III acromioclavicular dislocation is still dichotomous in the literature, since both the non-surgical and surgical approaches have similar clinical results. This study is a systematic review applying the PRISMA guidelines. The data sources used were PubMed/MEDLINE, Embase, Cochrane and Scopus. The search was carried out using the descriptors “acromioclavicular dislocation”, “type III”, “treatment” and “conservative”. The methodological evaluation was carried out using the Newcastle-Ottawa scale. The scales used to assess pain were the Constant Score and the Visual Analog Scale (VAS). After analysis, 7 studies were reviewed, from which 299 patients were included, 148 undergoing conservative treatment and 151 undergoing surgical treatment. The average age of the patients was 41, with a predominance of males. The average follow-up time was 5.3 years for conservative treatment and 3.7 years for surgical treatment. With regard to the functional scales, the Constant Score (CS) was higher in the surgical approach

RESUMEN. La luxación acromioclavicular de tipo III se caracteriza por la rotura completa de los ligamentos acromioclavicular y coracoclavicular. El abordaje de la luxación acromioclavicular aguda de tipo III (LCA) sigue siendo dicotómico en la literatura, ya que tanto el abordaje no quirúrgico como el quirúrgico tienen resultados clínicos similares. Este estudio es una revisión sistemática que aplica las directrices PRISMA. Las fuentes de datos utilizadas fueron PubMed/MEDLINE, Embase, Cochrane y Scopus. La búsqueda se realizó utilizando los descriptores «acromioclavicular dislocation», «type III», «treatment» y «conservative». La evaluación metodológica se realizó mediante la escala Newcastle-Ottawa. Las escalas utilizadas para evaluar el dolor fueron la puntuación Constant y la escala visual analógica (EVA). Tras el análisis, se revisaron 7 estudios, de los que se incluyeron 299 pacientes, 148 sometidos a tratamiento conservador y 151 a tratamiento quirúrgico. La edad media de los pacientes era de 41 años, con predominio de varones. El tiempo medio de seguimiento fue de 5.3 años para el tratamiento conservador y de 3.7 años para el tratamiento quirúrgico. En cuanto a las escalas funcionales, la puntuación Constant (CS) fue superior en el abordaje quirúrgico y la escala analógica

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and the visual analog scale was lower. The scores for the surgical modality were CS 90.2 and VAS 0.83, while the conservative modality was CS 87.9 and VAS 1.66. There seems to be no significant difference in the persistence of pain between conservative and surgical treatment. The choice of treatment still depends on the surgeon, and risk factors and complications should help in the decision.

Keywords: acromioclavicular, conservative, dislocation, pain, treatment.

visual fue inferior. Las puntuaciones de la modalidad quirúrgica fueron de 90.2 CS y 0.83 VAS, mientras que las de la modalidad conservadora fueron de 87.9 CS y 1.66 VAS. No parece haber diferencias significativas entre la persistencia del dolor en el tratamiento conservador y el quirúrgico. La elección del tratamiento sigue dependiendo del cirujano, y los factores de riesgo y las complicaciones deberían ayudar en la decisión.

Palabras clave: acromioclavicular, conservador, luxación, dolor, tratamiento.

Abbreviations:

ACL = acromioclavicular dislocation

CS = constant score

PICO = Population, Intervention, Comparison, Outcome

PRISMA = Preferred Reporting Items for Systematic reviews and Meta-Analyses

VAS = visual analogue scale

Introduction

The acromioclavicular joint is a diarthrosis located between the distal portion of the clavicle and the medial aspect of the acromion. It is surrounded by a thin capsule, which is inserted proximally to the acromioclavicular and coracoclavicular ligaments. It is divided into conoid and trapezoid. The whole is responsible for suspending the upper limbs, assisting in scapular rotation and abduction of the glenohumeral joint, as well as having an intimate relationship with the deltoid and trapezius muscles.^{1,2}

The trauma mechanism is often related to direct trauma, such as during sports activities and car accidents. Acromioclavicular dislocations are divided into six types (I-VI) according to Rockwood's classification.³ Type III acromioclavicular dislocation is characterized by complete rupture of the acromioclavicular and coracoclavicular ligaments.^{3,4}

The approach to acute type III acromioclavicular dislocation (ACL) is still dichotomous in the literature, since both the non-surgical and surgical approaches have similar clinical results.^{4,5} However, when the correction of anatomical and radiographic parameters, such as coracoclavicular and acromioclavicular distance, is evaluated, surgical treatment has better results. As with the functional scales, with better scores, but without statistical significance.¹

Other factors should also be taken into account when choosing the method, such as the aesthetic result, functional activity, recovery time and return to work.^{2,6} In addition, complications such as loss of reduction, the need for reapproach or conversion of treatment, infections and degenerative changes in the joint should also be taken into account.^{3,7}

With this in mind, this study aims to evaluate a series of studies and compare the persistence of pain in the medium term in patients diagnosed with acute Rockwood type III acromioclavicular dislocation, treated surgically and conservatively. Functional scores and complications will also be assessed secondarily.

Material and methods

This systematic review was conducted in accordance with the preferred reporting items for systematic reviews and meta-analyses (PRISMA).

Search strategy and selection criteria

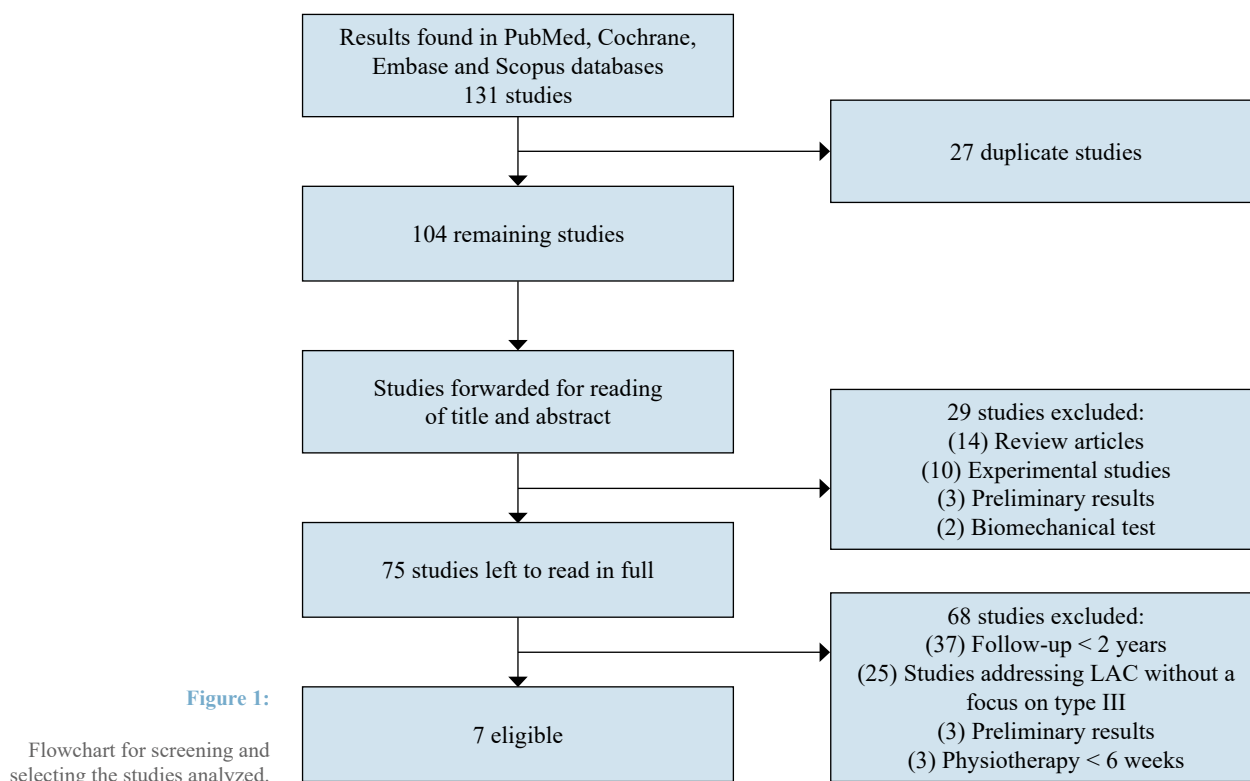
A systematic literature search was carried out in the following databases: PubMed/MEDLINE, Embase, Cochrane and Scopus. The main health science descriptors searched in English were: «*acromioclavicular dislocation*», «*type III*», «*treatment*» and «*conservative*». Boolean operators such as AND/AND and OR/OR were used in the databases. The search phrase used was «*acromioclavicular dislocation*» AND «*type III*» («*treatment*» OR/AND «*conservative*»). Initially, all the studies that discussed the treatment of type III acromioclavicular dislocation were approached for screening, and selected according to the criteria.

The inclusion criteria were: a) studies addressing surgical or conservative treatment of patients diagnosed with type III ACL with follow-up of at least two years (24 months); b) studies that used validated functional criteria for functional assessment such as constant-Murley score (CS) and/or visual analogue scale (VAS) for pain assessment; c) conservative treatment with immobilization with a sling/orthotic for 2-4 weeks followed by at least six weeks of physiotherapy; d) acute acromioclavicular joint injuries (< 28 days); e) study participants must be of low demand.

The exclusion criteria were: a) systematic reviews; b) case reports; c) studies carried out on animals and/or cadavers; d) experimental trials; e) studies that did not fully describe the treatment; f) biomechanical trials.

The articles were also selected according to the Population, Intervention, Comparison, Outcome (PICO) strategy.

Population: patients treated surgically or conservatively for acute Rockwood type III LAC. Intervention: analysis of pain using direct (VAS) and indirect (CS) functional scales in patients followed up for at least two years. Comparison: observation of the surgically treated group compared to the non-surgical group in terms of pain and complications. Outcome: to



indicate which approach is related to persistent pain in patients with acute type III acromioclavicular dislocation.

Pain assessment tool

Given that the aim of this study was to assess persistent pain, it was decided to use scales that are widely used and validated in different cultures. In addition, as it is a subjective variable of the patient, it is necessary to have a tool that is easy to apply and with minimal disagreement between observers. Therefore, the visual analogue scale (VAS) will be used.

Data extraction

After initial evaluation of the abstracts against the criteria, the relevant studies were selected for full reading and sorted. The data was extracted by a research team made up of four independent reviewers. Disagreements between the reviewers regarding the inclusion or exclusion of a study were resolved by consensus and, when necessary, a fifth reviewer was consulted. The variables collected included mean age, gender, follow-up time, the interventions carried out and the functional results obtained.

Quality assessment

To assess the quality of the studies found, the Newcastle-Ottawa scale was used, which evaluates eight items and has a score of 0-9 points in relation to the selection criteria, comparability and outcomes of the control studies.

Table 1: Distribution in terms of number, average age, follow-up and functional scales of patients treated for acromioclavicular dislocation.

	Conservative	Surgery
Patients, n	148	151
Average age [years]	40.4 (16 ± 65)	41.6 (16 ± 65)
Follow-up time [years]	5.3 (2 ± 20)	3.7 (2 ± 20)
Constant score [0-100]	87.9 (78 ± 98)	90.2 (82 ± 98)
VAS [0-10]	1.66 (0.2 ± 4)	0.83 (0.4 ± 2)

VAS = visual analogue scale.

Statistical analysis

After selecting the studies and extracting the sample number, variation and mean data, the data was tabulated. To assess the possibility of comparison between the studies, heterogeneity was estimated using the chi-square test. As there is no parameter within the pain analog scale to consider treatment satisfactory or not, the CS scale was used to assess treatment satisfaction, since pain is the main reason for changes in strength and mobility.

Results

Literature search and study characteristics

The databases found 131 results. A total of 27 studies were excluded because they were duplicates. In the second stage, 93 studies were excluded due to the pre-established

criteria. After analysis, seven articles were considered eligible for this review (Figure 1).

Characteristics of the references

This study reviewed 299 patients diagnosed with acute type III acromioclavicular dislocation, 148 of whom were treated non-surgically and 151 surgically. Among the trials, there was a predominance of male patients with a mean age of 40 years. A higher prevalence of surgical treatment than conservative treatment was found, with acromioclavicular fixation being the most commonly used, followed by coracoclavicular fixation methods. The average follow-up time ranged from two years to 20 years. The data collected included functional and pain assessment scales. The results analyzed included a comparative evaluation between non-surgical and surgical treatment.

Type III acromioclavicular dislocation

Initially, a numerical difference was observed between the number of patients in the surgical and conservative groups, which is related to the non-randomization of all the studies used, which presented asymmetrical groups. The mean age of the patients differed significantly, ranging from 28.7 to 53.5 years. There was a significant difference in the length of follow-up, with the conservative modality having a mean time of 5.3 years compared to 3.7 years for surgical treatment. As for the functional scales, the Constant score was higher in the surgical approach (90.2 vs 87.9) and the visual analog scale was lower (0.83 vs 1.66) (Table 1). In addition, the chi-squared result was $p = 0.0543$.

The different surgical approaches were divided into acromioclavicular fixation, with Hook plate being the most

Table 2: Description, characteristics and outcomes of the studies evaluated among those eligible for analysis.

Study	Patients	Age (years)	Sex	Dominant limb	Comorbidities	Comparison	Follow-up (months)	Result	Re-approach/ complication rate
Bostrom Windhamre H, et al ⁶	61 (C 31, Cc 30)	39.5	56 M 5 F	17 C 15 Cc	Smoking 1 C/4 Cc Diabetes 1 Cc	Hook plate or physiotherapy	24	C CS 88 (DASH 5) VAS 0.2 Cc CS 91 (DASH 6) VAS 0.8	Conservative (2) 2 persistent pain Surgery (1) 1 infection
McKee et al ⁷	83 (40 C, 43 Cc)	37.6	78 M 5 F	24 C 26 Cc	Smoking 10 C/16 Cc	Hook plate or physiotherapy	24	C CS 94.6 (DASH 4.5) VAS 0.8 Cc 90.8 (DASH 6.1) VAS 1.2	Surgery (6) 2 reduction; 2 acromial erosion; 1 clavicle fracture; 1 infection Conservative (3) 2 persistent pain; 1 heterotopic ossification
Gstettner C, et al ⁸	50 (28 C, 22 Cc)	36.7	45 M 5 F	18 C 16 Cc	NA	Hook plate or physiotherapy	34	C CS 90.4 VAS 0.8 Cc CS 80.7 VAS 2	Surgery (1) Arthrosis
Joukainen A, et al ¹⁰	11 (7 C, 4 Cc)	53.5	10 M 1 F	5 C 3 Cc	NA	Transarticular Kirschner or physiotherapy	216-240	C CS 87 Cc CS 78	Surgery (2) 1 loss of reduction; 1 infection Conservative (1) 1 osteoarthritis
Natera Cisneros LG, et al ¹³	9 (C 5, Cc 4)	40.1	8 M 1 F	NA	NA	Hook plate or physiotherapy	34.77	C CS 91.3 VAS 1.45 Cc CS 91.05 VAS 1.5	Conservative 54.3% scapular dyskinesia Surgery 18.3% scapular dyskinesia
Álvarez-Álvarez L, et al ¹⁵	30 (C 15, Cc 15)	50.5	24 M 6 F	9 C 6 Cc	NA	Endobutton duplo vs conservador	36.8	C CS 82 VAS 1 Cc CS 86.38 VAS 0.2	Surgery 33.3% degenerative changes Conservative 60% degenerative changes
De Carli A, et al ¹⁶	55 (25 C, 30 Cc)	28.7	55 M	22 C 25 Cc	NA	TightRope™ system vs conservador	42	C CS 98 VAS 0.4 Cc CS 98.2 VAS 0.2	Surgery 70% calcification and 6% osteolysis Conservative 30% calcification

C = surgery. Cc = conservative. CS = constant score. DASH = disabilities of the arm, shoulder and hand. F = female. M = male. NA = not reported. VAS = visual scale analogic.

common, and coracoclavicular fixation, with Endobutton being the most common. In the group that underwent acromioclavicular fixation, a long-term study was carried out using transarticular Kirschner wires (*Table 2*).

The functionality scales showed no significant changes between the methods. Complications varied according to the treatment method. In conservative treatment, calcifications, scapular dyskinesia and degenerative processes were mainly observed, followed by persistent pain and osteophytes. In surgical treatment, loss of anatomical reduction was the most common, followed by calcifications, infection, removal of the synthesis material, degenerative processes and scapular dyskinesia.

Discussion

There is no consensus on the choice between a surgical or conservative approach to type III acromioclavicular dislocation.^{6,7,8} Many of them point out that there is no significant difference between the functional scores of the approaches, although pain is an important factor in treatment.⁹

In addition, it is known that synthesis methods, when compared to non-surgical methods, improve anatomical and radiographic parameters. However, these characteristics are not manifested in clinical expressions, since the results of strength, mobility and pain do not show significant differences in some studies ($p < 0.05$).⁷ Within the results, the surgeon-dependent factor must be taken into account.^{7,8} When the use of orthoses or sling in the conservative approach was evaluated, the Constant score was 82 vs 81, respectively ($p = 0.90$).⁹

Surgical treatment initially has worse functional scores, which, over the course of follow-up, are similar to conservative treatment. In some studies, it surpasses the other method, and return to work respects this order.^{7,10} Complications related to pain, with the need for an approach, are more common in patients treated conservatively.¹⁰

Acromioclavicular fixation

Hook plate

The Hook plate hardware technique was the most widely used in the studies, but variations are found in the literature and modify the results when compared. An evaluation of the simple Hook plate with and without reconstruction of the double tunnel coracoclavicular ligament showed better functional results for reconstruction, especially in relation to the visual analog scale, with results of 2.52 versus 4.12 respectively, as well as fewer complications.¹¹

A randomized clinical trial evaluated the physiotherapy approach versus the Hook plate. There was a low rate of complications in the surgical approach, while there was a need for conservative treatment patients to be treated for pain.⁶ This factor was relevant to the choice of approach, since pain is a factor of dissatisfaction.

Furthermore, when ligament reconstruction is added to anchor fixation, the Constant score increases from 88.5 to 92.7, which is not observed when only Hook plate fixation is performed; even with the addition of reconstruction, conservative treatment shows better results in comparative studies, in terms of pain and functional recovery.¹¹ Another important factor is the early and late approach, the former showing better results when compared to the latter.¹²

An important factor related to the Hook plate is the incidence of scapular dyskinesia, which shows improvement compared to conservative treatment, with 18.3% and 54.3% respectively.¹³ Other complications may also be present, such as signs of arthrosis.⁸

In addition, the Hook plate needs to be removed. In general, the plate needs to be removed between 12 and 24 weeks, which increases treatment costs due to the need for qualified staff and hospital facilities. This should be considered when choosing the approach.⁶

Transarticular Kirschner wires

A prospective randomized study that followed patients for 18-20 years also evaluated the results of conservative versus surgical treatment. It was observed that after this period the functional results, such as Constant score, were similar, but the difference between the methods was greater, even though both were considered satisfactory (78 vs 87).¹⁰ Pain was more common in patients treated non-surgically.

Coracoclavicular fixation

Endobutton

There is also no consensus on the surgical techniques for acromioclavicular dislocation. When comparing the double and triple Endobutton techniques, it was found that there were no significant changes in functional tests such as Constant score (93.5 vs 93.1), respectively, and a similar pain analog scale. An important issue is reduction failure, which can be found in up to 30% of patients, and this number is higher with the double Endobutton.¹⁴

When comparing the Endobutton system assisted by arthroscopy and conservative treatment, there was also no significant difference between the Constant score values (82 vs 86).¹⁵ This study disagrees when it comes to pain in the two approaches. The pain analog scale showed values of 1 for surgery and 0.2 for conservative treatment.

Other methods

Other techniques have already been described, such as TightRope in type III acromioclavicular dislocations, with excellent results. However, when compared to conservative treatment, using the Constant score, the results were the same (98 vs 98.2). A greater number of complications were observed with surgical treatment, such as calcifications and osteolysis.¹⁶

The surgeon factor

There is no consensus among specialists regarding the management of patients with type III acromioclavicular dislocation. In a survey of 210 German departments, 84% of professionals operate on type III injuries, although they believe that the functional outcome of conservative treatment is similar.^{16,17} In Latin America, it's no different. A cross-sectional study carried out a questionnaire on the treatment of acute type III injuries for Brazilian orthopedists. Conservative treatment was used by 19.3% and surgical treatment by 80.7%. The most commonly used method is coracoclavicular fixation, followed by fixation with transfixing wires, ligament transfer and suturing with ligament reconstruction^{18,19}

Conclusion

In this sense, when evaluating conservative versus surgical treatments in terms of pain persistence, there seems to be little statistical difference between the samples, with both approaches being satisfactory. It is important to note that this study looked at low-demand patients, so the results cannot be applied to athletes or manual workers, as well as the elderly and children who need individualized assessment. In addition, this study has inherent limitations in terms of the level of evidence of the studies, which were not all randomized clinical trials, making it impossible to conclude on treatment modalities. Another noteworthy factor is the complications observed in the studies, with infection and loss of anatomical reduction being commonly cited, however, alterations such as ossification of the ligament and osteolysis of the clavicle were rarely mentioned, demonstrating a possible preference for conservative treatment in the trials.

Thus, in view of the results, new trials are needed using validated protocols as well as assessing the need for resources and the associated costs, as well as adapting to the local reality of each service.

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