Evaluation and conservative treatment of shoulder instability in volleyball players an overview

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Abstract

Background: *Currently the conservative approach regarding shoulder instability in volleyball player results still be highly contested and discussed in clinical practice. To stipulate a rehabilitation treatment appropriate and personalized, it will be crucial to include the local region in the preliminary assessment compromised and the global kinetic chain, given the numerous correlations between the different body districts. Objective*: *Evaluate through the collection of literature the best scientific evidence regarding the evaluation and conservative treatment of shoulder instability in volleyball player to be used as an option in situations where surgical treatment would be excessive and invasive for the young athlete. Method*: *The research was conducted by a single operator through a review of the literature of the last* 15 *years in databases such as Medline, PubMed and Pedro. The research began in January* 2022 *and ended in March* 2022. *The selection of the articles was made on the basis of the reading of the title, abstract and full-text. Result*: *The research initially yielded* 66 *scientific articles but after reading the title, abstract and full-text,* 19 *related articles were considered. The best evidence has been sought regarding treatment protocols for shoulder instability in the athlete. Conclusion*: *According to the researches carried out the recommendations of the authors and the results obtained by the latter, the conservative approach plays a fundamental role in the recovery in case of shoulder instability. Most athletes have felt positive not only physically but also mentally. Despite this, more extensive studies will be needed in the future, to ensure the professional and the athlete a protocol of conservative recovery as appropriate as possible.*

INTRODUCTION

Shoulder instability in the volleyball player is one of the most complex problems to manage for the physiotherapist, according to data reported in the literature, more than 85% of all instability events occurred in the male population, of which 70% were episodes of subluxation, while the remaining 15% were events of dislocation [1]. The shoulder is overloaded during the sporting gesture, then exposed to micro- traumatism repeated over time, this has been seen to be a crucial risk factor for the onset of pathologies. Dimitrios C., et al. 2016 [2], and the presence of morphological, biomechanical and functional abnormalities in the dominant shoulder of the athlete tied is an entrance door to the establishment of shoulder instability. A crucial risk factor has been defined the presence of the reduction of the internal rotation (GIRD) and the increase of the external rotation (ERG) in the dominant shoulder of the volleyball player, the GIRD has been defined pathological if greater than 18°- 20° relative to the contralateral with ERG not simultaneous, also the total arc of movement (TROM) > 5° was associated with a risk of 2.5 times greater than suffering injury. The injury is therefore a reason for absence from training and competition, often manifested during the season with negative psychological feedback for the athlete precisely because of its clinical complexity. In fact the primary cause of instability can be traced back to functional anomalies present in different districts with respect to the articulation concerned. Kibler, et al. (2016) reported an association between scapular dyskinesia and weakness during hip abduction [3]. In the literature the importance of a correct evaluation of the gleno-humeral in all its components, but also of the global kinetic chain, has often been stressed, fundamental to stipulate an individualized conservative rehabilitation treatment with the aim of obtaining a valid and performing return to the game. Therefore the purpose of this study was to define the importance of a correct initial evaluation and to gather in the literature through a careful evaluation the most effective protocols of conservative treatment for shoulder instability in volleyball player.

METHODS

The research was carried out by a single operator through a review of the literature of the last 15 years in electronic databases such as Medline, Pubmed and Pedro, with the following research keys: Shoulder Instability, Volleyball Athletes, Conserva-

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tive Treatment Shoulder. Inclusion criteria: studies concerning conservative treatment for shoulder instability in professional and non-professional volleyball players, randomized controlled trials (RCTs), guidelines, systematic reviews. Exclusion criteria: abstracts not available, full-text not available, dated articles, irrelevant articles, studies that included surgical treatment procedures and post-surgical rehabilitation.

RESULTS

The selection of articles was made by reading titles, abstracts and full-text. An initial study produced 66 scientific papers. Through the reading of titles and abstracts, 50 articles were excluded as not relevant to the objective of the study. Finally, from the reading of the relevant articles, a further three have been added, with a total of 19 articles. The flowchart (Figure n.1) shows the methodological procedures that led to the selection of the 19 articles. Table No. 1 shows the research of conservative treatment for shoulder instability in the athlete.

UNSTABLE SHOULDER EVALUATION

Following consultation of the main guidelines in the literature [4], [5], [6], the "Stanmore" approach to classifying and recognising different types of instability [4] has been defined as useful for professionals. Shoulder instability is a pathology that presents with multiple nuances, sometimes the onset can be insidious given by multifactorial causes. Therefore the key elements to be included in the assessment of shoulder instability are: the verification of joint stability, the control of the scapula including the function of the peri-scapular muscles and the muscles of the rotator cuff, the presence of joint laxity, neurological status, pain and psychosocial factors including fear and anxiety of shoulder movement [4], [5], [6]. Michael A., et al. (2016) in his study adds importance in defining the age of the patient at which the first event occurred and the chronological timing of any subsequent event, as these have a prognostic value for determining the recurrence of instability [5]. Important diagnostic clues to identify the type of injury can be given: by the mechanism in which the phenomenon occurred and by the position of the upper limb at the time of the accident [5], [6]. However, the clinician should always take into account the type of sport practiced by the patient (contact vs non-contact), the level of play, the current season and the patient's expectation [5]. In addition, it is recommended in the study

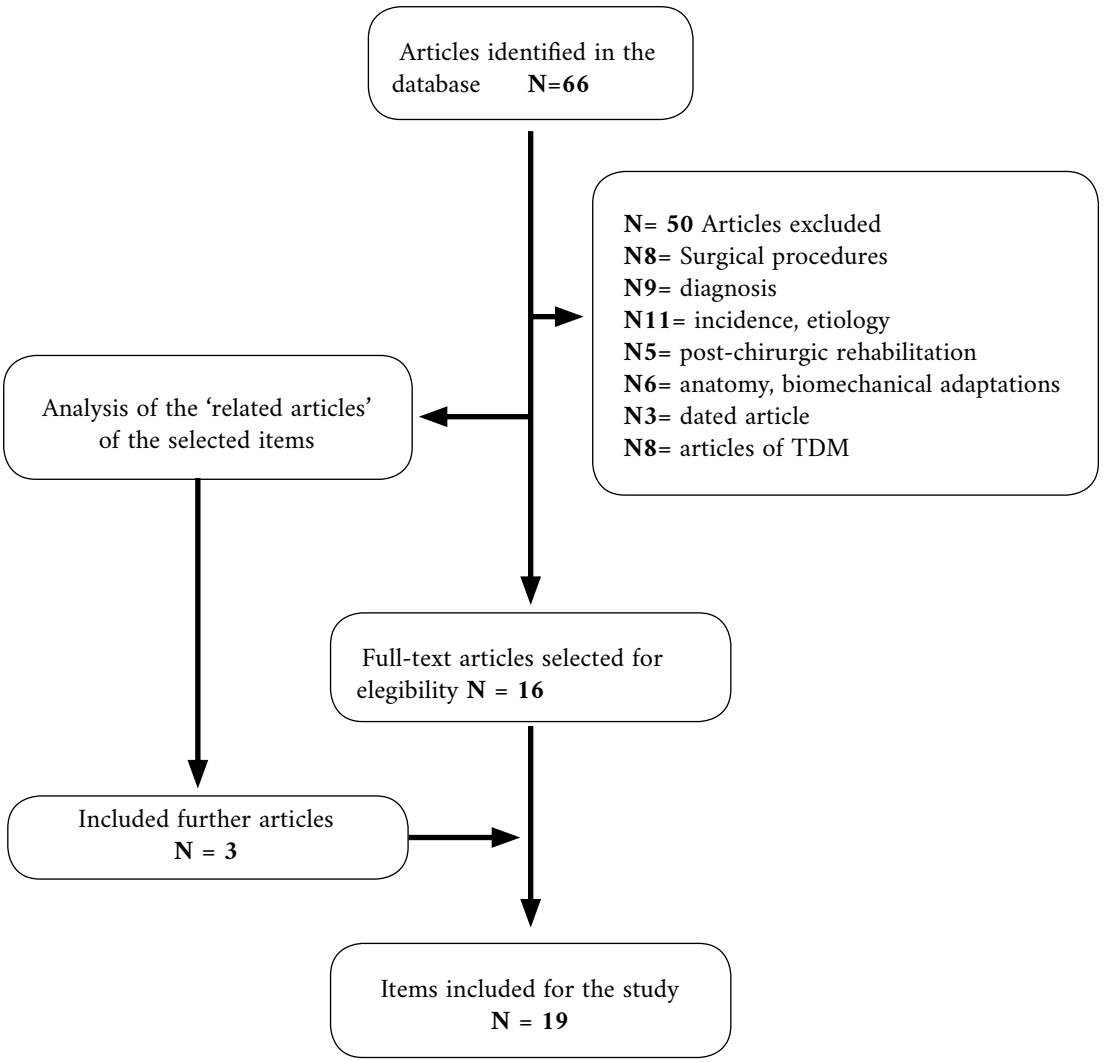

Fig. 1 *-Flowchart of included studies*

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by Ann M. Cools, et al. (2015), to perform in-depth screening of the cervical and thoracic spine, as well as an assessment of mobility, strength and stability of the lower body quadrant [6].

CONSERVATIVE TREATMENT FOR SHOULDER INSTABILITY IN VOLLEYBALL ATHLETES

Based on the research carried out, the authors share the importance of a correct initial assessment, several studies have investigated and reported frequent correlations between temporomandibular disorders (TMD) and postural disorders associated with shoulder instability [7]. In the early stages of rehabilitation several authors favor closed-chain kinetic exercises, while open-chain exercises are recommended at more advanced stages without hand support. In addition, the posterior stiffness and scapular dyskinesia of the gleno humeral joint are probably the most common adaptations observed on the dominant side of shoulder-instability athletes who launch in multiple sports. This causes the internal rotation to be reduced by 17° or more compared to the contralateral. Some studies in the table define the importance of stretching sessions especially in the early stages of instability treatment, which will then have to be maintained in the long term, in the study of Ann M Cools et al. (2015), [6] a daily stretching program of 6 weeks in which you perform 3 repetitions maintained for 30 seconds associated with the hold-relax technique is able to significantly increase the acromion-humeral distance in the dominant shoulder of athletes with GIRD. Given often the presence of muscle imbalances in the athlete with shoulder instability, a part of the training is also dedicated to the restoration of the latter, recommended and shared by several authors 3 key exercises to reduce the activation of the upper trapezium and increase the activation of the middle, lower trapezium, with regard to the rotator cuff has been defined crucial eccentric activation during activities [8]. The sport gesture requires adequate mobility, stability and strength of the legs, hips and trunk, so it will be crucial to correct any stiffness or weakness of the hind muscles of the thigh, hip and trunk, therefore requiring the functional and adequate activation of the entire global kinetic chain [4] to resolve instability and prevent injury. The Advanced Thrower's Ten Exercise Program emphasizes resistance training not only of the shoulder and of the scapular-thoracic musculature, but also that responsible for maintaining the correct position of the trunk and lower limbs during launch [9]. The pliometric activity in the last stages of the treatment will be peculiar, it has been seen that a pliometric operation performed 2 times a week for 12 weeks has been crucial for athletes compared to the conventional approach [10]. Therefore, we must not limit ourselves only to the recovery of strength, dynamic stability and proprioception, but also promotes the development of the necessary resistance to facilitate the return of the athlete to sports activity, Fatigue has been defined as one of the causes of reduced muscle activation and risk factor for injuries.

DISCUSSION

Shoulder instability is much discussed in the literature in terms of both assessment and treatment, the onset at a young age and the related relapses are very frequent especially if you practice contact sports but also in the case of overuse sports as happens in volleyball players [2]. It has often been argued in studies that it is essential to have a reliable and adequate clinical and instrumental assessment, the survey must include all structures from local to global, thus considering every single aspect as a possible cause [4]. In the early stages of recovery was shared by most of the authors the usefulness of stretching in the dominant shoulder, strengthening activities in isometry and closed kinetic chain, without requiring the shoulder girdle excessive degrees of articulation. In the following phases, joint recovery, reinforcement of deficient muscles, open kinetic chain activities and the development of joint proprioception are increasingly encouraged [2]. A crucial element in the rehabilitation of instability is to include in the treatment the overall body reinforcement, given the functionality of the shoulder girdle correlated with the other body districts [2]. The limit of this work is the wide variability and heterogeneity of the samples examined in the studied studies as well as the methodology, and the classification of shoulder instability; where a comparison is often difficult to achieve.

CONCLUSION

The proposals in the literature define the importance of conservative treatment and safe return to the game of volleyball player with shoulder instability. The progression of the rehabilitation activities listed in the review, are those most recommended by the different authors and with positive effects on the athlete both physical and psychological. The players following the execution of the activities reported the reduction of symptomatology, the recovery of pre-morbid sports performance and the safe return to sport activity. Despite this, more extensive studies will be needed in the future, to ensure the professional and the athlete a protocol of evaluation and rehabilitation conservative recovery as appropriate as possible. Future research is essential to build high quality studies to have greater methodological rigor in this field, thus placing the common ground for the construction of guidelines and good clinical care practices.

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Table 1 - *Summary of the main results*: *Evaluation and conservative treatment of shoulder instability in volleyball player an overview*

STUDY DESIGN	TARGETS	METHODS	CONCLUSIONS
[6] Ann M. Cools, et al. (2015) Narrative review	The article provides an overview of current knowledge and guidelines relating to evidence-based rehabilitation of athletes with glenohumeral instability.	In general, the following should be preferred: the restoration of strength, joint ROM, optimization of flexibility and muscle performance, gradual increase of the specific functional load.	The functional kinetic chain activity should be implemented in all phases of the rehabilitation program.
[8] Cool A. M, et al. (2007) Controlled laboratory study	Of the 12 commonly used trapezius strengthening exercises, a selection can be made for rehabilitation of muscle balance.	45 healthy subjects = electromyographic activity of the 3 parts of the trapezius and the SA was evaluated during the execution of 12 scapular exercises.	In case of trapezius muscle imbalance, some exercises are preferable to others due to their low UT / LT and UT / ratios. MT.
9] Kevin E. et al. (2011) guideline	The study presents an innovative approach to the rehabilitation of the athlete: The Advanced Thrower's Ten Exercise Program.	It involves the execution of 10 exercises with progressive difficulty each of which focuses on certain structural components and objectives.	This type of activity facilitates the transition from rehabilitation to return to play.
[10] Bahri G, et al. (2017) Randomized case study	This study aimed to evaluate the effects of 12 weeks of plyometric training.	21 volleyball players = plyometric program 20 volleyball players = conventional training. Both programs run 2 times a week.	The changes that occurred between pre- and post-test were more correlated in the plyometric group. Despite this, positive outcomes were found in both groups.
11) Sarah A Warby, et al. (2018) Randomized pilot study	Comparison of the effectiveness of 2 specific exercise programs for MDI.	Participants with non-traumatic MDI randomly divided into the Rockwood and Watson program. They are evaluated with the Melbourn instability score and WOSI.	The Watson program appears to produce better results due to its focus on primary recovery of scapular activity.
12) Mohsen M, et al. (2020) RCT	The study evaluates the effects of exercising with theraband for 8 weeks.	60 male volleyball players with GIRD, divided into training group and control group.	Significant differences were found in the training group compared to the control group, both in terms of rotator cuff strength and in the sense of scapular position.
13) Lyn W, et al. (2017) Case series	The study assesses the effectiveness of a physiotherapy-led exercise program for MDI subjects.	43 participants with MDI, 12-week activity, outcome measures used, Melbourne instability shoulder score, WOSI, oxford shoulder instability score.	Significant effects were found in the pre and post rehabilitation assessment scores.
14) Steven F. et al. (2018) Systematic review	The study presents coordinated launch programs and gradual return-to-play protocols dependent on their sport.	Reinold and Gill describe a rehabilitation process divided into 4 progressive stages.	The overall duration of treatment depends on the athlete and the severity of the injury, however, in patients who fail conservative management, surgical stabilization may be required.
15) Lyn Watson, et al. (2016) Randomized controlled study	The article outlines the first 2 phases of a rehabilitation program for the conservative management of multidirectional instability with a focus on shoulder blade control and activities in functional positions.	Assessing the effect of manual correction is a key component of the Watson Program based on whether rehabilitation can be beneficial.	These steps are imperative for the MDI patient to master in order to gain sufficient strength and control to move on to the next steps.
16) Lyn Watson et al. (2016) Randomized controlled study	The study presents the second part of the Watson rehabilitation program.	Step 3: Control 0- to 45-degree flexion Step 4: Control of the sagittal plane and coronal plane from 45- to 90-degrees Step 5: Recovery of strength in the deltoid Phase 6: sport specific phase.	The Watson MDI program focuses on developing shoulder blade control on performing functional and sport-specific exercises.
17) Ann M. Cools et al. (2020) Narrative review	The article presents a clinical commentary that discusses each of these 3 challenges in the dominant shoulder of the volleyball player.	In the early stages the aim is to reduce the symptoms, subsequently activities for the global kinetic chain must be integrated, for the recovery of the GIRD and to define the limit values for the return to play.	This paper aimed to incorporate some recent trends and research data into the injury prevention continuum.
18) Richard Ma, et al. (2017) Case series	Evaluate the evidence-based literature and the concepts that surround it rehabilitation in patients with anterior instability injuries.	The first post-injury approach is usually not surgical, however surgical management still seems useful in younger patients (age <30) and in individuals with high risk like contact athletes.	Some objective parameters, such as the range of motion and the strength of the cuff of the rotators, are considered important to normalize during the rehabilitation process after the injury.
[19] Kevin E. et al. (2015) Narrative review	Kevin Wilk and his team explain how to build muscle in the usually weak shoulder blades.	Specific strengthening and flexibility interventions to restore the dynamic stability necessary for the resumption of sport.	Successful rehabilitation depends on clear identification of the underlying causes

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