



Special Article

Concept of healing of recurrent shoulder dislocation[☆]

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ABSTRACT

This paper presents the main surgical techniques applied in the treatment of anterior recurrent shoulder dislocation, aiming the achievement of the normality of articulate movements. This was obtained by combining distinct surgical procedures, which allowed the recovery of a complete functional capacity of the shoulder, without jeopardizing the normality of movement, something that has not been recorded in the case of the tense sutures of the surgical procedures of Putti-Platt, Bankart, Latarjet, Dickson-O'Dell and others.

The careful review of the methods applied supports the conclusion that recurrent shoulder dislocation can be cured, since cure has been obtained in 97% of the treated cases. However, some degree of limitation in the shoulder movement has been observed in most of the treated cases.

Our main goal was to achieve a complete shoulder functional recovery, by treating simultaneously all of the anatomical-pathological lesions, without considering the so-called essential lesions.

The period of post-operative immobilization only last for the healing of soft parts; this takes place in a position of neutral shoulder rotation, since the use of vascular bone graft eliminates the need for long time immobilization, due to the shoulder stabilization provided by rigid fixation of the coracoid at the glenoid edge, as in the Latarjet's technique.

Our procedure, used since 1959, comprises the association of several techniques, which has permitted shoulder healing without movement limitation. That was because of the tension reduction in the sutures of the subscapularis, capsule, and coracobraquialis muscles.

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Conceito de cura da luxação recidivante do ombro

RESUMO

O presente trabalho analisa as principais técnicas cirúrgicas empregadas no tratamento da luxação recidivante do ombro (LRO), com o objetivo de obter a normalidade da amplitude dos movimentos articulares e associar diferentes tempos cirúrgicos num único procedimento para obter uma capacidade funcional completa, sem comprometer a normalidade dos movimentos, por causa das suturas tensas usadas nas cirurgias de Putti-Platt, Bankart, Latarjet, Dickson-O'Dell e outras.

Palavras-chave:

Luxação do ombro/cirurgia

Articulação do ombro/cirurgia

Instabilidade articular

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Após cuidadosa revisão desses métodos em uso, chegamos à conclusão de que a LRO pode ser considerada resolvida quanto à porcentagem de cura (97%). Permanecem, no entanto, limitações dos movimentos na grande maioria dos casos, aceitas até como necessárias para evitar recidivas.

O nosso objetivo cirúrgico visa à obtenção de uma recuperação funcional completa, atuar simultaneamente sobre as várias lesões anatomopatológicas e abandonar a ideia das chamadas "lesões essenciais".

A imobilização do ombro operado será feita somente durante a cicatrização das partes moles em rotação neutra. Com o uso de um enxerto ósseo pediculado dispensa-se qualquer tipo de imobilização prolongada, por causa da estabilidade obtida pela osteossíntese da coracoide no rebordo da glenoide, como na técnica de Latarjet.

Essa nossa conduta, empregada desde 1959, consiste, portanto, na associação das várias técnicas com as quais se obtêm a cura sem limitação dos movimentos, por causa da redução da tensão nas suturas da cápsula e dos músculos subescapular e coracobraquial empregadas nas técnicas acima.

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Introduction

As indicated by the title of this study, my intention here was to demonstrate our thinking regarding the concept of curing of recurrent shoulder dislocation (RSD), in the light of current knowledge and personal experience, more than simply describing a treatment method and analyzing its results. I also aimed to provide an explanation for the general tendency to accept healing of RSD to be cessation of recurrences, even if joint function has to be partially compromised to achieve this. Our position is to define the concept of curing of RSD as healing that results not only in cessation of recurrences but also in restitution of normal functioning of the operated joint.

Evolution of surgical treatments

Surgical treatment for RSD has undergone evolution that can be divided into four somewhat elastic periods.

The first, from 1870 to 1910, was the period during which the first attempts to implement surgical solutions emerged. These attempts demonstrated that there was confusion regarding knowledge of this pathological condition, based on erroneous premises. Surgeons' attention was directed toward the capsule, and its laxity was interpreted as the sole cause of the instability. From this notion, capsulorrhaphy was developed, with its lack of success.

The second period, from 1910 to 1940, was the era of description of the techniques that would mark the path toward definitive cure of the disease, which seemed to lead to the same objective: creation of an inelastic scar on the anterior face of the shoulder. Thus, the operative techniques of Hybbinette,¹ Eden,² Oudard,³ Putti-Platt,⁴ Gallie,⁵ Bankart,⁶ Nicola,⁷ Magnuson,⁸ etc. emerged.

The third period was between 1940 and 1950, when it became possible to gather together the worldwide experience for judgment and analysis. This would confirm the success of the above techniques, and show the distribution of preferences according to geographical zones of influence of languages, schools or ascendance.

1950 marked the start of the period in which simplification of the surgery was sought. This goal is acceptable as a general principle of progress in any field: resolution of difficulties of a technical nature, presentation of improved results and even simplification of the surgical procedure.

Over the course of time, there was slow but sequential development of studies on RSD. Studies were conducted and their conclusions were compared until a properly grounded body of knowledge had been attained. A defined basis was thus formed, from which new attempts would start, with procedures that were identified as valid contributions toward improvements, in relation to interpretation either of the events already observed or, especially, of details with the capacity to improve the functional results from the treatment.

My participation in this subject dates back to the start of my activities within this specialty and was marked by contact with the technique of Nicola,⁷ which at that time was received with great enthusiasm, since it seemed to address a common anxiety among the specialists. This anxiety seems to us to be defined as the search for simplicity, in contrast with the techniques of Bankart⁶ and Putti-Platt,⁴ which are also efficient but demand greater dexterity among surgeons, given the complexity of these procedures. This complexity comes not only from their requirement for the operation to be of longer duration, but also from repercussions of the risks of prolonged general anesthesia.

During the time that I was at the Rizzoli Institute, in Bologna, as a bursary-holder in 1948 and 1949, I had the satisfaction of assisting Professor Delitala⁹ around ten times, to carry out his technique. As known from its details, this was also introduced as an attempt to simplify Bankart's technique,⁶ comprising fixation of the capsule on the glenoid rim.

After my return from the Rizzoli Institute, my intention was to put into practice the experience with Dalitala's technique⁶ that I had acquired, although I continued to feel that it was complex, albeit less so than earlier techniques. Thus, it still did not reach our ideal.

It was clear that there was a need to go into greater depth in studying this topic. Between 1952 and 1958, as we reviewed all the existing literature, we developed a new idea. Based

on knowledge of the pathological anatomy of RSD, we were led to the observation that rather than consisting of a single essential lesion, there were several coexisting lesions.

Thus, the technique to be used in treating a shoulder that repeatedly dislocates should be one that reconstitutes the main lesions observed, to as great an extent as possible. This would theoretically prevent the dislocation from recurring.

Current knowledge shows that capsule-ligament lesions, bone lesions at the glenoid rim and muscle lesions manifested mainly by atrophy and distension of the subscapularis exist concomitantly. Thus, a technique that could be called ideal would be one that aimed to correct all of these injured elements.

Since the majority of authors had based their work on the notion that there was one essential lesion and hence had proposed different techniques directed toward treating these lesions, the idea laid out above necessarily led toward combining these different approaches and creating a single operation for treating almost all the lesions. This differed from the few combined techniques that had already been put forward, given that these were all limited to bringing in only one additional approach, to join together with the main approach. Our reasoning was based on two main principles:

1. Knowledge of the anatomopathological lesions and therefore of the physiopathology of the recurrences, which made it possible to conceive of treatment for them that had the aim of achieving true "anatomical restitution", which would consequently be functional.
2. Use of certain technical details and general orthopedic principles that could contribute significantly toward this complete functional recovery.

With regard to the first principle, the historical evolution of knowledge of the pathological anatomy and physiopathology of RSD coincided with the appearance of a series of techniques that became the main ones among the 200 or so that were already known. These techniques became consolidated and established through years of experience around the world, with the interesting fact that each of them formed the basis for treating one of the anatomopathological lesions, which the author of that technique considered to be the "essential lesion" for explaining the recurrence of the dislocation.

The term "essential lesion" first appeared in the study by Bankart,⁶ who described this as deinsertion of the labrum of the rim of the glenoid bone, which formed a cleft through which the humeral head would start to dislocate again. This term became generalized after its author thought that he had clarified the while complexity of the problem.

Capsule lesions had already been described, and hence capsulorrhaphy was the first technique for treating RSD to be published.

Bone lesions of the glenoid rim had likewise been described. From this, pre-glenoid bone grafting emerged, as seen in the techniques of Eden² and Hybbinette.¹

Following this, muscle lesions were described, particularly those of the subscapularis muscle, as shown by Magnuson.⁸ This author's technique is still used.

Posterior external depression of the humeral head, which is present in almost all cases of RSD, was also taken to merit the

name of principal lesion, as described by Palmer and Widen.¹⁰ This was based on how this depression fitted into the anterior rim of the glenoid.

Through phylogenetic and ontogenetic analyses, Dickson and O'Dell¹¹ were even led to propose RSD treatment by means of restitution of the internal rotator function of the pectoralis minor, which had been lost through the evolution of the species, with consequently unbalancing of the joint such that the external rotators were favored.

Summarizing the points laid out above, the following injuries were described as essential or principal lesions by their discoverers, and a specific technique was proposed for treating each of them:

1. Capsule-ligament injury, with labral lesion.
2. Injury to the rim of the glenoid bone.
3. Impaction injury of the posterior external part of the humeral head.
4. Injury to the subscapularis muscle.
5. Factors that predisposed toward joint instability, of a phylogenetic or ontogenetic nature, due to the pectoralis minor.

Nonetheless, with the current knowledge regarding the pathological anatomy of RSD, a multiplicity of lesions is recognized. For each of these, a solution has been proposed, which has been accepted and consolidated through long experience.

Implementation of a treatment method aimed toward correcting only one of the multiple lesions present would require this method to be responsible for suppressing the other recurrence factors, probably at the cost of reducing joint mobility. This limitation would become a form of "stabilizing factor", which would avoid dislocation by preventing a series of functional deficits from being triggered, which would have been consequences of the multiple anatomopathological lesions.

These deductions are based on the high percentage of shoulder movement limitations found in the detailed statistics on the methods most used.

Some authors (such as Magnuson,⁸ DePalma,¹² Watson-Jones¹³ and several others) conceded that these limitations were necessary in order to promote the cure. Others admitted that they decided not to count limitations of less than 20° in analyzing their cases, if the patients did not complain about this degree of limitation. In this manner, a concept of cure at the cost of partial loss of joint mobility was established.

Taking into consideration the high percentage of such injuries among athletes and their young age, varying degrees of limitations in external rotation and abduction movements would definitively prevent athletes from doing their sports activities.

With regard to the second principle, we are convinced that by adopting a treatment technique that acts on all anatomopathological lesions directly or indirectly, a series of stabilizing factors for improving the functional recovery of the joint are created. The factors proven to be the causes of the mobility limitations in each of the techniques are sought. Through adopting some operative and postoperative measures with the capacity to undeniably contribute toward facilitating the return to normal movements in the operated joint, suturing under excessive tension or shortening of the anatomical elements are avoided. This reconstructive

technique brings together known methods, chosen from among those that favor recovery as early as possible, such as by doing away with prolonged immobilization. Moreover, we believe that postoperative measures relating to the type, position and duration of immobilization may give rise to better results.

We will now more objectively analyze the important details of the reasoning presented. Most of the surgical techniques used for treating RSD are based on correction of one of the multiple anatomopathological lesions that make up the set of causes of recurrences. Whereas these techniques present favorable results in relation to recurrences, full recovery of joint movements is incomplete in a significant number of cases, in all the statistics, to the point that this has become a general concern. Since 1960, our preference has been for using a technique that sought, in a single procedure, to correct multiple anatomopathological lesions and act simultaneously on capsule, muscle and bone lesions. To these details of the surgical procedures, others are combined so as to enable as short a duration of immobilization as possible, in a functional position, in the same way as done in relation to other joints in general, thereby facilitating recovery of these movements without compromising the stabilizing action desired. The principle that we start from is that each structure treated allows proximal external rotation to the midpoint between the two rotations, so that it can be thus mobilized, with the aim that the recovery phase immediately after removal of the plaster cast already starts with half of the gain in rotary excursion.

We will examine the injured anatomical elements and the ways of restoring them and will identify the factors that limit function.

Injuries to the subscapularis, which is an important muscle for stabilizing the joint, are manifested mainly in the external rotation and abduction positions. When this muscle is placed under tension, these injuries are transformed into dynamic blocking of the passage of the humeral head. However, healing of injuries to the muscle fibers, to form fibrous tissue, gradually causes loss of elasticity and contractile capacity, which results in atrophy and consequent loss of the dynamic containment role. The technique aimed at recovering this function involves reimplantation of the humeral insertion of this muscle, with redirection of its oblique positioning to a horizontal position. This detail results in increased stabilizing function. In our view, this transfer of the insertion of the subscapularis from inside to outside the bicipital track not only advantageously directs its fibers, but also increases its angle of insertion in the humeral neck. In turn, this increases the internal rotation power of this muscle. This benefits the dynamics of the shoulder, since the increase in internal rotation strength partially rebalances the comparison with the external rotary forces, which are anatomically favored by the greater insertion angles of their muscles. This functional role, which in our view is important, has not previously been attributed to the subscapularis at its new insertion. It is important never to surgically interrupt the continuity of its fibers and transfer this muscle, which has been stretched through creation of a fibroperiosteal flap, when dissecting it starting at its insertion in the lesser tuberosity. All the known techniques that are based solely on transferring the insertion of the subscapularis externally to the bicipital tracks deliberately aim to reduce the

external rotation of the shoulder by 20° to 50° (Magnuson-Stack,⁸ DePalma,¹² Palumbo and Quirin,¹⁴ McLaughlin and Cavallaro¹⁵).

Rupturing of the capsule or extraction of its glenoid insertion produces a retraction, such that its suture is placed under tension. Putti-Platt,⁴ Brav¹⁶ and Matti,¹⁷ alongside their good results, noted that external rotation had a permanent limitation. Colonna and Ralston¹⁸ observed that a 15° reduction in external rotation of the shoulder always remained and thought that the good results might have resulted from this partial blockage of movements, since this would avoid slippage of the deformed head over the glenoid rim, which causes the dislocation.

In a series of 49 cases, Mackinnon¹⁹ found that 45 had a limitation of 15° or more in their external rotation movements. The only three cases in which there was full recovery of movements were the ones that present recurrence. In a series of 36 cases, Merle D'Aubigné et al.²⁰ found that eight presented a limitation of more than 30°. Sandow and Jannes²¹ found that 100% of their 90 cases operated had limitations of external rotation. From analysis on the statistics published on the technique of Putti-Platt,⁴ there was a definitive limitation of at least 15° in external rotation movements.

Techniques that act on the capsule or in which it is opened are carried out in a direction parallel to the anterior edge of the glenoid. It is known that the duration of the operation for suturing the capsule at the glenoid rim may cause movement limitations, particularly with regard to external rotation.

We prefer to open and suture the capsule in a horizontal direction and to correct its laxity without shortening its longitudinal fibers, which maintains the elasticity of the capsule during abduction and external rotation. Suturing the capsule in a horizontal incision enables closure in the craniocaudal direction, which corrects its laxity without shortening it.

Techniques that act on bone lesions are based on using bone grafts to correct the wear on the anterior bone rim of the glenoid, so as to impede fitting of the posterior external depression due to expansion of the width of the glenoid cavity. Techniques that use a free bone graft compromise joint function due to delayed consolidation. Introduction of the pedunculated bone graft of Latarjet,²² fixed by means of osteosynthesis, provided the possibility of rapid consolidation and did away with joint immobilization, since it not only increased the area of the glenoid cavity but also impeded fitting of the posterior external depression.

We believe that it is extremely important to reconstruct the glenoid bone rim, which has an undeniable role in shoulder instability. Pedunculate bone grafts not only have the mechanical requisites for their intended role, but also eliminate problems of a biological nature, because of the robust pedicle, which is highly vascularized by the coracobrachialis muscle, thereby providing assured rapid consolidation. Fixation of this graft, which is prepared and done using a spongy screw, does away with immobilization and allows functional recovery to be started early on.

Contrary to Latarjet,²² we adopted the practice of opening up not only the bone surface of the glenoid but also the face of the graft with which it will be in contact, along with performing osteosynthesis by means of a spongy screw encompassing both cortical bones of the scapular neck, in order to ensure

rigidity and do away with the use of external immobilization.

Regarding postoperative immobilization, we adopted an intermediate position between internal and external rotation and followed a principle that is used for all joints, so as to facilitate its recovery and thus avoid capsule and scar retractions and also muscle retraction. When the shoulder is immobilized in the Velpeau position, it is kept in internal rotation, and this becomes transformed into a factor that limits external rotation and requires significant loss of time from the recovery phase. The intermediate position between the two extremes of rotation movement is tested during the surgical procedure before starting to close the wound. The patient is immobilized in a thoracobrachial brace for a short time, solely with the aim of protecting the soft-tissue sutures while they are healing, which takes 12-14 days. After this period, the painful sensation will have diminished and movement can be resumed immediately after removal of the plaster cast.

Since we sought to obtain a bone graft that was as big as possible, we perform osteotomy on the coracoid apophysis at its base, which would imply losing the insertion of the pectoralis minor and abandoning it in the deep planes of the operative wound. In this case, we prefer to make use of it and restore its primitive function. The tendon of the pectoralis minor is dissected from the upper face of the coracoid apophysis and its fibroperiostic expansion, extending as far as its lateral edge, is conserved. It is used to provide stretching of this muscle, thereby facilitating its insertion into the greater tuberosity of the humerus and thus avoiding possible limitation of external rotation. We use this surgical procedure proposed by Dickson and O'Dell¹¹ in order to add further internal rotary force, which protects the joint against the tendency to dislocate and partially restores the balance of forces that was lost during the evolutionary process that the shoulder underwent, as described in well-known phylogenetic and ontogenetic studies (Fig. 1).

This transfer of the pectoralis minor sometimes shows greater tension in the transferred muscle, which is observed when it is sought to test placement of the limb in neutral

rotation for immobilization. In this case, we proceed with stretching of the aponeurosis of this muscle, by sectioning only the superficial inelastic fibrous parts and sparing the integrity of the elastic muscle fibers, which yield without breakage.

Conclusions

1. A pedunculated bone graft, which is used to improve joint stability, expands the surface of the glenoid, in accordance with Latarjet's technique, and at the same time creates an obstacle that impedes sliding of the humeral head, since it reconstitutes the bone rim of the injured glenoid and expands the area of the glenoid cavity, which may be anatomically deficient or deficient as a consequence of the repeated trauma of dislocation.
2. The Bristow technique, which is taken in English-speaking countries to be similar to Latarjet's technique, is different in our view. The difference lies in a detail that we judge to be important: transfixation of the subscapular muscle by the coracoid, which causes blockage of extensive sliding of this muscle and impedes complete external rotation. These features are not seen with Latarjet's technique.²²
3. Use of coracoid grafts is superior to using capsulorrhaphy, in terms of recovery of mobility and recurrences. The recurrence rate is 2.5%, versus 11.5% from Bankart's operation, according to Walch et al.²³
4. Latarjet's technique presented a recurrence rate of 3% in Gazielly's series²⁴ of 89 cases, and no statistically significant correlation was found between postoperative arthrosis and age, or between arthrosis and the type of sport practiced.
5. In a review series in 2001, covering more than 15 years, Hovelius et al.²⁵ confirmed that the presence of a bone graft did not cause more arthrosis than seen in Bankart's procedure.
6. In 1957, based on embryological and phylogenetic concepts, Dickson and O'Dell¹¹ published a technique comprising transfer of the pectoralis minor from its coracoid insertion to the greater tuberosity of the humerus, which we also began to combine in our cases.

Conflicts of interest

The author declares no conflicts of interest.

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Fig. 1 – Original technique of Dickson and O'Dell (transfer of the pectoralis minor from the coracoid process to the greater tuberosity).

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