

Recurrent Anterior Shoulder Dislocation*

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It is not our intention to provide an exhaustive account of recurrent shoulder dislocations since the literature is full of such accounts, which in addition are much pithier than anything we could come up with. Our aspiration is simply to tell the reader about the things we have seen, the things we have done in the past and the things we currently do. In passing, we would also like to mention those aspects of the question we feel surer about as well as those about which we have doubts or where our knowledge fails us.

It is a well-known fact that recurrent shoulder dislocation presents itself with particular frequency in the sports and military settings. This is a statement based upon our own experience, which largely draws on both fields.

More often than not, the pathology affects young adults aged between 18 and 35. The condition is far more common in males than in females since the former are much more frequently exposed to high-energy trauma or abrupt falls capable of causing them their original dislocation. Having said this, although in global terms their numbers are indeed rather low, we do believe that women are more prone to this condition probable given the higher degree of joint laxity that characterizes them. Evidence of this is the great prevalence of this condition found among the small number of girls that engage in activities like horse-riding and skiing in Spain. We have seen no epileptic patients affected with this condition, although it is well known that epileptic individuals are greatly exposed to this lesion. Among our cases, we have two siblings, one of them with a bilateral dislocation, and a father-son pair, apart from other cases with a less certain familial connection. The literature mentions numerous familial cases, which would seem to contradict the current belief that the problem should be approached from a purely traumatic perspective.

PRODUCTION MECHANISM

It is always difficult to determine how the initial dislocation came about. Frequently it is a complex trauma made up of different stages that rapidly succeed one another.

Moreover, falls can occur backwards, and naturally it is easier to understand something happening before our eyes than something that does not.

Normally the initial dislocation giving rise to the syndrome is the result of a violent fall or a high-energy trauma. Backwards falls with a pulled-back elbow and an abducted externally rotated arm are typical and extremely frequent in soccer goalkeepers and in rugby players. These falls provide the ideal conditions for the dislocation to occur. As soon as the elbow touches the ground, the rest of the body pushes the shoulder forward against the anterior rim of the glenoid; the former colliding into the glenoid labrum and provoking the dislocation.

Recurrent shoulder dislocations can also occur, as a result of a similar mechanism, in falls on an abducted arm. As the scapula is not on the same axis as the humerus but rather forms with it an forwardly open obtuse angle, a thrust of the shoulder in the direction of the humeral axis tends to make it slip tangentially on the anterior border of the glenoid. This is the production mechanism that most directly accounts for the injury typically seen in the postero-lateral segment of the humeral head. On other occasions, the injury is caused by a forward impact originating behind the shoulder or by the movements inherent in external rotation or in dorsal extension with an abducted arm.

At the beginning, high-energy trauma is required to provoke the dislocation. But after the first few instances, it occurs further to increasingly mild trauma and even as a result to simple arm abduction movements. Likewise, pain can be extremely sharp initially but tends to become milder in successive dislocations.

Reduction of these dislocations also tends to become less and less problematic since the humeral head finds increasingly few obstacles on its way out as well as on its way in, which explains that patients who have had numerous dislocations in their lifetime report that they can reduce their own dislocations themselves simple by making a few specific movements.

What patients find difficult to get used to is the complete functional incompetence they are left with, which is accompanied by a growing feeling of distrust toward their shoulder and an inferiority complex that makes them vehemently wish that they could put an end to their ordeal by whatever surgical procedure that is proposed to them.

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PATHOANATOMY

Undoubtedly Bankart¹ must be credited with having extraordinarily clarified the pathological concept and the operative efficacy of recurrent shoulder dislocation. Injuries to the articular fibrocartilage had been known for a long time, but Bankart¹, with great enthusiasm and determination put them back on the orthopedic agenda and described a direct way of addressing them. Probably, the overconfidence with which he expounded his opinions earned him a great deal of criticism, especially in his own country. This criticism could also be motivated by the fact that his proposed procedure is not as simple as he makes it sound, which had led many surgeons to turn to other concepts that can be put into practice in a more straightforward way. But in the meantime we have all grown accustomed to opening the joint, recognizing the injuries that are present and debating the things we have seen with our own eyes.

The detachment of the base of the fibrocartilage at the anterior half of the glenoid rim is the most frequent injury. Sometimes the detached fibrocartilage forms together with the capsule, the periosteum and the soft tissue on the anterior aspect of the neck a sliding pocket that cannot be recognized if the joint is not opened parallel to the glenoid rim, pulling the capsular attachment forward. Now it can certainly be seen! Usually the fibrocartilage is broken and sometimes it may have disappeared from that area. It is also quite common to see free cartilage bodies similar to those found floating on the synovial fluid when the knee is opened further to certain meniscal lesions.

Cases operated with the Nicola technique² and bone stops are not useful for our purposes since in them the fibrocartilage injury is not visible; of the 21 cases in which we carefully looked for the injury we found it unequivocally in 18. In one case we were in doubt and in the remaining two we were certain it did not exist. Both of these were women

and one of them in particular presented with great joint laxity with an extremely relaxed capsule (Figs. 1 and 2).

In order to look for humeral head injuries, we systematically perform pre-op x-rays with the shoulder rotated internally. These are highly demonstrative: that in Figure 2, which looks like a dislocation, is an internally rotated version of the case in Figure 1. Both cases had typical left shoulder dislocations that had dislocated on multiple occasions and, in spite of that, showed no injury to the fibrocartilage.

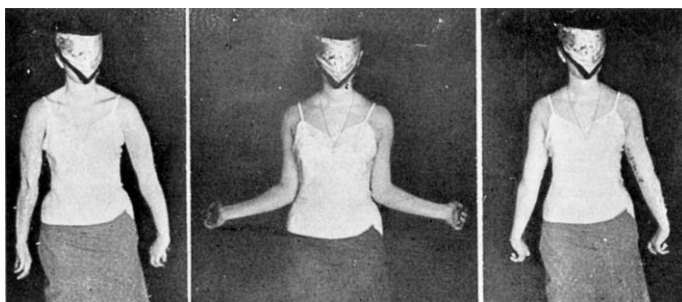
Depressions of the humeral head occur as a result of repeated clashes of the posterior segment against the anterior glenoid rim and have been demonstrated by numerous authors in retrieved specimens and in resected heads. We systematically look for them in anteroposterior x-rays obtained in internal rotation and have found it in about half of our cases. However, we are under the impression that it is a more frequent occurrence than that. Sometimes, even if it is present, it may go unnoticed in pre-op x-rays and even during surgery. It is normal for the anterior glenoid rim to also show signs of contusion; in one of our cases it appeared fully worn (Fig. 3).

Capsule laxity

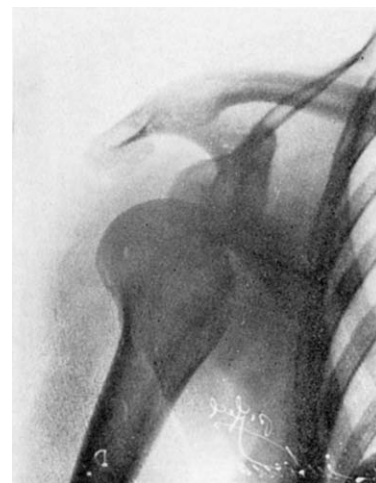
In some cases, such as those shown in Figures 1 and 2, dislocation is mainly due to an excessive laxity of the joint, where –as can be seen– the humeral head moves excessively and almost independently of its support inside the glenoid.

TREATMENT

It is a well known fact that this condition can only be treated surgically and that there are innumerable techniques available. We are only going to refer to the ones we have had experience of.



Figures 1 and 2. Before surgery. Abnormally extensive internal and external rotation. The x-ray in Figure 2 corresponds to the internal rotation of the patient's right shoulder. Joint laxity is so extreme that it could be mistaken for a dislocation.



At the beginning we used a modified Incola technique², which seemed a logical, elegant and straightforward procedure. The original Incola technique² consists in creating, together with the biceps tendon an intraarticular ligament that is similar to the teres ligament of the hip. In order to do that, it is necessary to section the tendon at the bicipital groove, then pass the proximal tendon through a tunnel bored into the bone that runs through the humeral head, which sometimes poses difficulties, and subsequently suture the two ends of the tendon again. We simplified this technique even further, making it more anatomical. Once the bicipital groove was laid open, we used a thin narrow chisel to ream out of the groove's edge a curved bone piece. We smoothed the bottom of the canal with a sharp small curette and, without sectioning the tendon, we let it take up that area naturally, on its own accord. We then placed the small bony piece that we had reamed out on top of the groove, covering it as if it was a lid. Subsequently we sutured the periosteum and the capsule.

Of the eleven cases in which we performed a Nicola-type tenodesis², two were carried out with the author's technique and the remaining nine with the modification described above. All of them recovered rapidly without pain. We heard no more about seven of them after their discharge. Of the remaining four cases, one had new recurrences after he had played amateur soccer for nearly four years as a goalkeeper. The other three are doing well, and one of them is a parachute officer in active service 12 years after his operation.

With Ouard-type anterior arthrorisis³, we only operated two cases; this was ten years ago. One of them is currently a professional soccer goalkeeper, which means that the result achieved was excellent. The second has a painful limitation with regard to extreme abduction movements, external rota-

tion and particularly internal rotation. Although he has had no further dislocation and his discomfort is minimal (and nonexistent at rest) I do not consider this to be a good result. This is the oldest patient in the series: he was 35 at the time of surgery.

For some time we have been using the procedure described below to treat all recurrent shoulder dislocations, with no more variations than those imposed on us by the difficulty or specificity of the case at hand. These variations draw on the basic tenets of the procedures described by Bankart¹, Putti-Platt⁴ and Ouard³, which do not add complexity to our procedure but rather make it simpler.

Surgical technique

We consider it essential for the shoulder to be well positioned for the operation. The scapula should wobble and the glenoid must be moved forward while the humeral head dangles slightly backwards. How to achieve depends on each individual's physical constitution and it is difficult to provide a general rule. That is why before surgery it is advisable to place the patient in the supine position with his/her arm parallel to his/her body and tuck small sandbags under his/her back until the ideal position is found; this is the position to be used during surgery.

An incision must be made following the delto-pectoral groove which, in highly muscular individuals, is continued by a superior tail parallel to the clavicle. The surgeon must reach deeply between both masses of muscle placing the cephalic vein under the retractor, generally the internal one.

The anterior third of the deltoid must be sectioned two centimeters away from its superior attachment. The coracoid process must be identified and isolated, after which it is chiseled obliquely together with its muscle attachments. Subsequently the coraco-acromial and coraco-clavicular ligaments are sectioned and all of these are taken down so that they do not hinder the procedure. The whole field should be cleared and hemostasis is accomplished with an electrocautery. An autostatic retractor must be put in place.

The arm should then be rotated in both directions in order to be sure of the location of the glenoid rim and of the upper and lower boundaries of the subscapularis. The subscapularis is sectioned from top to bottom without cutting the three little horizontal veins that run along the lower margin. Before this a strong catgut stitch must be used to fix the subscapularis so that it does not disappear as it retracts. Sometimes both the subscapularis tendon and the capsule are attached at the same site, but in general if the incision is made 1.5 cm away from the glenoid rim, both structures will be perfectly separated.

We must allow the subscapularis to retract inwards and then section the joint capsule at the above mentioned site. The surgeon must pull at the internal margin of the capsular incision while an assistant leverages the arm to move the



Figure 3. Notching in the humeral head, wear of the glenoid rim and avulsion of the greater tuberosity..

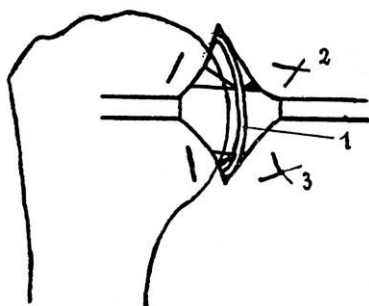


Figure 4. Diagram showing the two bone fixation stitches. They pass the lateral margin of the capsule and then run through the two holes bored into the glenoid rim. Henceforth, each suture end crosses the periostium and the soft tissues that have been deployed in front of the neck. When the knot is tied, the folded capsule becomes strongly attached to the refreshed bony edge; the periostium and the neck fibrous tissue act as coverage: 1) glenoid rim of the two holes through which the superior 2) and inferior 3) sutures are passed.

humeral head backwards and outwards; in this way it is possible to identify the injury that is present. With the patient in the same position, the arm is rotated in both directions in order to explore the head.

Using a periosteotome, the anterior edge of the glenoid and later its extension onto the anterior aspect of the neck are refreshed. This allows us to get an idea of the shape of the anterior bony edge, which may be protruding and strong or flat and sclerotic, two situations that are very different from each other.

Once the rim has been prepared, two holes are bored into it: one at the top and the other at the bottom. Boring four holes in a line on the bone margin is not only more difficult but it also makes the patient more prone to sustain a marginal fracture, which makes the problem even worse. Many surgeons that routinely use Bankart's standard technique¹ are bound to have encountered this problem. We then put in two fairly broad stitches at the capsule, one in the superior region and the other in the inferior one, we pass the two ends of the first one through the top hole and the other two through the bottom hole. On tightening these, the external margin of the capsule can be seen to attach to the glenoid rim, but in addition to this the former becomes thicker and stronger and smaller in size, leading to a perfect capsulorrhaphy (Fig. 4).

The next step is to pass both ends of the suture through the periostium and the soft tissues that we have deployed in front of the glenoid neck and we tie a strong knot. Each stick has the shape of an 8. We believe that the holes should be bored with a dental drill, since in this way the glenoid rim will be subjected to less lateral stress. However, one should always have a reamer at hand since on some occasions these perforate the bone more easily. We must also



Figure 5. The bone fixation stitches were applied with flexible steel wires. Since the material we use is thin, it can sometimes go unnoticed in anteroposterior x-rays.

use a soft wire-passer that can be bent as necessary. The suture material should be strong nylon or steel wires (Fig. 5). All of these maneuvers are rather complicated but they can become almost impossible if we have not appropriately adjusted the patient's position, since in these cases the humeral head tends to emerge and the glenoid rim, which is the structure we need to act upon, stays at the bottom. We cross the internal margin of the capsule over the suture and at the same time we apply four catgut stitches to the former over the capsule, which covers the humeral head.

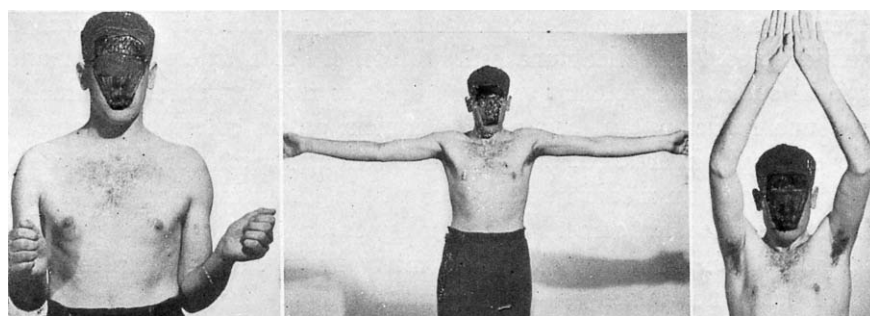
Traction is exerted from the suture that attaches the retracted subscapularis, we place the arm in internal rotation and with the muscle fully deployed we suture it beyond the subscapularis tendon, over both anterior planes and generally at the level of the bicipital groove, which must be previously decorticated with a scalpel. This maneuver is called the Putti-Platt's procedure⁴, and performing it has not involved any delays or any additional difficulties.

The autostatic retractor is withdrawn and the coracoid process is sutured with a few stitches, but instead of doing this at its usual position it must be moved downwards and outwards. This allows us in passing to perform Ouard's procedure³. The deltoid is sutured with catgut stitching. A few stitches are applied to bring the deltoid and the pectoralis major closer and the wound is closed.

A Bankart.type¹ fixation of the capsule to the glenoid rim greatly contributes to the safety of the procedure. In addition, the capsule is plicated precisely at the site at which it tends to lose its floor; since it is folded it will thereby be strengthened. A bone stop is placed in an antero-lateral position with respect to the coracoid process and internal rotation is somewhat restricted. This is not a problem because patients are still able to exercise their



Figure 6. An army officer operated with the technique described. Result obtained.



Figures 7, 8 and 9. Three professional athletes operated with the technique described. Checking the shoulder's mobility.

shoulders' most athletic aptitudes and, what is more, they can do so more safely.

Of the twenty-one cases operated with this technique, four are parachutists, four soccer goalkeepers, another four (two males and two females) do horse-riding, two played rugby, another two (among them a woman) are skiers and the remaining five ones played no specific sport. All of them were able to go back to their previous sports activity with complete safety in spite of its strenuousness. None of them has perceived the slight reduction in external rotation. Of the twenty-one only one has sustained a new shoulder dislocation. This was a professional soccer goalkeeper weighing 180 lb who had a rather violent playing style. One

month after the draping was removed, he was swimming front crawl and backstroke, and shortly afterwards resumed his training. He played as a goalkeeper uninterruptedly for one season and a half, training every day and sustaining all sorts of trauma. Once, in the middle of a game, he fell to the ground with the ball in his hands with another two players falling onto him, which resulted in his sustaining a dislocation that, according to the report of a colleague and what this man himself told me, could have been a posterior dislocation.

Clearly, there is nothing one can do to preserve the human body's fragile structures if these are subjected to such high-energy trauma. Therefore, I believe that even in the

case described, the procedure succeeded. In the remaining twenty cases we had no recurrences.

Lastly we believe that the two bone fixation stitches are simpler, firmer and more efficient than the four posited by Bankart¹. Moreover, as far as the other details of the procedure are concerned, they contribute to achieving a strong shoulder, which has in no case been incompatible with good shoulder mobility.

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Commentary

Dr. Garaizábal Bastos' paper was presented in 1955 at the 4th National SECOT Congress in Asturias, only sixteen years after Bankart's classic article in the *British Journal of Surgery*.

On reading it, one realizes that the author knows exactly what he is talking about and that it reflects the experience of a frank scientist. Furthermore, the paper is a highly illuminating compendium on shoulder instability, dealing with notions that might seem obvious today but which in those days were still controversial.

Dr. Garaizábal's description of intraoperative findings in recurrent dislocations is impeccable. He insists that most of his patients had a labral defect that could be an avulsion, a tear or the apparent disappearance of the labrum. According to the author, these defects can only be identified by means of an intraarticular inspection conducted through the capsular opening. Nowadays we know that this is the determining factor accounting for the instability of most of our patients, i.e. those we group under the post-traumatic unidirectional instability heading. He also mentions that in two of his cases the above mentioned injury did not exist and he suggests that the cause for the instability could be an excess of capsular laxity. This is an unquestionably apt comment, made 15 years before the publication of Neer and Foster's paper on multidirectional instability¹.

Dr. Garaizábal describes in a straightforward manner the two most common kinds of instability we find in our practices. Sometimes pathological findings coincide and it is not infrequent to find Bankart lesions associated with redundant capsules that require combined treatment.

The paragraphs devoted to the surgical technique reveal the author's preference for performing an anatomical reconstruction of the lesion. He makes a detailed description of how the patient should be positioned and what approach should be used to reach the anterior glenoid rim with ease, carrying out a coracoid osteotomy to increase exposure. Later, he describes the technique he uses to perforate the glenoid and reinforce the medial capsule, insisting on the

difficulty of the technique and recommending the use of two holes, «one at the top and the other at the bottom», instead of the four holes suggested by Bankart.

With a few variations, this technique is similar to what we do nowadays in our open surgeries. The passage of time and the evolution in instrument design have allowed us to achieve the same results with a less aggressive open procedure where it is possible to anatomically repair the labrum, preserve in some cases the subscapularis attachment, working through this structure, and posteriorly displace the humeral head by means of a Fukuda retractor. In that way, we can perform this surgery through an incision of as little as 4 cm.

The factor that unequivocally determines anterior post-traumatic instability is the presence of an injury at the anterior portion of the labrum, an area we must strive to repair.

The precise knowledge of the pathological pattern of instabilities gained in the last decade has led to the consolidation of arthroscopic surgery as an alternative to classical techniques. Currently, the results published by different groups on the arthroscopic reconstruction of labral lesions are fully comparable to open techniques, but have an undeniable benefit for the patient in the first three months post-op^{2,3}.

The same could be said about instabilities resulting from capsular laxity, in which arthroscopy plays an increasingly important role since it can intraarticularly replicate Neer's classic plicature⁴. In our view, the next decade will see how arthroscopy consolidates its position as the technique of choice for treating shoulder instability, to the detriment of older methods.

It is interesting to stop to consider the results presented by Dr. Garaizábal. He meticulously describes each one of his patients, their return to sport activity, their relapses and what he considers good and bad results. At a time at which most of our research draws on solid statistical foundations that validate our conclusions, we may be surprised by the lack of a specific analysis of the different cases. All the cases presented show an impaired external rotation, although «none of them has perceived the slight reduction in external