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Our experience with LARS artificial plasty in massive rotator cuff tear

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- Following Rockwood, future of glenohumeral joint involves a functional rotator cuff .
- Rotator cuff muscles are critical:
 - to smooth (suave, ligera, como la seda)
 - strong
 - coordinated glenohumeral (motion).

Regarding motion of the glenohumeral joint

- Rotator cuff muscles function also as:
 - dynamic stabilizers that maintain a stable glenohumeral joint
 - the deltoid raises the arm into abduction and avoid subluxation of the humeral head
- For all these reasons not treating rotator cuff tears will cause chronic and /or degenerative injuries in the rotator cuff itself and the glenohumeral joint.
- This is the reason that justifies the complete treatment of the massive and large rotator cuff degenerative tears.
- Classic techniques for treatment of rotator cuff degenerative tears(Debeyre, Neer, Jobe, Gaziely.....) have given an excellent result.
- We are trying to improve shoulder function and clinical results looking for new techniques in massive and large rotator cuff tears.

Shoulder: Treatments

In shoulder pathologies we can use

- Conservative/Non surgical/Rehabilitation vs. Surgical treatment that can be:
- Arthroscopic treatment or/and Open surgery that consist in:
- Repair of the rotator cuff tear (tendon suturing)
- Antero-inferior Acromioplasty
- Debridement of abnormal tissue
- Plasties: Organic (transfer of muscles) or Artificial

SHOULDER is a complex joint because

- Shoulder pathologies are extremely common.
- Glenohumeral joint has a great mobility, but should keep at the same time its Stability
- We find Soft tissues like rotator cuff with important function and common injury
- Subacromial compression/Impingement syndrome
- Different kind of pathologies: Acute vs. chronic/degenerative
- Conservative treatments give excellent results in most part of patients with shoulder pathologies. Surgical treatment is necessary just in selected patients.
- Talking about Rotator cuff tears these must be repaired in selected patients being the most important factors:
 - age
 - type of injury of the rotator cuff
 - preoperative range of motion. (most important)

Artificial Plasty: We find 3 Functions

- Reinforcement of the rotator cuff
- Substitution
- Interposition between the acromion and the humeral head

Artificial Plasty: Methods

- We reviewed the records of 26 consecutive cases in 19 patients (6 bilateral cases and 1 revisions) between 1999 and 2002.
- The study included 13 men and 6 women
- The average age was 57 years (range 37 to 70 years)
- The right shoulder was involved in 17 cases; and the left one in 9 cases
- Regarding Follow up: mean 26.11 months (Range 24-30m)

Artificial Plasty: Methods

- Rotator cuff tear was:
 - Massive (more than 5cm):11 cases
 - Large (from 3 to 5 cm):14 cases
- We found Muscular atrophy: 18
- Acromio-humeral distance (less than 7 mm):13
- Subacromial osteophyte:15

Artificial Plasty:Methods

- Rotator cuff calcifying tendinitis:4
- Previous Infiltrations :18
- Previous surgery:
 - Open Acromioplasty:5
 - Arthroscopic Acromioplasty:3
 - Side to side suture:1 (7 years before)
- Proximal humeral fracture:1(1 year before surgery)
- Reoperation:1 case, revision of the plasty due to pain and poor mobility)

Artificial Plasty: Modified Laboreau Technique.

- Original laboreau technique was doing an osteotomy of the acromion in a posterior approach. We changed it to the anterior-lateral approach to decrease morbidity, complications and hospital stay.
- Skin incision about 9 cm long from the anterior edge of the acromion and just lateral to the coracoid. To Incise deep fascia.
- Split the deltoid muscle no more than 5 cm distal to the acromioclavicular joint. Detach the deltoid muscle from acromion (no more than 1 cm)
- Anterior-lateral Acromioplasty
- Debridement of soft and degenerative tissues, Osteophytes should be removed
- Suture of the plasty to remaining tissue of good quality of the rotator cuff as we can see in this pictures.
- Suture of the capsule.
- 2 interference screw in the humeral neck as is shown in the picture.

In this picture we can see result of post-surgery standard plain radiographs.

Artificial Plasty:To remind,Technique

- Keep artificial plasty in tension when screwing
- Repair deltoid

Artificial Plasty: Results

- Patients were evaluated pre and postoperatively on the basis of a history, a physical examination and a examination of standard plain radiographs (anteroposterior and axillary), magnetic resonance imaging(just preoperatively),and Constant's and Ucla scores.
- Patients were evaluated at an average of 24 months (range 24 to 30) after surgery procedure.
- We also evaluated range of motion, pain(subjectively on a scale of 0,no pain, to 10 severe pain) and patient satisfaction(yes or no)
- Functional outcome: . Function was graded according to the level of pain and the active range of motion .
- The result was considered excellent if the patient was essentially pain-free, had an active range of motion that was within 10° of normal in all planes, and had resumed unrestricted activities; good if the patient had only occasional soreness or aching, >140° of active forward elevation and >30° of active external rotation, and some limitation of functional activity with repetitive or strenuous overhead activity; and fair if the patient had intermittent episodes of pain necessitating occasional use of analgesics, >90° of active forward elevation and >5° of active external rotation, and persistent weakness and limitation of function with some improvement after the revision procedure. As excellent, good, and fair ratings indicated that the patient had substantial pain relief and elevation of the arm above the horizontal, they were considered to indicate a "satisfactory" functional result. The result was considered poor, or "unsatisfactory," if the above criteria were not met.

Artificial Plasty: Results

- Ucla score improved from 8.79 points preoperatively to 25 postoperatively and Constant score from 30 to 78.86 points.
- The average active elevation in the scapular plane improved from 56.92° preoperatively to 126.35° postoperatively , antepulsion from 59.3 to 125.38. The average active external rotation with the arm at the side improved from 17° preoperatively to 47° postoperatively,). The average active internal rotation improved from 16 to 37° and retropulsion from 15° to 34°.
- The average pain rating improved from 7.4 points preoperatively to 1.2 points postoperatively.
- All patients were satisfied
- 93% had a satisfactory result: Excellent, good or fair.
 - ABDUCTION/ELEVATION: 56,92° (DT: 27,05°).
 - ANTEPULSION: 59,03° (DT: 25,21°).
 - RETROPULSION: 15,38° (DT: 8,82°).
 - INTERNAL ROTATION: 16,73° (DT: 15,35°).

– EXTERNAL ROTATION: 17,30° (DT: 13,87°)

Artificial Plasty:Results

- Postoperative range of movement
 - ABDUCTION/ELEVATION: 126,346°
 - ANTEPULSION: 125,38°
 - RETROPULSION: 34,80°
 - INTERNAL ROTATION: 37,69°
 - EXTERNAL ROTATION: 46,92°

Artificial Plasty:Results

- Physiotherapy:
 - Mean 7,84 Months (Range 2-18).

Postoperatively, all patients used a sling for six weeks and followed a three-phase shoulder rehabilitation program. Limited passive range of motion, including pendulum exercises, passive elevation, and passive external rotation, was begun on the first postoperative day. Extension and internal rotation were avoided in the early postoperative period. Active range of motion was begun at six weeks postoperatively and resistive exercises were begun at three months

Artificial Plasty: Complications

1 revisions:

1 revision of the plasty due to pain and poor range of movement. It was necessary to remove original plasty sending it to pathology. These pictures show that there is no inflammatory reaction and no rebuffer to the plasty.

Artificial Plasty, Why this improvement?

As we said artificial plasty has 3 important functions

- Substitution plasty (Massive :11, Large :15) and
- Reinforcement (Muscular atrophy: 18) of the rotator cuff that improves
 - » strong
 - » coordinated glenohumeral motion.

- And the third one is an Interposition plasty that

- Decrease of pain together with acromioplasty.
- Avoid subluxation of the humeral head

Artificial Plasty: Conclusions

-We think is necessary the complete treatment of this pathology to avoid rotator cuff arthropaty