Surgical treatment of pectoralis major muscle rupture with cortical button. Technique description and Case Report.

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Abstract

Tendon ruptures of pectoralis major muscle (PMM) is an uncommon lesion. However, we have observed a progressive increase of incidence during the last decade, due to the increasing number of population practicing heavy weight lifting sports, and also, combined occasionally with use of anabolic steroids. This case report shows our experience with this type of muscle rupture using an unique cortical button technique for fixation of avulsed tendon of humeral insertion. We describe our surgical technique and postoperative rehabilitation. Finally we review our results compared with other techniques like bone tunnel and suture anchor repair most widely used.

Keywords

Pectoralis major; muscle; rupture; tendon; repair; surgery

Introduction

The avulsion of the pectoralis major muscle (PMM) tendon is a quite rare injury that was first described by Patissier in 1822 and later, in 1861, by Letenneur who reported another case. The anatomy of PMM distributed into 2 heads: the clavicular and sternocostal. The insertion of PMM in the humerus is at the inferior part of the crest of the greater tuberosity at bicipital groove side (1,2).

PMM function is mostly adduction, but is also responsible for internal rotation, extension, and forward flexion combined with other muscles.

These injuries are rare (3); mostly they occurred during intense physical activity (bench press and contact sports) or labour accidents. Mechanism leading to partial or total ruptures of the humeral shaft tendon is a combination of forceful contraction with external rotation and forward flexion (4).

Physical examination reveals a tenderness and ecchymosis in humeral shaft insertion; and in complete the avulsions a loss of the axillary fold that can be observed in arm abduction.

Complete tears in active patients must be surgically treated to restore strength during adduction, forward flexion and internal rotation of the arm (3,4).

Partial tears can be treated with conservative management in most cases with low or mild functional demand, but in high demand sport or labour patients even these partial avulsion most times have to be treated surgically.

Complete tears in elderly or low demand patients can be conservative treated (5).

As far as we know, none of the techniques shown in literature are biomechanically superior over the others, although authors consider that may be easier or more comfortable. The up-to-date recommendation is that the technique used in the surgical treatment of PMM ruptures should depend on surgeon preference and skills (6,7).

The aim of this report is describing our preferred surgical technique to perform acute treatment of partial or complete avulsion of PMM.
Case Report

Patient Anaesthesia and Positioning

The combined regional and general anaesthesia in beachchair position is our preferred method; normally the arm is sustained in brace positioner that helps maintain a good view of the surgical field, operative extremity is dressed in the standard sterile technique.

Surgical Approach

A deltopectoral approach with a 4-5 cm incision inferior to the coracoid process is perform, careful dissection of the clavipectoral fascia is performed, anterior deltoid muscle is retracted laterally to find PMM humeral insertion, along the medial side of the bicipital groove.

Once delimitated humeral shaft insertion of the PMM, the tendon can be find easily if the avulsion is partial or acute. Tendon can be retracted medially and superiorly with scare tissue in revisions or in chronic cases, which may difficult identifying the tendon of about 5 cm length and 1 cm width. Careful dissection of neurovascular surrounding structures must be performed.

Once the tendon is individualized a Kocher clamp is placed in the tip to help traction and manipulation; meticulous release of adhesions to the adjacent tissues is perform to recover the normal length of the muscle, in order to prevent and excessive tension of the suture.

Tendon Insertion on Humeral Shaft

Once the humeral PMM insertion is identified, a Hohmann retractor is placed to retract deltoid muscle with external rotation of the arm. Resection of remaining scar tissue and decorticating bone to prepare healing of the tendon is the next step. The positioning of cortical button implants (SutureButton, Arthrex, Naples, FL) in the bony platform is performed with a 3.5 mm drill, and displayed equidistant in the insertion. We use the unicortical technique, which is easier to perform, and has less risk of iatrogenic injuries (axillary and radial nerves).

The stump is then prepared for fixation with nº5 FiberWire (Arthrex) suture; a Krackow stitching technique is use trying to spread out the suture as possible to increase the surface area of healing. In the case presented we use two button and two sutures to perform the reinsertion (Fig 1).

The two tips of both sutures were loaded in each button previously to cortical insertion (Fig 2). Once the button is prepared with sutures, to introduce it in the drilled cortex holes, a perpendicular orientation must be achieved, afterwards the suture tensioning will help flipping the button and positioning it closely to the inner cortex of the humeral shaft (Fig 3).

The sliding suture technique, with a progressive suture tensioning, will bring the tendon to the bony platform previously prepared in the native insertion using a knot pusher and toggling sutures (Fig 4).
After fixation of PMM tendon to assess the tension of the fixation, the arm is gradually externally and internally rotated while the repair is evaluated.

Wound closure is then performed in a standard layered fashion with the clavipectoral fascia closed using nº2 Vicryl suture (Ethicon, Somerville, NJ), the skin layer closed with staples (Fig 5), and the arm is placed in a standard sling.

The hospital discharge is after 24h. If no neurovascular or wound problems are observed after 3 weeks of immobilisation, early rehabilitation with a physical therapist is indicated initially with passive and active assisted range of motion protocol. After 6 weeks active movements are introduced but with a limitation of external rotation up to 20º, until 10 weeks. After 12 weeks, once range of motion is complete, and ultrasound confirms tendon healing, an endurance protocol is introduced until full recovery of strength.

Discussion

Although PMM rupture is becoming more common, specially the last 20 years, and is also being studied more widely, it is still fairly uncommon, with publications discussing the clinical outcomes of specific surgical techniques.

Generally authors agree about the injury mechanism, and range age of patients (8). As previously detailed young and active man, mostly during weightlifting activities with the arm extended an in external rotated, are the common injury mechanisms.

Transosseous repairs, suture anchors and cortical buttons are the most frequent repair methods. In biomechanical studies comparing these repair methods there was no significant difference in any of the biomechanical outcomes (9).
In our experience, other tendon repairs like distal biceps or anterior tibial tendon had good clinical results and a low iatrogenic rate with unicortical cortical button devices. Reinsertion PMM tendon is a good option for this surgical technique and in our hands is easier to perform than more traditional techniques at the time of surgery. PMM tendon repair is a successful treatment that results in a high rate of return to sport and work, pain relief, and improved cosmetic appearance, and with our technique has a very low rate of iatrogenic events. The proof supporting our outcomes is restricted by the infrequency of the injury, the variable surgical techniques, and the different evaluation standards.

We have performed this technique in 4 patients with good results in all of them and return to sport and work activities, we think that cases early operated had better outcomes than the ones with delayed treatment. As other authors sustain we think that the delayed operation is also associated with better outcome than the conservative treatment (5,10).

References