Physical Therapy in Sport 20 (2016) 32–39

Contents lists available at ScienceDirect

Physical Therapy in Sport

journal homepage: www.elsevier.com/ptsp

Case studies

Rehabilitation exercise program after surgical treatment of pectoralis major rupture. A case report

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ARTICLE INFO

Article history:
Received 3 September 2015
Received in revised form
28 March 2016
Accepted 2 May 2016

Keywords:
Pectoralis major tendon
Rupture
Rehabilitation exercise program

ABSTRACT

Objective: To present a rehabilitation exercise program and suggest a schedule of activities for daily living and participation in sports after surgical treatment of a pectoralis major rupture.
Design: A single case study.
Setting: Hospital-based study, Thessaloniki, Greece.
Participants: We present a 30-year-old male athlete (height, 196 cm; weight, 90 kg; right hand dominant) with a complete rupture of the pectoralis major tendon after a fall.
Rehabilitation exercise program: The athlete received a post-operative rehabilitation exercise program for 16 weeks. During the program, there was a gradual increase in the exercise program regime and load across the sessions according to the specific case demands.
Main outcome measures: Shoulder function was evaluated using Constant score.
Results: Magnetic resonance imaging (MRI) confirmed the diagnosis and the patient had surgical treatment repairing-reattaching the tendon back to its insertion using a bone anchor. At the end of the rehabilitation exercise program, the patient had full range of movement, normal muscle power and a return back to his previous level of athletic activities achieved.
Conclusions: Post-operatively, a progressive rehabilitation protocol contributed to the patients' full recovery and allowed an early return to activities of daily living and participation in sports.

1. Introduction

The pectoralis major muscle is the large muscle located on the anterior chest wall (Fig. 1). Rupture of the pectoralis major muscle is a very rare injury which occurs near its insertion at the lateral lip of intertubercular groove of the humerus (Haley & Zacchilli, 2014). It was first described in Paris by Patissier in 1822, followed by Letenneur in 1861 (Kakwani, Matthews, Kumar, Pimpalnerkar, & Mohtadi, 2007; Wang et al., 2005). It is classified as partial or complete, and according to the site as tendinous, myotendinous and intramuscular (Zvijac, Schurhoff, Hechtman, & Uribe, 2006). It has been predominantly reported as a sports injury in young male athletes (Kakwani et al., 2007).

During recent decades, the incidence of pectoralis major tendon rupture has increased as the number of athletes participating in both professional and recreational sports has also increased (Connell, Potter, Sherman, & Wickiewicz, 1999). A thorough knowledge of the clinical presentation, surgical treatment and post-surgical rehabilitation exercise program is critical for practitioners (Wang et al., 2005). The pectoralis major muscle is not essential for normal daily shoulder function, but is crucial in strenuous activities. As a result, low-demand individuals may be able to return back to normal daily activities without substantial difficulties after conservative treatment (Shepard, Westrick, Owens, & Johnson, 2013). However, for individuals who wish to return to sport activities, surgical treatment is preferred. Thus, it follows that surgical management is the first choice treatment for professional or recreational athletes (Manske & Prohaska, 2007).

The presentation of a supervised rehabilitation exercise program after pectoralis major rupture, as well as a possible athletic activities schedule after surgical treatment are critical. Two studies have provided treatment guidelines that should be followed after

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http://dx.doi.org/10.1016/j.ptsp.2016.05.001
1466-853X/

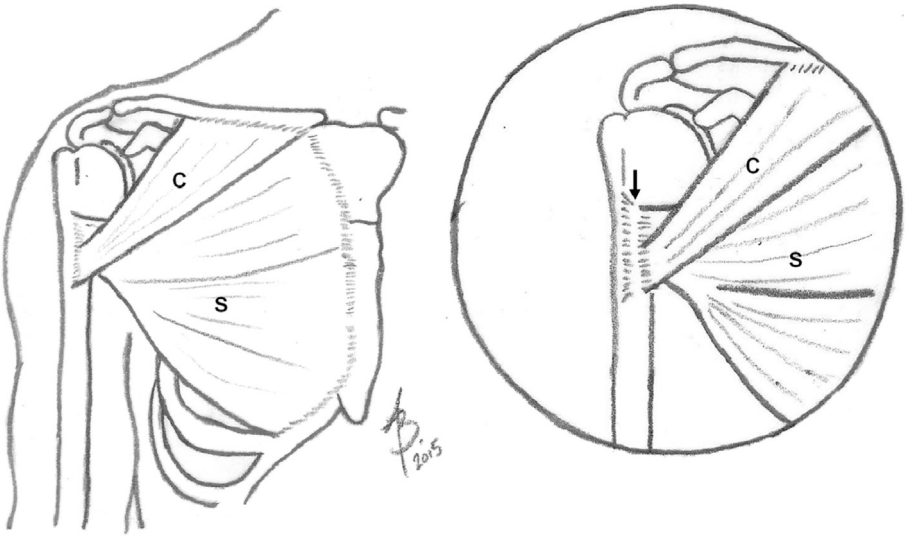

Fig. 1. Normal anatomy of the pectoral major muscle. Anatomic drawing of the anterior surface of the chest wall shows the divided two heads, the clavicular head (C) and the sternocostal head (S), as well as the insertion in the lateral lip of intertubercular groove of the humerus. Diagram of the pectoralis major muscle and tendon shows the point of rapture (black arrow) in our patient (drawing into the circle).

surgical treatment of the pectoralis tendon rupture. The first was presented in Wichita State University (Manske & Prohaska, 2007) and the other by the US Army-Baylor University (Hoppes, Ross, & Moore, 2013) without providing information about time schedule of athletic activities to be followed. Thus, the aim of this study is: (i) to present a rehabilitation exercise program and (ii) to suggest a reasonable schedule of activities of daily living (ADLs) and participation in sports after surgical treatment of a pectoralis major tendon rupture.

2. Methods and results

2.1. Case presentation

A 30-year-old right handed male athlete presented with left shoulder pain after a fall while snowboarding with a forced abduction and external rotation of his left shoulder, accompanied by a popping sound. On examination, there was a small ecchymosis over the anteromedial aspect of the left arm, tenderness on palpation and a partial loss of contour of the pectoralis major and anterior axillary fold which was accentuated by left shoulder abduction. Plain X-ray examination was negative for any osseous abnormality. The patient had no clinical signs of anterior shoulder instability and because of extra-articular and superficial local ecchymosis, he was referred for an MRI scan, but intra-articular injection of contrast material was not requested. The MRI scan showed a full thickness tear of the left pectoralis major tendon a few millimeters before its attachment on the lateral lip of the groove of the humerus with an associated surrounding hematoma (Fig. 2). Shoulder function was assessed and the pre-operative Constant score was 44 out of 100 points (Constant & Murley, 1987).

2.2. Surgical treatment

The patient was treated surgically to prevent any residual chest deformity and restore his previous functional level. Under general anesthesia, interscalenous block and direct anterior approach of the left deltopectoral groove, the ruptured tendon was identified and repaired using a bio-absorbable bone anchor. Tension sutures were applied between bone anchor and medial tendon stump. The lateral tendon stump, which was not substantial and had degenerated, was attached onto the previously repaired bone to tendon structure, with non-absorbable sutures being used on both occasions. Before wound closure, the repair was assessed in 30° shoulder external rotation without features of early failure. After surgery, the arm was rested in a broad arm sling for the first six weeks, followed by a personalized graduated rehabilitation exercise program.

2.3. Post-surgical rehabilitation exercise program

The rehabilitation exercise program was dependent on specific weekly goals and was completed in sixteen weeks. The specific post-operative rehabilitation exercise program followed specific protocols and goals focusing on: (i) attaining and maintaining full non-painful mobility of the joint and surrounding soft tissues, thus avoiding adhesion formation, (ii) improving muscle power, proprioception and stability of the joint and, (iii) a gradual return to strenuous work and recreational sport activities. The post-operative rehabilitation exercise program actually begins after the post-operative pain has settled, and as soon as the patient is ready to follow incremental exercise load.

The patient is evaluated by the orthopedic surgeon at the time of their initial post-operative appointment and a progressive rehabilitation program (Table 1) formed an essential sequence after surgical treatment, with benefits for the functional independence of the patient. The rehabilitation program was designed to meet patient's specific needs and initiated. For the first post-operative 4 weeks, the primary goal was to provide protection for the shoulder using a post-surgical shoulder sling immobilization to control pain and avoid re-injury. In that phase, during weeks 2–4 after surgery, the patient performed active elbow flexion and extension to prevent deformities and help keep the joint flexible. During weeks 5 and 6 post surgery the goals were to continue providing protection for the shoulder using an arm sling immobilizer and also a passive range of motion (PROM) using pendulum circle exercises with the arm in internal rotation was performed to help minimize the risk of local post-operative adhesion formation (Fig. 3a).

From the 7th to 10th post operative weeks, a light active-assistive range of motion using finger/shoulder wood ladder was added to regain full ROM in all directions (Fig. 3a). In addition, by