



## Isolated Traumatic Brachialis Muscle Tear: A Case Report and Review of Literature

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**Received:** April 14, 2017

**Revised:** August 3, 2017

**Accepted:** September 15, 2017

### ▶ ABSTRACT

Isolated traumatic brachialis muscle tears are uncommonly reported – leading to occasional misdiagnosis and misdirected treatment. The rarity of brachialis muscle tear may promote misdiagnosis or mistreatment of this injury. We report an isolated brachialis muscle tear in a young female, possibly caused by strenuous exercise in the gymnasium. The diagnosis was made clinically and confirmed by magnetic resonance imaging. The patient was subsequently managed adequately with conservative treatment. We herein present a 35-year-old woman who was diagnosed with an acute brachialis muscle tear being diagnosed with a combination of clinical signs and imaging and successfully managed non-operatively. A chronologically arranged review of literature is also presented.

**Keywords:** Brachialis, Muscle tear, Trauma.

Please cite this paper as:

Sharma P, Mehta N, Narayan A. Isolated Traumatic Brachialis Muscle Tear: A Case Report and Review of Literature. *Bull Emerg Trauma*. 2017;5(4):307-310. doi: 10.18869/acadpub.beat.5.4.476.

### Introduction

Excessive sudden physical stress or repetitive activity may sometimes result in a sprain or tear of a particular muscle or muscle group. These injuries are not infrequent in heavy weight lifters, sports persons, body builders and labourers [1]. In the upper limb, such an injury frequently affects the biceps brachii muscle or tendon with there being abundant medical literature regarding the diagnosis and management of this not so uncommon entity. However, isolated brachialis muscle rupture

is relatively rare with very few cases reported in literature so far [2-9].

Brachialis muscle is one of the flexor muscles of elbow, which has two heads - originating from the glenoid and inserting over the anterior surface of coronoid process of ulna. The deep head is helpful for initiation of elbow flexion in full extension and assists function of biceps brachii in further flexion. The superficial head of muscle which is inserted distal to deep head over the coronoid process helps in stabilizing arm during mid-flexion [10]. Dynamic contractility of elbow in concentric or eccentric

contraction is also controlled by brachialis muscle along with biceps brachii. While pronating forearm from supination, eccentric contraction of muscle may be responsible for rupture of brachialis muscle in athletes [11].

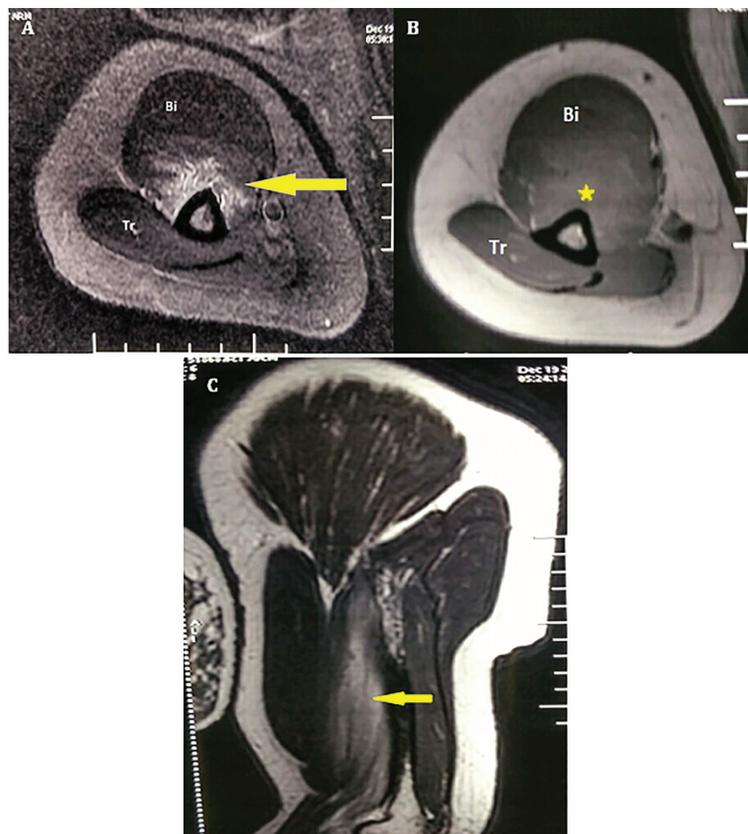
The rarity of brachialis muscle tear may promote misdiagnosis or mistreatment of this injury. We report an isolated brachialis muscle tear in a young female, possibly caused by strenuous exercise in the gymnasium. The diagnosis was made clinically and confirmed by magnetic resonance imaging. The patient was subsequently managed adequately with conservative treatment.

### Case Presentation

A 35-year-old woman, working as a professional physiotherapist reported to the Casualty department of our hospital with pain and swelling over right arm. The pain occurred acutely and was accompanied by a 'snap' in the right lower arm while she was working out in the gymnasium. It was associated with sudden swelling over the lower arm and movements of the right elbow (flexion-extension) were extremely painful. There was no significant history of past trauma to the same limb. Patient had no history of chronic illnesses including diabetes, hypertension, chronic renal diseases, chronic liver diseases or thyroid disorders. On physical examination, we

noted that the skin over the swelling was normal and the limb was held in a supinated and mildly flexed position. The point of maximum tenderness was over the anterolateral aspect of lower right arm, which was aggravated upon resisted flexion of the upper limb at the elbow joint. All other muscle-tendon units including biceps and triceps were in continuity and intact. There was no distal neurovascular deficit.

In concordance with standard trauma practice, our first step was to get plain radiographs in two separate orthogonal views. These revealed the imaged bones to be normal. The patient was discharged on anti-inflammatory medications and immobilization with an arm sling for 3 days and advised to follow up in our out-patient department. We reviewed her after three days and after noting the swelling to have increased in size, advised for an MRI scan. MR imaging of the right arm was performed and high resolution T1- and T2-weighted serial sections were obtained in the axial, coronal and sagittal planes using a phased array surface coil on a 3.0 Tesla scanner. The study revealed patchy, confluent soft tissue T2 hyperintensity involving the entire muscle bulk of brachialis from its origin to insertion (Figures 1). The clinical scenario along with MRI findings prompted us to make a diagnosis of brachialis muscle tear. The patient was explained about the injury, its rare nature and the treatment options. A collective decision of non-operative



**Fig. 1.** MRI of Right arm. T1 weighted FS STIR axial image showing signal hyperintensity (yellow arrow) in brachialis muscle – which is located deep to the biceps brachii (Bi). Triceps (Tr) is also seen in the posterior compartment (A); T1 weighted axial image showing signal hyperintensity (yellow star) in brachialis muscle – which is located deep to the biceps brachii (Bi). Triceps (Tr) is also seen in the posterior compartment (B); T2 weighted coronal image showing patchy confluent signal soft tissue hyperintensity (yellow arrow) involving the brachialis muscle (C).

management was taken and the limb was supported with an above elbow dorsal Plaster of Paris splint for ten days after which supervised physiotherapy was initiated. Range of movement exercises were increased in intensity sequentially both in active and passive forms. The patient regained an almost full pain-free arc of flexion and strength of upper limb after observed physiotherapy for three months.

## Discussion

Trauma to the upper limb is very common. If radiographs of the injured part on the initial trauma series are normal, most of these cases are dismissed as 'soft tissue injuries'. However, the ever-improving standard of orthopaedic practice, increased awareness and demands of the patient and an insistence on 'being specific' by insurance companies and hospitals make it essential to 'chase' a diagnosis and provide evidence-based treatment. Among the many muscles in the upper limb, the biceps brachii muscle-tendon unit is most commonly involved [12]. Most of the injuries of biceps tendon are documented in sports activities like para-trooping and water sports [1, 13]. Isolated brachialis muscle and tendon injury is a relatively rare entity with very few cases reported in medical literature [2-9]. Confusion may exist amidst surgeons and clinicians encountering this entity with regards to the best line of treatment as very few cases have been reported and it is more than likely that the case presenting to the treating surgeon is a novelty. In such a scenario, case reports such as this provide valuable insight into this injury.

Our review of the literature revealed a total of 8 traumatic injuries of the brachialis muscle reported since the 1950's. The first report of a brachialis muscle rupture was by Van Den Berghe and Queenan in 2001 [2]. They reported a case of a 67-year-old man who had been lifting heavy objects the day before initial presentation. A tear of the biceps brachii muscle was the initial suspicion; however, MRI revealed a tear in the distal aspect of brachialis near the musculotendinous junction. He was followed up by serial clinical examinations, an MRI in six weeks and regained full function in 10 months.

Nishida *et al.*, [3] reported 2 cases of brachialis muscle tears, both within the muscle belly. Both were athletically active males, aged sixteen and sixty-seven, and attributed their injuries to specific physical activity. The patient was a Judo athlete that presented 7 days after injury with pain and swelling in the left arm. The patient presented 7 days after noticing pain while practicing his golf swing. Due to the sub-acute presentation of both patients, a neoplasm was originally suspected. After evaluation by MRI, both patients were diagnosed with partial tears of the brachialis muscle. Both patients were treated conservatively with range of motion exercises and returned to normal activity in 3 months. The authors

made some interesting observations which we feel need to be highlighted: i) Both injuries probably occurred while moving the pronated forearm from a flexed position to extension leading to possibly eccentric contraction of the brachialis, ii) MRI would reveal a muscle tear of the brachialis only indirectly by showing intramuscular haemorrhage and the signal intensity would reflect the different patterns of blood breakdown in localized hematomas arising from the muscle injury.

Subsequently, Winblad *et al.*, [4] in 2008 and Wasserstein and White [5] in 2010 reported similar cases which were managed conservatively. In 2011, Schonberger and Ernst [6] reported an isolated brachialis rupture in a 45-year old amateur body-builder and metal worker after he lifted his motorcycle. Physical examination combined with conventional radiographs and ultrasound evaluation confirmed the diagnosis of a ruptured brachialis muscle. MRI was not performed in this study. This was the first and the only study using ultrasound for confirmation of this diagnosis. The patient was treated conservatively.

Two case reports were published by different authors in 2012. Murugappan and Mohammed [7] reported an acute rupture of the brachialis muscle with a supposedly hyperextension injury in a 17-year old rugby player. USG was initially used to rule out a distal biceps injury and later, MRI was used to confirm a brachialis muscle rupture. The patient recovered completely in 3 months and returned to active sports by 4 months. The other case was reported by Krych *et al.*, [8] and their case was unique in more than one way. The brachialis muscle tear was associated with a closed posterior elbow dislocation which was reduced in the emergency department. MRI revealed a complete tear of the brachialis with a measured gap of 2.75cm with the joint flexed at 80 degrees. Owing to the player's high-demand physical activities, he underwent surgical repair of the brachialis muscle. This study reports the first incidence of a complete brachialis muscle tear with a clinically appreciable gap and more importantly, the first incidence of this injury being tackled surgically.

The most recent case was reported by Costa *et al.*, [9] in 2015. The authors reported an isolated rupture of the brachialis muscle in a 52-year-old man who suffered a hyperextension injury to his left elbow after a fall. Clinical examination combined with conventional radiographs, ultrasound and MRI, confirmed the diagnosis. The patient was treated conservatively and had a return to full function. Aside from traumatic injuries to the brachialis muscle, some unusual reports include a tuberculous abscess of brachialis and biceps [14], brachialis necrosis secondary to exercise [15], and atraumatic snapping of brachialis tendon [16, 17].

The clinical features of a brachialis muscle injury are pain and swelling in the anterior mid-arm. Unlike

a biceps muscle injury, in which a palpable gap may be felt on physical examination, injury to the brachialis muscle would be difficult to palpate due to its position deep to the overlying biceps brachii. As always, plain films should be taken to rule out other common causes. Additional imaging should depend on the history and physical examination. If the patient's pain is out of proportion, or simply, a confirmation of an injury to musculoskeletal structures is desired, then further imaging can be used. MRI supercedes USG in confirming a tear of the brachialis muscle.

All the cases reported in literature so far, excepting the one reported by Krych *et al.*, [8] have been managed successfully by non-operative management. Our patient also had a good outcome with such a management and was able to return to professional work after 3 months.

In conclusion, tear or rupture of the brachialis muscle should be kept as a rare differential diagnosis in a patient presenting with pain and/or swelling about the elbow. Careful clinical examination of the limb may suggest injury of brachialis muscle, which should be confirmed with the help of other investigations which may include ultrasonography and MRI. These investigations may also prove to be helpful in evaluation of the course of injury during follow-up. Over time healing of the muscle rupture or tear should occur and no functional impairment of upper limb is expected to remain. Patients can hence be managed conservatively with immobilisation followed by physiotherapy and surgical intervention is not required.

**Conflicts of Interest:** None declared.

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