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Case Report

A rare musculo-septal aponeurotic tunnel in the arm with anomalous arterial pattern



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Introduction

A number of variations have been previously reported in the muscles, nerves and arteries of the upper limb. The presence of any such variations in the arm and forearm is vulnerable and prone for injury during diagnostic procedures, surgeries and accidents. The biceps brachii muscle (BBM) originates by two heads. Both the tendons unite in the arm, cross the elbow joint and attaches as a common tendon to the posterior aspect of radial tuberosity. A triangular expansion from the tendon

called as bicipital aponeurosis (BBA) or lacertus fibrosus strengthens the deep fascia of the cubital fossa.¹ Supernumerary heads are the most commonly reported variations in this muscle.² The insertion of all the accessory heads was reported to be to the radial tuberosity. There is paucity of literature regarding the variations in the insertion of this muscle.^{3,4}

The median nerve (MN) and the brachial artery (BA) that form the main neurovascular structures of the arm descend close to the medial aspect of the BBM and the brachialis muscles and are also closely related to the medial intermuscular septum (MIS) of arm.¹ The proximity to the musculoaponeurotic structures makes them susceptible to varying degrees of entrapment during anatomical variations in the region. Thus knowledge of the variant insertion of BBM is significant as it can give rise to MN and/or BA entrapment.

Axillary artery (AA) continues as the BA at the lower border of teres major muscle. BA continues distally in the anterior compartment of arm till it reaches the cubital fossa. During its course in the arm it is crossed anteriorly by MN which also descends to the cubital fossa medial to BA. At the level of neck of radius the artery divides into its terminal branches – radial (RA) and ulnar arteries (UAs). RA usually begins at the level of the neck of the radius and terminates by forming the deep palmar arch in the hand by anastomosing with the deep branch of the UA.¹ Variations in the arterial pattern of upper limb have also been reported by several investigators. A brachioradial artery is the most commonly reported variation in the arterial pattern of upper limb with an incidence close to 20%. The incidence of superficial radial artery has been found

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to be as low as 1%. A superficial brachioradial artery (SBRA) is a very rare variation with an incidence lower than 0.26%.⁵

Here we describe the case of a rare musculo-septal aponeurotic tunnel due to a variant insertion of tendon of BBM which has not been reported previously in literature with coexistent entrapment of MN and BA and the presence of SBRA. Such multiple variations suggest an embryological anomaly. The knowledge of these types of variations is important in diagnostic purposes like cardiac catheterization, arterial grafting and other angiographic procedures.

Case report

Routine dissection of the left upper limb of a 50-year-old male cadaver preserved in 10% formalin was performed. The branches of brachial plexus and AA and the muscles were dissected carefully and the fascial planes including the medial and lateral intermuscular septa were delineated.

There was a well-developed triangular aponeurosis of length 9 cm in the lower part of arm. It extended from the medial aspect of bicipital tendon (BT) to the MIS. It had a well-defined sharp crescentic free margin of 4 cm (Fig. 1). This aponeurosis formed the roof of a musculo-septal aponeurotic tunnel that extended up to the cubital fossa. MN and BA were found to pass through this tunnel with the MN coursing medial to the BA (Fig. 1). Beyond the tunnel the MN passed between the two heads of the pronator teres muscle. Neither the MN nor BA was found to give any branches inside the tunnel after they were opened by dissection. The floor of the tunnel was formed by the MIS with the origin of superficial flexors of forearm. The BBA was found to be thinner and lesser developed than usual.

There was an abnormal medial branch from AA given off 3 cm proximal to the lower border of teres major muscle and 5 cm proximal to the MN formation (Fig. 2). This branch

coursed superficially throughout the arm giving only cutaneous branches to the arm and muscular branches to BBM. At the elbow it crossed from medial to lateral aspect by passing superficial to the tunnel and continued superficially through the forearm as RA and terminated by forming the deep palmar arch along with deep branch of UA. Hence the artery was named as SBRA as per the terminology by Rodríguez-Niedenführ et al.⁵ The larger continuation of AA coursed deep to the MN and gave profunda brachii, superior and inferior ulnar collateral arteries. Beyond the elbow it gave off a recurrent artery which anastomosed with the radial collateral artery (anterior descending branch of profunda brachii). At the level of neck of radius, it divided into UA and a common trunk which later gave off the median artery (MA) and interosseous arteries. The MA was found to pass through the MN splitting the nerve (Fig. 2, inset). The nerve fibers reunited after the artery passed through. The UA coursed normally and terminated in the hand by forming the superficial palmar arch along with a superficial branch of SBRA. There was no communication between SBRA and BA.

The other neurovascular and musculo-fascial structures were found to be normal. The right upper limb was also found to be normal.

Discussion

BBM is a highly variable muscle.⁶ Several authors have reported variations in the number and pattern of fusion of its heads. BBM has been found to have additional heads in as high as 20% of the population.² The present case reports the presence of a musculo-septal aponeurotic tunnel due to a variant insertion of BT with associated entrapment of MN and BA which has not been reported in the past and is rare. Awareness of such a variation helps the surgeon in treating the

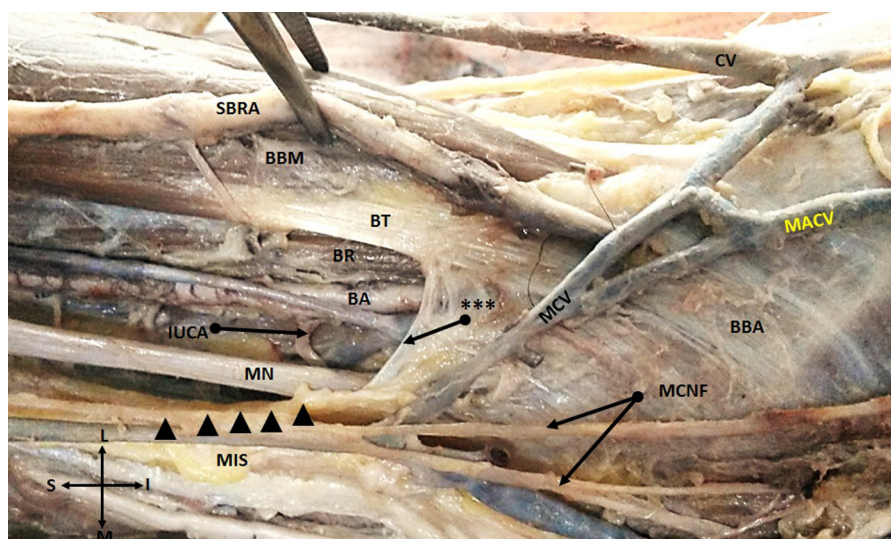


Fig. 1 – Lower third of left arm and cubital fossa showing the musculo-septal aponeurotic tunnel. *** Sharp crescentic free margin of the abnormal expansion from bicipital tendon, BBM – biceps brachii muscle, BT – bicipital tendon, BBA – bicipital aponeurosis, BR – brachialis muscle, BA – brachial artery, SBRA – superficial brachioradial artery, MN – median nerve, MIS – medial intermuscular septum, MCV – median cubital vein, MACV – median antecubital vein, MCNF – medial cutaneous nerve of forearm, CV – cephalic vein, IUCA – inferior ulnar collateral artery.

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