



Experimental Research

Arterial anatomy of anconeus muscle flap

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ABSTRACT

Anconeus is a small muscle located in the elbow region. The muscle flap may be used as a pedicled flap for the reconstruction of defects of the same area. There are very few studies conducted on the flap anatomy of this muscle. In this study 15 formalin fixed cadavers were dissected under 4x loupe magnification. The arterial blood supply was found to be posterior recurrent interosseous artery. The mean diameter of the artery was 0.5 mm at the origin. The diameter was found to be too small for using the flap as a free flap. The localization of the pedicle was defined according to easy surgical landmarks. The mean distance of the origin from interepicondylar line and from the proximal tip of the olecranon was 73 mm and 28.9 mm respectively. The average length of the pedicle of the flap was found to be 8.5 mm. The localization of the point where the pedicle entered the muscle was calculated according to the distance from the interepicondylar line. The distance of the muscle entry point of the artery to the interepicondylar line was 65.2 mm (range 8 – 101 mm). It is concluded that although the pedicle is too small to be used as a free flap its constant anatomy makes the flap an ideal muscle flap for the reconstruction of defects of the elbow region.

Key words; Anconeus flap, muscle flap, anatomy, elbow reconstruction, radioulnar joint reconstruction, radiocapitellar joint reconstruction

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1. Introduction

Anconeus muscle is a small muscle located on the dorsum of the elbow joint. It is a continuum of triceps brachii muscle. It is a fan shaped muscle originating from the lateral epicondyle and inserts into the proximal dorsal ulna and olecranon. The muscle is innervated by the radial nerve and has a function in extension of the forearm. In classical literature anconeus muscle was reported to be nourished by the recurrent interosseous artery and medial collateral artery (Moore, 1992; Cormack and Lamberty, 1994; Williams et al., 1995; Mathes and Nahai, 1997; Yamaguchi et al., 1997 Agur and Danley, 2005). The aim of this study was to investigate the arterial anatomy of anconeus muscle and provide data for the flap surgery operations conducted on this muscle.

2. Experimental Procedure

In this study anconeus muscles of 15 formalin fixed cadavers (30 cases) were dissected under 4x loupe magnification. The arterial anatomy of the muscle was investigated according to the practical surgical landmarks.

3. Results

Posterior recurrent interosseous artery was found to be the sole artery of the anconeus muscle. In all cases type I arterial pattern was found according to the Mathes Nahai classification. The diameter of the artery at the origin was found to be 0.5 mm (range 0.2 - 0.6 mm) on the average. The mean distance of the origin from interepicondylar line was 73 mm (range 57 – 97 mm). The average distance of the origin from the proximal tip of olecranon was 28.9 mm (range 12- 43 mm). The distance of the muscle entry point of the artery to the interepicondylar line was 65.2 mm (range 8 – 101 mm). The average length of the artery before it entered the muscle was 8.5 mm (range 4 – 12 mm) (Fig. 1).

4. Discussion

During the operations conducted in the elbow region preservation of the blood supply of anconeus muscle along with other muscles is important. In the classical literature the artery of anconeus muscle was reported to be the medial collateral artery (Williams et al., 1995). As the surgical techniques developed the importance of



Fig.1. EM: medial epicondyle, MA: anconeus muscle, AIR: posterior interosseous recurrent artery, AIP: posterior interosseous artery

this muscle increased and new anatomical studies were conducted.

Schmidt in his study on 17 cases reported that anconeus muscle is nourished by medial collateral artery, posterior recurrent interosseous artery and radial collateral artery (Schmidt et al., 1999). Cormack studied on forty cases reported that only recurrent posterior interosseous artery was the blood supply of anconeus muscle (Cormack and Lamberty, 1994). Our findings correlate with the study of Cormack.

During the resection or fractures of the radius head especially if instability is present internal fixation may be impossible and prosthesis application may be needed. Complications like ectopic bone formation, heterotopic ossification, surgical infections may be seen. In these cases there are few methods to correct the function of proximal radioulnar joint. Anconeus arthroplasty is one of these methods with relatively less complications. Anconeus

arthroplasty may be performed in three different methods and preservation of the arterial supply from posterior recurrent interosseous artery is important during this operation (Morrey and Schneeberger, 2002)

Schmidt used the anconeus muscle flap in nine cases. The muscle flap was reported to cover 7 cm^2 defects around radiocapitellar joint, distal triceps tendon and olecranon. Although the flap is small the muscle flap has the advantage of being an expendable muscle.

Chang elongated the posterior interosseous recurrent artery flap along the intermuscular septum to reach the medial epicondyle including the anconeus muscle (Chang et al., 1987). During elevation of the flap it must be kept in mind that the origin of the artery is located 73 mm away from the interepicondylar line.

Hwang reported the outer diameter of posterior recurrent interosseous artery to be $1.11 \pm 0.32 \text{ mm}$ and its average length was $29.05 \pm 9.29 \text{ mm}$ (Hwang et al., 2004). They concluded that anconeus flap may be used as a free flap. In our study the diameter and length of the artery was found to be less compared to this study. The diameter of the artery was 0.5 mm on the average, the mean length of the artery was 8.5 mm . According to our findings anconeus flap is not suitable to be elevated as a free flap.

It is concluded that the pedicle of anconeus muscle flap is too small to be used as a free flap. On the other hand the flap has a constant arterial supply from the recurrent posterior interosseous artery and may be used as a local muscle flap for the reconstruction of small defects of the elbow region. Our study provides information on the arterial anatomy of the anconeus flap. These data may be applied during the elevation of this muscle flap.

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