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The Study of Incomplete Superficial Palmar Arch and Hypertrophied 1St Lumbrical Muscle

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ABSTRACT

The hand in the humans is supplied with blood by two anastomotic arches; they are be¬ing the superficial palmar arch (SPA) and the deep palmar arch (DPA). Both the arches are constituted by radial and ulnar arteries. This study on superficial palmar arch was performed on 20 cadavers, out of the 20 cadaver 16 cadavers are male and 4 cadavers are female. In the 20 cadavers 20 right hands and 20 left hands total 40 hands are dissected in the Department of Anatomy of Gitam Medical College, Visakhapatnam, A.P. In the present study incomplete superficial palmar arch are formed entirely by ulnar artery without anastomosing with radial artery and supplying thumb and index finger was found in 8 out of 40 hands with an incidence of 20%. In one of the right upper limb showing the hypertrophied first lumbrical were observed. The superficial palmer arch variation in the hands is essential for surgeons, radiologists and anatomists because of innovative microsurgical techniques in reconstruction of a traumatized hand. The hypertrophied first lumbrical muscle may lead to the compression of radial collateral digital arteries leading to chronic sub –ischemia of fingers.

KEYWORDS : Superficial palmar arch, deep palmar arch, Radial artery and Ulnar artery

INTRODUCTION

The superficial palmer arch lies deep to palmar aponeurosis and superficial to digital branches of median nerve, long flexor tendons of the forearm and lumbricals of the hand. About two third of the SPA is formed by superficial branch of ulnar artery alone, remaining one third by superficial palmar branch of radial artery. Superficial palmar arch gives off four palmar digital arteries; the medial most one supplies the medial side of the little finger and is called the proper palmar digital artery. The other three are common palmar digital arteries which pass to the medial three interdigital clefts. The superficial branch of radial artery supplies the thumb and radial side of index finger by its two branches – the arteria princeps pollicis and arteria radialis indicis. It is important to note that the variations of SPA are more common than the deep palmar arch.

Coleman & Anson subdivided the complete SPA into five varieties and the incomplete SPA in to four varieties. Coleman & Anson (1961) found the incidence of complete arch formed entirely by ulnar artery in 37%. The present study is to establish the prevalence of the possible variations of SPA in the south Andhra Pradesh population.

MATERIALS AND METHODS

This study on superficial palmar arch was performed on 20 cadavers, out of the 20 cadaver 16 cadavers are male and 4 cadavers are female. In the 20 cadavers 20 right hands and 20 left hands total 40 hands are dissected in the Department of Anatomy of Gitam Medical College , Visakhapatnam, A.P. They were fixed in 10% formalin solution. The dissections of hands were performed as per the Cunningham's manual of practical anatomy. The limbs were dissected from the level of the wrist joint on the palmar aspect till the web spaces, superficial branches of radial and ulnar arteries were identified and the branching pattern and course were traced. The incomplete arch are formed entirely by ulnar artery without anastomosing with radial artery is noted.

OBSERVATIONS

The incomplete superficial palmar arch are formed entirely by ulnar artery without anastomosing with radial artery and supplying thumb and index finger was found in 8 out of 40 hands with an incidence of 20%(Figure:1).



Figure-1, UA-Ulnar Artery, SPA-Superficial Palmar Arch, CPDA-Common Palmar Digital Arteries, ARI-Arteria Radialis Indicis, PP-Princeps Pollicis

In one of the right upper limb showing the hypertrophied first lumbrical were observed(Figure:2)

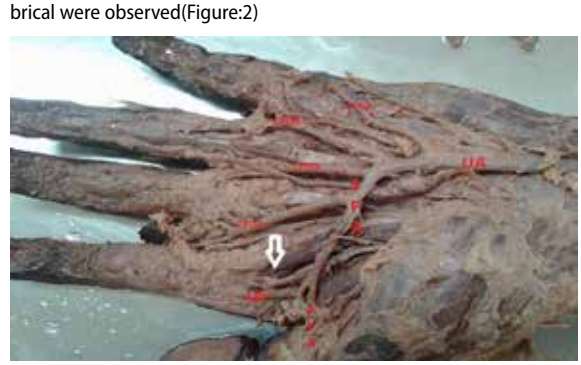


Figure-2, UA-Ulnar Artery, SPA-Superficial Palmar Arch, CPDA-Common Palmar Digital Arteries, ARI-Arteria Radialis Indicis, PP-Princeps Pollicis Artery

DISCUSSION

The SPA is classified into two categories-complete or incomplete. Arches considered being complete if an anastomosis is found between the vessels constituting it. An incomplete arch has an absence of a communication or anastomosis between the vessels constituting the arch.

Coleman SS and Anson BJ (1961) reported the superficial palmar arch is entirely formed by ulnar artery itself by 37% and it supplies thumb and index finger. Earley MJ (1986) noted that superficial palmar arch is completely formed by ulnar artery itself by 20% of the cases. Loukas M et al (2009) reported a case of complete superficial arch is formed by ulnar artery without any contribution of radial artery and terminated by giving rise to a common trunk for princeps pollicis artery and radialis indicis artery. Mookambica RV et al (2010) noted that superficial palmar arch is completely formed by ulnar artery, without contribution of any other vessels.

In the present study 8 upper limbs out off 40, the superficial palmar arch is formed entirely by ulnar artery with an incidence of 20%.

The hypertrophied first lumbrical muscle may lead to the compression of radial collateral digital arteries leading to chronic sub –ischemia of fingers (Singh et al., 1975). Hypertrophy of the lumbricals, anatomic variants such as abnormally long lumbrical muscles and the aberrant tendinous origin of the first lumbricals can lead to carpal tunnel syndrome. Joshi et al, conducted a detailed study to note the origin and insertion of the lumbrical muscles and their relation to carpal tunnel(CT). In half of the cases however the first lumbrical was found to be bulky.

In the present study 1 right upper limb showing incomplete superficial palmar arch and hypertrophied first lumbrical were observed.

CONCLUSION

Superficial palmar arch has a principal role in microsurgeries following crush injuries of hand. The plastic surgeons, hand surgeons and orthopedicians should be aware of these variations before attempting Surgical procedure like vascular repair, graft applications. The hypertrophied first lumbrical muscle may lead to the compression of radial collateral digital arteries leading to chronic sub –ischemia of fingers. Awareness of such variations of lumbricals is necessary to avoid complications during radio-diagnostic procedures of hand and surgeries of hand like lumbrical release operation.

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