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A Rare Variation of Radial Nerve Coexisting with the Intercalated Ectopic Muscle from Latissimus Dorsi Muscle

Una Rara Variación del Nervio Radial que Coexiste con el Músculo Ectópico Intercalado del Músculo Latísimo del Dorso

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SUMMARY: The axilla is the main communication channel connecting the upper limbs, the neck and chest. Stabilization of the internal structure is essential for upper limb and shoulder mobility. In this case, we observed and recorded the characteristics of the variation of the radial nerve as well as the intercalated ectopic muscle from latissimus dorsi muscle. The position relationship between both, was also particularly noted by us. In view of the presence of the variation we reported, related clinical research, surgery and disease diagnosis are expected to take this case into account.

KEY WORDS: Variation; Brachial plexus; Intercalated ectopic muscle; Radial nerve.

INTRODUCTION

The axilla is the main communication channel among the upper limbs, the neck and the chest. Its passing contents are complex. A comprehensive understanding of the anatomical variations and hemodynamic characteristics of the arteries is very important for the implementation of safe and effective interventional diagnosis and treatment techniques in the axilla.

Usually, the flat tendon of the latissimus dorsi muscle curves around the inferior margin of the teres major, forming the posterior wall of the axilla. The radial nerve arises from the posterior cord of the brachial plexus, passing out of the axilla and traveling through the triangular space to reach the posterior compartment of the arm.

The intercalated ectopic muscle and the variation of radial nerve have been reported previously, but this report is different from previous ones. In the present report, we observed and recorded the shape and characteristics of the intercalated ectopic muscle from latissimus dorsi muscle (All of the following are abbreviated as the intercalated ectopic muscle) as well as the variation of radial nerve. The position relationship between the two of them was also particularly noted by us. The significance of this case is immense, because it not only can effectively help doctors to carry out relevant analysis and examination, but also is worthy of note for surgeons, especially during the surgical clinical work at the axilla.

CASE REPORT

In an autopsy of an adult male cadaver of approximately 55 years of age, we found a variation in the origin of the left radial nerve and an intercalated ectopic muscle from the left latissimus dorsi muscle. The cadaver specimen came from the department of Anatomy and Embryology, Wuhan University TaiKang Medical School (School of Basic Medical Science), which was fixed with 10 % formaldehyde and kept for 3 years. The relevant data were measured with vernier calipers (accuracy 0.01 mm). It was observed that in addition to the latissimus dorsi which normally ended at the humeral lesser tuberosity crest, the medial-upper edge of the latissimus dorsi muscle emitted an unusual intercalated ectopic muscle that moved inward and upward from the poste-

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rior axillary vascular nerve tracts to the coracoid process. The intercalated ectopic muscle was 60.50 mm long, 6.35 mm wide and 6.25 mm thick in the middle. The intercalated ectopic muscle, the upper and lateral margin of the normal latissimus dorsi muscle and theshoulder joint enclosed a triangular space. The radial nerve in this specimen was formed by the merger of the medial and posterior cords of the brachial plexus. The upper root was 50.75 mm long and 3.05 mm in diameter. The lower root was 52.05 mm long and 1.90 mm in diameter. The upper root and the lower root clamped the intercalated ectopic muscle in a Y-shape. The combined radial nerve passed outwards and downwards into the humeral canal. The inferior root of the radial nerve from the posterior cord, the thoracodorsal nerve and the thoracodorsal artery crossed the triangular space. To be more specific, the thoracodorsal nerve, with a diameter of 1.20 mm, originated from the upper root of the medial cords before the merger of the radial nerve. Furthermore, the diameter of the thoracodorsal artery accompanying the thoracodorsal nerve was 1.95 mm, and the diameter of the branch from the thoracodorsal artery to the serratus anterior was 2.05 mm (Fig. 1).

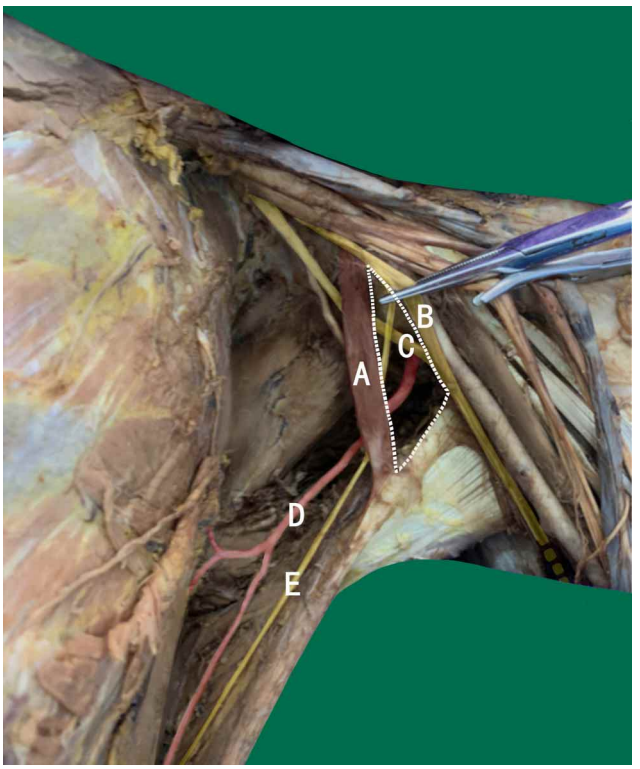

Fig. 1. The variation of radial nerve and the intercalated ectopic muscle from latissimus dorsi muscle. (A) the superior root of the radial nerve (originating from the medial brachial plexus), (B) the inferior root of the radial nerve (originating from the posterior cord of the brachial plexus), (C) the area enclosed by the dotted line is a triangular shaped space surrounded by the intercalated ectopic muscle, the upper and lateral margin of the normal latissimus dorsi muscle and the shoulder joint, (D) thoracodorsal artery, (E) thoracodorsal nerve.

DISCUSSION

This type of variation is incidental and has been reported before. Han & Nan (1982) reported that there was an intercalated ectopic muscle at the upper edge of the fourth rib leaving the lower edge of the latissimus dorsi muscle and ending in the medial side of the humerus tubercles. Xu *et al*. (2014) have reported that the left latissimus dorsi muscle sent out a triangular-shaped intercalated ectopic muscle at the level of the fourth rib which ended on the inner surface of the pectoralis major. In recent years, there have also been reports on the simultaneous occurrence of the intercalated ectopic muscle and the variation of radial nerve origin. Lv *et al*. (2016) reported that the radial nerve respectively originated from the external and posterior cords of the brachial plexus. Meanwhile, there was also an intercalated ectopic muscle travelling between two nerve roots and ending at the lower edge of the latissimus dorsi muscle (Lv *et al*., 2016). Namking *et al*. (2013) also reported that one intercalated ectopic muscle originated from the shoulder joint capsule at the lesser tubercle and passed through the brachial plexus. Then, it was enclosed by two roots of the radial nerve and inserted into the upper part of the latissimus dorsi muscle. The variant posterior cord in this report divided into two roots: a thin lateral and a thick medial root. The lateral root gave off the thoracodorsal nerve that innervated the intercalated ectopic muscle (Namking *et al*., 2013). However, these were dissimilar to our present study which was mentioned above where the origin of the intercalated ectopic muscle as well as the radial nerve differed. Meanwhile, the structures that passed through the triangular shaped space were also different from the cases.

Lv *et al*. (2016) mentioned that in surgical clinical work, understanding the variation of radial nerve's origin and the simultaneous existence of the ectopic muscle could avoid injuries caused by unfamiliar anatomical variations in surgery. In this case, it is speculated that the upper limb movement may cause local muscle pain and further lead to latissimus dorsi numbness because of the variation. Due to the narrowing of the triangular space, the thoracodorsal artery may be compressed, resulting in insufficient blood supply. These will be eventually affect the adduction, extension, and pronation of the humerus. When interpreting nervous compression with unexplained clinical signs and symptoms (sensory loss, pain, and paresis), we should also consider the situation I have mentioned above. If axillary surgery is performed, we should not only consider these aspects of anesthetic blocks and surgical approaches, but also pay special attention to the narrower triangular space which may be caused after improper operation or the poor postoperative recovery. This may deepen the patient's mobility inconvenience in the future. In the

transplantation of latissimus dorsi myocutaneous flap, dissociating the abnormal latissimus dorsi myocutaneous flap mentioned above and transferring it to the covered wound through the open channel may have better clinical effects. According to "Bipolar latissimus dorsi transplantation for congenital multiple arthropathy" (Frizzell *et al*., 2020), the intercalated ectopic muscle transfer may improve the inability of patients with muscular atrophy, which can make them flex the elbow normally. At the same time, this intercalated ectopic muscle may be used for reconstruction of hip abductor muscle through neurovascular latissimus dorsi transplantation (Barrera-Ochoa *et al*., 2017).

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RESUMEN: La axila es el principal canal de comunicación que conecta los miembros superiores, el cuello y el tórax. La estabilización de la estructura interna es fundamental para la movilidad del miembro superior y del hombro. En este caso observamos y registramos las características de la variación del nervio radial así como del músculo ectópico intercalado del músculo latísimo del dorso. La relación de posición entre ambas también fue significativa en este estudio. En vista de la presencia de la variación que informamos, se espera que la investigación clínica relacionada con la cirugía y el diagnóstico de la enfermedad tengan en cuenta este caso.

PALABRAS CLAVE: Variación; Plexo braquial; Músculo ectópico intercalado; Nervio radial.

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