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Complex Variation Of Median Nerve: A Case Report

Median Sinirin Kompleks Varyasyonu: Olgu Sunumu

ABSTRACT
During routine dissections we saw complex variation of median nerve in the right arm of an adult male cadaver. Lateral cord continued as lateral root of median nerve without giving off musculocutaneous nerve and it formed median nerve joining with medial root of median nerve which arises from medial cord. There was a communicating accessory branch 2.5 cm long running obliquely between the cords which formed the median nerve. Coracobrachialis muscle was innervated by a thin branch arising from lateral cord. Median nerve given two branches at a point 9 cm distal to its formation. First branch supplied to biceps brachii, the second branch continued as brachial muscle's nerve and lateral antebrachial cutaneous nerve. Main trunk passed through the cubital fossa and ran along the forearm following the normal course of median nerve. We think it is important that clinicians performing surgical procedures or nerve blocks in this region should consider this variation in order to avoid failures and complications.
Key words: Median nerve, musculocutaneous nerve, variation, dissection

ÖZET
Rutin diseksiyon sırasında yetişkin erkek kadavranın sağ kolunda kompleks bir median sinir varyasyonu gördük. Lateral fasikül muskulokutanöz sinir terminal dalını vermeden median sinirin lateral kökü olarak devam etmekte ve medial fasikülden gelen median sinirin medial kökü ile birleşerek median siniri oluşturmaktaydı. Median siniri oluşturan bu iki fasikül arasında oblik olarak seyreden 2,5 cm uzunluğunda birleştirici aksesuar bir dal mevcuttu. Korakobrakial kas lateral fasikülden gelen ince bir dal tarafından innerve edilmişti. Median sinir oluşumunun 9 cm distalinde iki dal vermişti. İlk dal biseps braki kasını innerve etmişti, ikinci dal ise brakialis kasının siniri ve lateral antebrakial kutanöz sinir olarak devam etmişti. Ana gövde ise kubital fossa içinden geçip median sinirin normal seyrini izleyerek önkol boyunca uzanmıştı. Klinisyenlerin bu bölgedeki cerrahi işlemleri ve sinir bloklarını yaparken bu varyasyonu göz önünde bulundurmasının başarısız girişimleri ve komplikasyonları önlemek için önemli olduğunu düşünmekteyiz.
Anahtar kelimeler: Median sinir, muskulokutanöz sinir, varyasyon, diseksiyon

INTRODUCTION

Lateral and medial roots, which are the terminal branches of lateral and medial cords of brachial plexus, unite to form the median nerve anterior to the axillary artery. The median nerve runs downwards with brachial artery and ulnar nerve in the groove medial to the biceps brachii muscle. It enters the cubital fossa along with the brachial artery. Normally it does not supply the muscles of the arm (1,2).

The musculocutaneous nerve is the nerve of the anterior compartment of the arm. It gives a branch to the shoulder joint and then passes through coracobrachialis, which it supplies, emerging to pass between biceps and brachialis. It sends branches to both these muscles. In the cubital fossa it lies at the lateral margin of the biceps tendon where it continues as the lateral cutaneous nerve of the forearm (3).

We described complex variation of median nerve in the right arm of an adult male cadaver and discuss the morphological importance and clinical implications.

CASE REPORT

During routine education dissections of axillary region, an complex variation was observed in the right arm of an adult male cadaver (Fig. 1). The musculocutaneous nerve was absent. Lateral cord continued as lateral root of median nerve without giving off musculocutaneous nerve and it formed median nerve joining with medial root of median nerve which arises from medial cord. There was a communicating accessory branch 2.5 cm long running obliquely between the cords which form the median nerve. Coracobrachialis muscle was innervated by a thin branch arising from lateral cord. We observed that the median nerve given two branches at a point 9

cm distal to its formation. First branch supplied motor innervation to biceps brachii, the second branch continued as brachial muscle's nerve and lateral antebrachial cutaneous nerve. Main trunk passed through the cubital fossa and ran along the forearm following the normal course of median nerve.

DISCUSSION

Variations of the nerves in the arm are common. As the brachial plexus supplies cutaneous and muscular innervation to the upper limb, its anatomical variations have important clinical implications. Therefore, knowledge of these is important for the anatomists, surgeons, radiologists, and anesthesiologists to be aware of anatomical variations that deviate from the classic anatomy.

The upper limb buds lie opposite the lower five cervical and upper two thoracic segments. As soon as the buds form, ventral primary rami from the appropriate spinal nerves penetrate into the mesenchyme. At first each ventral ramus enters with isolated dorsal and ventral branches, but soon these branches unite to form large dorsal and ventral nerves. Thus the ulnar and median nerves, which supply the flexor musculature, are formed by a combination of the ventral branches. Immediately after the nerves have entered the limb buds, they establish an intimate contact with the differentiating mesodermal condensations, and the early contact between the nerve and muscle cells is a prerequisite for their complete functional differentiation. Spinal nerves not only play an important role in differentiation and motor innervation of the limb musculature, but also provide sensory innervation for the dermatomes. Although the original dermatomal pattern changes with growth of the extremities, an orderly sequence can still be recognized in the adult (4).

Unusual courses, branching pattern and termination of median nerve and musculocutaneous nerve are of clinical importance during flap dissections, post traumatic evaluation of the arm or peripheral nerve repair and even for peripheral nerve stimulation in practice of anaesthesia.

Variations in the formation and ramification of the median nerve have been recorded. Such variations include formation of median nerve (5,6,7,8), and abnormal communications with the musculocutaneous nerve (9).

Aggarval et al. (5) reports an anomaly of median nerve on both arms, four roots forming median nerve on the left side, three roots on the right. On the left side, one each originated from the lateral and medial cords respectively and remaining two from the anterior division of middle trunk, whereas on the right side three roots were found arising from lateral cord, anterior division of middle trunk and medial cord respectively. Villamere et al. (8) reported a case of median nerve formation by three branches. On the left side of the cadaver there was a second terminal branch from the lateral cord that joined the median nerve distal to the union of the lateral and medial roots of the median nerve. Goyal et al. (6) in their study reported two lateral roots of median nerve arising from the lateral cords bilaterally and single medial root. Uzun and Seelig (7) observed formation of median nerve by fusion of four roots on the left side: three originating from the lateral cord and one from the medial cord.

The musculocutaneous nerve has frequent variations. The known variations of the musculocutaneous include its doubled, short or total absence (10,11), not piercing the coracobrachialis (12), communications with the median nerve at various levels (9) and it may run behind coracobrachialis (3).

The musculocutaneous nerve arise from lateral cord (90.5%), from lateral and posterior cord (4%), from median nerve (2%) as 2 separate bundles from medial and lateral cords (1.4%) and from posterior cord (1.4%) (10). Bhattarai and Poudel (13) in their study revealed the variation in course, branching pattern and termination of musculocutaneous nerve in 6.25% of cases

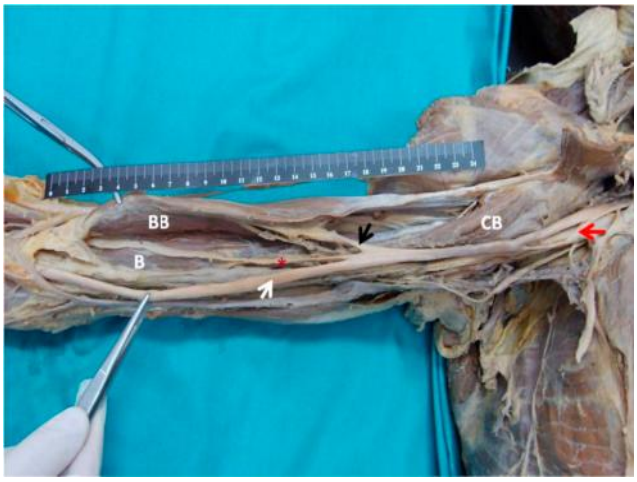

Figure 1. Complex variation of median nerve. Communicating accessory branch (red arrow) running between the cords of the median nerve, first branch (black arrow) supplied to biceps brachii, second branch (asteriks) continued as brachial muscle's nerve and lateral antebrachial cutaneous nerve, main trunk (white arrow) ran along the forearm. CB: Coracobrachialis muscle; BB: biceps brachii muscle; B: brachialis muscle.

unilaterally on the right side out of total 32 upper limbs. Similarly, Tsikaras et al. (14) observed that the musculocutaneous nerve arose from the median nerve unilaterally in a male cadaver.

Absence of musculocutaneous nerve has been described by various authors (15,16,11,17,18,19). But there is little data in the literature on the its real frequency. Beheiry (15) dissected 60 arms and noted absence of the nerve in only one of them (1.7%). Prasada Rao and Chaudhary (18) did not find this nerve in 8% of the 24 arms they dissected. Arora and Dhingra (20) reported this variation in 15 out of 100 cadavers.

In most of these cases median nerve took over the role of absent musculocutaneous nerve. In our study, median nerve innervated the biceps and brachialis muscles and gave lateral cutaneous nerve of the forearm.

Rajanigandha et al. (19) have reported the absence of musculocutaneous nerve in the infraclavicular part of the brachial plexus of the left upper limb. It was found that the median nerve had two lateral roots, an upper and a lower. These two roots of the median nerve took over the area of supply of musculocutaneous nerve by providing both muscular and sensory branches. A small twig from the upper lateral root of the median nerve supplied the coracobrachialis, where as the biceps brachii and the brachialis were innervated through multiple twigs by the lower lateral root of the median nerve. Absence of the musculocutaneous nerve was observed on the right arm of a male cadaver by Fregnani et al. (16). Area of innervation was supplied by the median nerve from which emerged three branches. One to the coracobrachialis muscle, another to the biceps brachii muscle and the third to the brachialis muscle. This last branch continued as a lateral antebrachial cutaneous nerve. Nakatani and Tanaka (21) describes a case of absence of the musculocutaneous nerve. The branches were arising directly from the lateral cord to supply coracobrachialis, both heads of biceps brachii and brachialis. The lateral cutaneous nerve of the forearm was derived from the lateral cord with a small contribution from the medial root of the median nerve. Poornima and Satyaprasad (22) reported absence of musculocutaneous nerve bilaterally and presence of third head of biceps brachii in the left arm. Median nerve and its branches were observed to innervate all the flexors in both upper extremity. But in our case there was no muscle involvement and nerve variation was unilateral.

Nayak (17) reported a variation of median nerve which is similar to our case in respect to absence of musculocutaneous nerve. But coracobrachialis muscle was innervated by median nerve which is different from our case. Median nerve also innervated biceps and brachialis muscles, there were two abnormal bands connecting medial root of median nerve with its lateral root. These variations are similar to our findings. We also found an abnormal communicating branch between medial root of median nerve and its lateral root.

High origin of nerve to coracobrachialis from lateral cord is not an uncommon finding (11). Singhal et al. (23) reported that the lateral cord gave rise to a direct branch to the coracobrachialis, the lateral root of the median nerve and thereafter continued as the musculocutaneous nerve. The musculocutaneous nerve gave two communicating branches to the median nerve and the lateral root gave a communicating branch to the first communicating branch of the median nerve. In our study, the nerve to coracobrachialis is a direct branch from the lateral cord.

The presence of anatomical variations of the peripheral nervous system is often used to explain unexpected clinical signs and symptoms. This is an anatomical variation that has clinical-surgical implications, considering that injury to the median nerve in our case would have caused unexpected paralysis of the brachialis and biceps brachii muscles and hypoesthesia of the lateral surface of the forearm. Tuncali et al. (24) states that brachial artery, vein and the ulnar nerve injuries can frequently accompany median nerve injuries. Given the fact that upper extremity traumas are relatively common, this may emphasis the significance of median nerve and hence its variations.

The variation described in our case may lead to confusions in surgical procedures and nerve block anesthesia in the axillary region. It has a number of implications for trauma surgery, plastic and reconstructive repair operations involving this region. Surgeons, anesthetists and radiologists should be aware of these variations to reduce complications and failures. In order to have a good surgical practice of the upper extremity nerves, it is important to know classic and variational anatomy of the upper limb.

Consequently, we think that it is important for surgeons to keep this variation in mind in order to avoid possible complications such as nerve injury.

Conflict of interest: The authors declare that they have no conflict of interest.

REFERENCES

1. Moore KL, Dalley AF: Clinically Oriented Anatomy. 4rd ed. Baltimore. Lippincott Williams & Wilkins. 1999.
2. Songur A, Uygur R, Akcer S, Toktas M: Fenestrated brachial vein perforated by the lateral root of median nerve: a case report. Anatomy 2009, 3:65-68.
3. Drake RK, Vogl W, Mitchell AWM: Gray's Anatomy. 39th ed. Edinburgh. Churchill Livingstone. 2005.
4. Sadler TW: Langman's Medical Embryology. 8th ed. Lippincott Williams & Wilkins. 2000.
5. Aggarwal A, Harjeet K, Sahni D, Aggarwal A: Bilateral multiple complex variations in the formation and branching pattern of brachial plexus. Surg Radiol Anat. 2009, 31:723-731.
6. Goyal N, Harjeet, Gupta M: Bilateral variant contributions in the formation of median nerve. Surg Radiol Anat. 2005, 27:562-565.
7. Uzun A, Seelig LL Jr: A variation in the formation of the median nerve: communicating branch between the musculocutaneous and median nerves in man. Folia Morphol. (Warsz) 2001, 60:99-101.
8. Villamere J, Goodwin S, Hincke M, Jalalı A: A brachial plexus variation characterized by the absence of the superior trunk. Neuroanatomy 2009, 8:4-6.
9. Loukas M, Aqueelah H: Musculocutaneous and median nerve connections within, proximal and distal to the coracobrachialis muscle. Folia Morphol. (Warsz) 2005, 64:101-108.
10. Bergmann R, Thompson SA, Afifi AK, Saadeh FA: Compendium of human anatomic variation. Baltimore, Munich, Urban and Schwarzenberg. 1988.
11. Gümüsburun E, Adigüzel E: A variation of the brachial plexus characterized by the absence of the musculocutaneous nerve: a case report. Surg Radiol Anat. 2000, 22:63–65.
12. Nakatani T, Mizukami S, Tanaka S: Three cases of the musculocutaneous nerve not perforating the coracobrachialis muscle. Kaibogaku Zasshi 1997, 72:191–194.
13. Bhattarai C, Poudel PP: Unusual variation in musculocutaneous nerves. Kathmandu Univ Med J. (KUMJ) 2009, 7:408-410.
14. Tsikaras PD, Agiabasis AS, Hytiroglou PM: A variation in the formation of the brachial plexus characterized by the absence of C8 and TI fibers in the trunk of the median nerve. Bull Assoc Anat. (Nancy) 1983, 67:501-505.
15. Beheiry EE: Anatomical variations of the median nerve distribution and communication in the arm. Folia Morphol. (Warsz) 2004, 63:313-318.
16. Fregnani JH, Macéa MI, Pereira CS, Barros MD, Macéa JR: Absence of the musculocutaneous nerve: a rare anatomical variation with possible clinical-surgical implications Sao Paulo Med J. 2008, 126:288-290.
17. Nayak S: Absence of musculocutaneous nerve associated with clinically important variations in the formation, course and distribution of the median nerve - a case report. Neuroanatomy 2007, 6:49-50.
18. Prasada Rao PV, Chaudhary SC: Absence of musculocutaneous nerve: two case reports. Clin Anat. 2001, 14:31-35.
19. Rajanigandha V, Mangala P, Latha P, Savinaya S, Vasudha S, Prakash S: A case report on multiple anomalies of upper extremity. Neuroanatomy 2006, 5:44–46.
20. Arora L, Dhingra R: Absence of musculocutaneous nerve and accessory head of biceps brachii: A case report. Indian J Plast Surg. 2005, 38:144–146.
21. Nakatani T, Tanaka S. Absence of the musculocutaneous nerve with innervation of coracobrachialis biceps brachii, brachialis and the lateral border of the forearm by branches from the lateral cord of the brachial plexus. J Anat. 1997, 191:459-460.
22. Poornima GC, Satyaprasad V: Variant innervation of flexors of the arm associated with additional head of biceps brachii. Neuroanatomy 2006, 5:24–26.
23. Singhal S, Rao VV, Ravindranath R: Variations in brachial plexus and the relationship of median nerve with the axillary artery: a case report. J Brachial Plex Peripher Nerve Inj. 2007, 2:21.
24. Tuncali D, Toksoy K, Tan Baser N, Terzioglu A, Aslan G: Upper extremity nerve injuries: the significance of soft tissue associations. Neuroanatomy 2004, 3:15-17.