INTRODUCTION

The musculocutaneous nerve (C5, C6, C7) is the nerve of the anterior compartment of the arm. It arises in the axilla as a branch of the lateral cord of the brachial plexus. It leaves the axilla by piercing the coracobrachialis muscle and enters the front of the arm. It courses down lying between the biceps brachii and brachialis muscle and comes out of the intermuscular plane laterally.

In the lower part of the arm it passes in front of the elbow, where it pierces the deep fascia and continues down as the lateral cutaneous nerve of the forearm. Several variations on musculocutaneous nerve have been described by many authors. The knowledge of the anatomical variation of the peripheral nerve in the upper extremities is important as this nerve could be injured during surgical procedures and because variation may explain unusual clinical symptoms. The present study is aimed at assessing variations of the musculocutaneous nerve.

MATERIALS AND METHODS

This study was carried out between August 2010 to October 2012 on formalin embalmed 25 cadavers out of which 13 were males and 12 females with ages ranging from 56 to 98 years. Procedures for the study were performed by dissection using the regular dissection kit and following the Cunningham’s manual of practical anatomy-15th Edition. The study analyzed by comparing with normal standard gross origin, courses and branches as stated in the Gray’s Anatomy-40th Edition. The variations of the musculocutaneous nerve and
correlation of the musculocutaneous nerve to the coracobrachialis were noted.

RESULT

Variations in courses, branching pattern and connection of Musculocutaneous nerve in the arm were observed. These variations were seen in 14% of cases. Out of this variation 4% variations were on the right side and 10% seen on the left side. No statistically significant difference by gender and side were observed. The musculocutaneous nerve was found to be unilaterally absent in 4 cadavers—absent in the left limb in three and right limb in one cadaver. In all 4 cases where it was found to absent, muscles of the front of arm were supplied by a branch of the median nerve and Coracobrachialis muscle was supplied by a direct branch from the lateral cord. (Fig.1) In one case Musculocutaneous nerve supplied the muscle and followed the normal course, but without piercing the coracobrachialis muscle. (Fig. 2) In two cases, in the left limb, Musculocutaneous nerve gave a communicating branch to median nerve after piercing the coracobrachialis muscle. (Fig. 3)

FIGURES

Figure1: Left side arm where branches from median nerve supplying muscles of front of arm and musculocutaneous nerve is absent

Figure2: Right side arm where musculocutaneous nerve is absent and branches from median nerve supply muscles of front of arm

Figure3: Left side arm where musculocutaneous nerve giving a communicating branch to median nerve

DISCUSSION

In humans, the forelimb muscles develop from the mesenchyme of the paraxial mesoderm during the fifth week of intrauterine life. The axons of the spinal nerves grow distally to reach the mesenchyme. Altered signaling between mesenchymal cells and neuronal growth cones or circulatory factors at the time of fusion of brachial plexus cords, may cause significant variation in nerve patterns. In the past many variations have been described regarding the course of musculocutaneous nerve and the median nerve. Le Minor described five types of variations:
Type 1: There is no communication between the median nerve and musculocutaneous nerve.

Type 2: The fibers of the medial root of median nerve pass through the musculocutaneous nerve and join the median nerve in the middle of the arm.

Type 3: The lateral root fibers of the medial root of median nerve pass through the musculocutaneous nerve and after some distance, leave it to form the root of the median nerve.

Type 4: The musculocutaneous nerve fibres join the lateral root of the median nerve and after some distance the musculocutaneous nerve arise from the median nerve.

Type 5: The musculocutaneous nerve is absent and the entire fibers of musculocutaneous nerve pass through lateral root and fibers to the muscles supplied by a musculocutaneous nerve branch out directly from the median nerve.

Venieratos and Anagnostopoulou\(^1\) also described three different types of communication between musculocutaneous nerve and median nerve in relation to coracobrachialis muscle:

Type 1: Communication between musculocutaneous nerve and median nerve is proximal to the entrance of musculocutaneous nerve into coracobrachialis muscle.

Type 2: Communication between the two nerves is distal to the muscle.

Type 3: Neither the nerve nor its communicating branch pierced the muscle.

In this study, the absence of the musculocutaneous nerve was observed in 4 cases which coincided with type 5 of Le Minor classification but did not correspond to any of the Venieratos’s classification. Normally the musculocutaneous nerve supplies the muscles and continues as lateral cutaneous branch of the forearm but in these cases it came off from the median nerve, similar to cases reported by Sud and Sharma.\(^1\) In Gupta and D’Souza \(^4\) it came from the lateral cord of the brachial plexus. It must be noted that the primary ventral branches of the spinal nerves that form the musculocutaneous nerve and the lateral root of the median nerve are common to these two nerves (from C5 to C7). Considering that in the present case the musculocutaneous nerve was absent, it is not a surprise that the nerve fibers heading for the flexor musculature of the elbow and the skin of the lateral surface of the forearm (coming from the C5 to C7 spinal nerves) would accompany those of the median nerve in the lateral fasciculus and, from there, would follow the median nerve along its path in the forearm. In two cases the nerve did not pierce the coracobrachialis muscle which coincided with type 3 of Venieratos’s classification. A similar case was found by More and et al.\(^1\) In two cases we found that there is a type 2 communicating branch as per classification of Venieratos’s, between the Musculocutaneous nerve and Median nerve. Guerri-Guttenberg and Ingolotti\(^1\) observed a similar communicating branch piercing the coracobrachialis muscle in 7.7% of the cases in their study. The knowledge of variations in the course and branching of the lateral cord of the brachial plexus assumes importance while performing surgical procedures on the upper limb like axillary lymph node dissection, flap dissections, neurotisation of brachial plexus lesions, Shoulder Arthroscopy by anterior glenohumeral portal and shoulder reconstructive surgeries, post-traumatic evaluations of the arm or peripheral nerve repair. After trauma to the arm, when the median nerve seems to be surgically intact, the fibers coursing in the musculocutaneous nerve may be damaged. While evaluating symptoms of unusual tingling, paresis or paralysis, these variations should be kept in mind. Thus, comprehensive knowledge of peripheral nerve course origin and variations in arm is essential for the medical person.

REFERENCE


