

IJBHS 2009037/5205

Prevalence and pattern of communication of median and musculocutaneous nerves within the black population: Nigeria - a case study

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(Received April 18, 2009)

(Accepted May 6, 2009)

ABSTRACT: Most of the studies done on the pattern of communication between the median and musculocutaneous nerves have been done on Caucasian population. As a result of the several variations attributable to ethnic and racial differences and also the absence of similar studies within the black population, this study was carried out on a Negroid population of Nigerian origin. A total of 50 cadavers were used for this study. Median-musculocutaneous communication was noted for 6% of the population where 4.4% was for males and 20% was for females. Twenty percent variation was noted for the left arm and 6% for the right arm. These variations with their pattern of occurrence were compared with the various reported values for the Caucasian populations. No significant difference was noted between the Negroid and Caucasian populations. All the communications noted in this study was unilateral.

Key Words: Median nerve, Musculocutaneous nerve, black population, variations, communication.

Introduction

Amongst the several variations noted with the formation, course and distribution of the roots, cords and branches of the brachial plexus is the communication of the median nerve with the musculocutaneous nerve. This variation has been noted to be the commonest, considering other variations of the branches of brachial plexus [1,2]. In these studies, numerous prevalence values of this variation have been established [3-11]. Some studies have also made attempts at classifying the various patterns of occurrence of this variation [10,12,13].

These studies have been carried out amongst people of various countries and ethnicities and the results of the prevalence values of this abnormal communication have been noted to vary as wide as 6 – 68% [13]. Also significant in the result is the differing classification criteria of these communication.

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This work has been designed to obtain data on the prevalence and pattern of this occurrence from the negro population of Nigeria and also to compare the data obtained with the various data documented for the Caucasian population by other authors.

Subjects and Methods

This study was carried out in the Department of Anatomy University of Nigeria. A total of 100 arms (45 male and 5 female) cadavers were dissected and used in this study. Primary dissections were done by undergraduate medical students of the College under the supervision of the authors. Further dissections were done by the authors. The dissection method was according to Romans [14]. The cadavers used for this study were those of young adult Nigerians. The gender and sides of the occurrence of the communications with the patterns were noted, and photographs taken.

Results

Out of the 50 cadavers used for this study, only 3 showed communication between the median and musculocutaneous nerve, giving a 6% prevalence. Two out of these communications occurred in the males giving a prevalence of 4.4%, while 1(20%) was noted for females. In all the cases, the communication was noted to be unilateral. Of these communications 2 (8%) were noted in the right arm, while 1 (4%) was noted in left arm. Both communications in the right arm (see Figures 1a and 1b) were noted in the male cadavers while the communication in the left arm was noted in the female cadaver (see Figures 2a and 2b). The connection between the two nerves in the population studied showed two patterns. In both patterns the communication was noted distal to the coracobrachialis muscle. In the first pattern (see Figures 1a and 1b), the connection was through a short communicating branch that ran from the musculocutaneous nerve to the median nerve. In the second pattern, the musculocutaneous nerve after emerging between biceps brachi and coracobrachialis divided into two terminal branches, the smaller lateral branch continues distally innervating the anterior compartment muscles of the arm, while the very larger medial branch which runs as the distal continuation of musculocutaneous nerve ends by fusing with the median nerve.

Table 1: Distribution of median-musculocutaneous nerve communication by gender and side.

| Sample | Right | Left | Total |
|--------|---------|--------|---------|
| Male | 2(4.4%) | 0(0%) | 2(4.4%) |
| Female | 0(0%) | 1(20%) | 1(20%) |
| Total | 2(4%) | 1(20%) | 3(6%) |

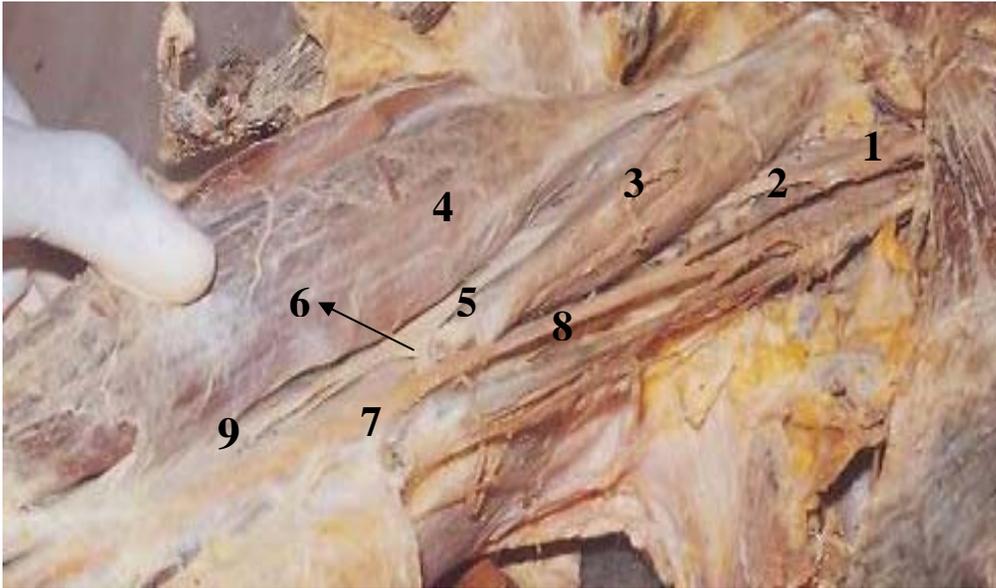


Fig. 1a: Photograph of the right axilla and arm, showing communication between the median and musculocutaneous nerves. 1;Lateral cord. 2;Musculocutaneous N before piercing coracobrachialis (**CB**).3; **CB**. 4;Biceps Brachii. 5; Musculocutaneous after piercing **CB**. 6; Communicating branch btw Median & Musculocutaneous Nerves.7; Median N after communication. 8; Median N before communication. 9;Musculocutaneous N after communication.

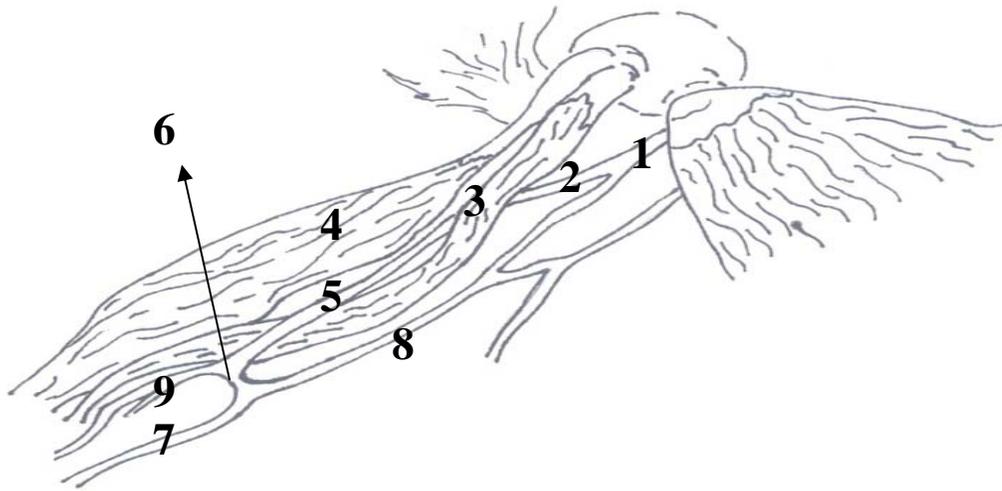


Fig.1b:Schematic representation of the right axilla and arm, showing communication between the median and musculocutaneous nerves. 1;Lateral cord. 2;Musculocutaneous N before piercing coracobrachialis (CB).3; CB. 4;Biceps Brachii. 5; Musculocutaneous after piercing CB. 6; Communicating branch btw Median & Musculocutaneous Nerves.7; Median N after communication. 8; Median N before communication. 9;Musculocutaneous N after communication.

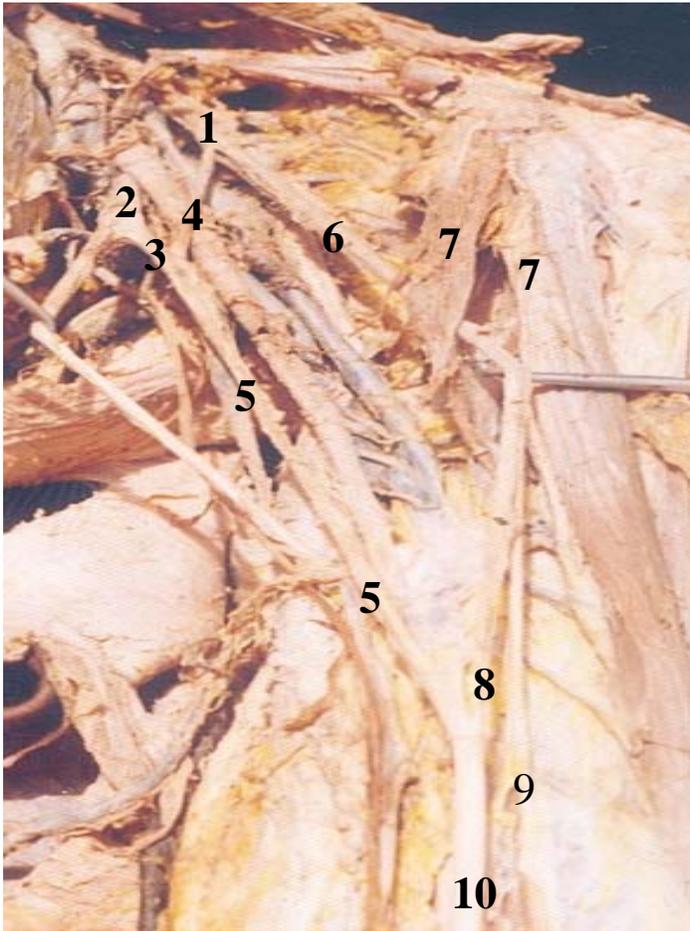


Fig 2a; Photograph of the left axilla and arm showing communication btw Median (MN) & Musculocutaneous (MCN). 1;Lateral cord. 2;Medial cord. 3;Medial root of MN. 4; Lateral root of MN. 5; MN. 6; MCN before piercing Coracobrachialis (CB). 7; CB. 8; One of the terminal branches of MCN that fuses with MN. 9; One of terminal branches of MCN that continues to forearm.10; MN after fusion with MCN.

Discussion

The prevalence of median-musculocutaneous nerve communication has been studied by many authors but mostly in Caucasian subjects. This prevalence has also been noted to have a very wide range (15). The 6% prevalence noted in this work falls within the range of 6% to 68% noted by Nakatani et al (7). This result when compared with other Caucasian values noted by some authors (see table 1), is seen to be very low, except for the 5% prevalence noted by Beheiry (11). No significant relationship ($p < 0.05$) was noted between the prevalence value noted in this work with the prevalence values noted in some other works done in

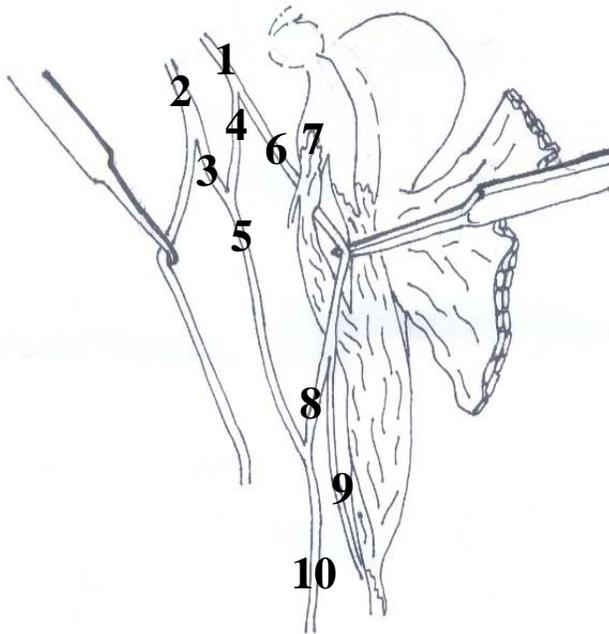


Fig 2b: Photograph of the left axilla and arm showing communication btw Median (MN) & Musculocutaneous (MCN). 1;Lateral cord. 2;Medial cord. 3;Medial root of MN. 4; Lateral root of MN. 5; MN. 6; MCN before piercing Coracobrachialis (CB). 7; CB. 8; One of the terminal branches of MCN that fuses with MN. 9; One of terminal branches of MCN that continues to forearm.10; MN after fusion with MCN.

Caucasian subjects.(see Table 1)

The effect of gender on this variation has not been shown to be significant either in this work or previous studies. Choi et al [15] noted a higher prevalence in the males while the higher prevalence was noted for the females in this study.

A higher prevalence of this variation has been noted to occur more on the left arm of the females than on the right. Choi et al [15] noted a higher prevalence (26.4%) in the female arm than in the male arm (16.7%). This work in agreement with their report, noted a higher prevalence (20%) in the female left arm than in the male left arm.

Table 2: Comparison of the result of the prevalence noted in this study with previous studies.

| AUTHOR | PREVALENCE |
|--------------------------|------------|
| Saeed and Rufai [1] | 26.4% |
| Choi et al [15] | 46.4% |
| Beheiry [11] | 5% |
| Loukas and Aqueelah [10] | 63.5% |
| Pandey and Shulka [16] | 12.8% |
| Present study | 6% |

In agreement with the work of Saeed and Rufai [1], this variation is predominantly unilateral. As a result of several research and case reports on this variation, the problem of classification of the pattern of this median-musculocutaneous nerve connection came up. In the classification by Choi et al [15], they gave 3 patterns, pattern 1 showed a case of fusion of both nerves, pattern 2 showed a case where such connection was through a connecting branch. This pattern had the largest prevalence in their study and going by this classification the three communications noted in this study can be grouped into the second pattern. In pattern 3, they showed a case of such communication through more than one connecting branch between both nerves. A different way of classification adopted by Loukas and Aqueelah [10], based this classification with respect to the point of entrance of the musculocutaneous nerve to the coracobrachialis. Using this method, they arrived at four patterns (i – iv) where the patterns discovered in our study fell within pattern ii, which is the pattern where the communication is distal to the point of entry of musculocutaneous nerve.

Studies of anatomical variations of peripheral nerves are important because most times, they bring clarity to otherwise incomprehensive clinical findings. The knowledge of variations such as has been discussed in this study is important in clinical neurophysiology, anterior surgical approaches in the upper limb [15, 18] in the upper limb.

In conclusion, no statistical significance has been established between the prevalence of the variation noted in this study with those established from Caucasian subjects. The prevalence rate of this variation has been noted not to be significantly affected by gender, ethnicity, and side of the arm. Study of this variation within same population area but with different samples of the population has been noted to give prevalent values that are wide apart [15]. There is yet to be a definite or unified pattern of classification of the different patterns of this median-musculocutaneous nerve communication despite the efforts and suggestions made by Venieratos and Anagnostopoulou [2], Kosugi et al [3], and LeMinor [5].

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