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CASE REPORT

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An unusual union of the intercostobrachial nerve and the medial pectoral nerve

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Variations in the branching pattern of the intercostobrachial nerve have been known to complicate dissection during mastectomy and other procedures involving the axilla.
We present the case of an 87-year-old Caucasian female, in whom the intercostobrachial nerve joined with a separate branch from the medial pectoral nerve. The clinical consequences of such a variation may include pectoral muscle motor loss, in addition to the commonly reported sensory loss resulting from the accidental injury or intentional sacrifice of the intercostobrachial nerve during axillary dissection.

Key words: intercostobrachial nerve, pectoralis minor muscle, pectoralis major muscle, medial pectoral nerve, mastectomy, lateral cutaneous branch of second intercostal nerve

INTRODUCTION

The intercostobrachial nerve (ICBN) arises from the second intercostal nerve as if it was a lateral cutaneous nerve, but fails to divide into anterior and posterior branches [7]. The ICBN pierces the intercostal muscles of the second intercostal space, the serratus anterior in the mid-axillary line, and then crosses the axilla, where its posterior axillary branch provides sensation to the posterior axillary fold. The nerve continues into the arm along its posteromedial border and supplies the skin of this region [3]. The few variations of this pattern that have been described in the literature have indicated that ICBN can penetrate the pectoralis major and minor muscles without providing additional nerve supply to these muscles [8, 9].

One of the most common complications of axillary node dissection during mastectomy is damage to the ICBN with resulting pain and paresthesia [5, 8, 17, 21]. Although, some surgeons often choose to sacrifice ICBN [3, 19], this technique is a point of controversy among surgeons, as some feel that sacrificing the ICBN is unnecessary [8]. We present a case in which the right ICBN received a branch from the medial pectoral nerve, which partially innervated both the pectoralis minor and pectoralis major muscles.

CASE REPORT

This variation was discovered during a faculty prosection (M.L.) of the axillary region in the Department of Anatomical Sciences at St. George's University during the spring term of 2007. The variation was discovered in an 87-year-old Caucasian female who had died of heart failure and myeloproliferative disease. The specimen had been previously fixed in formalin-phenol-alcohol solution and showed no evidence of previous procedures or gross evident pathologies of the axilla.

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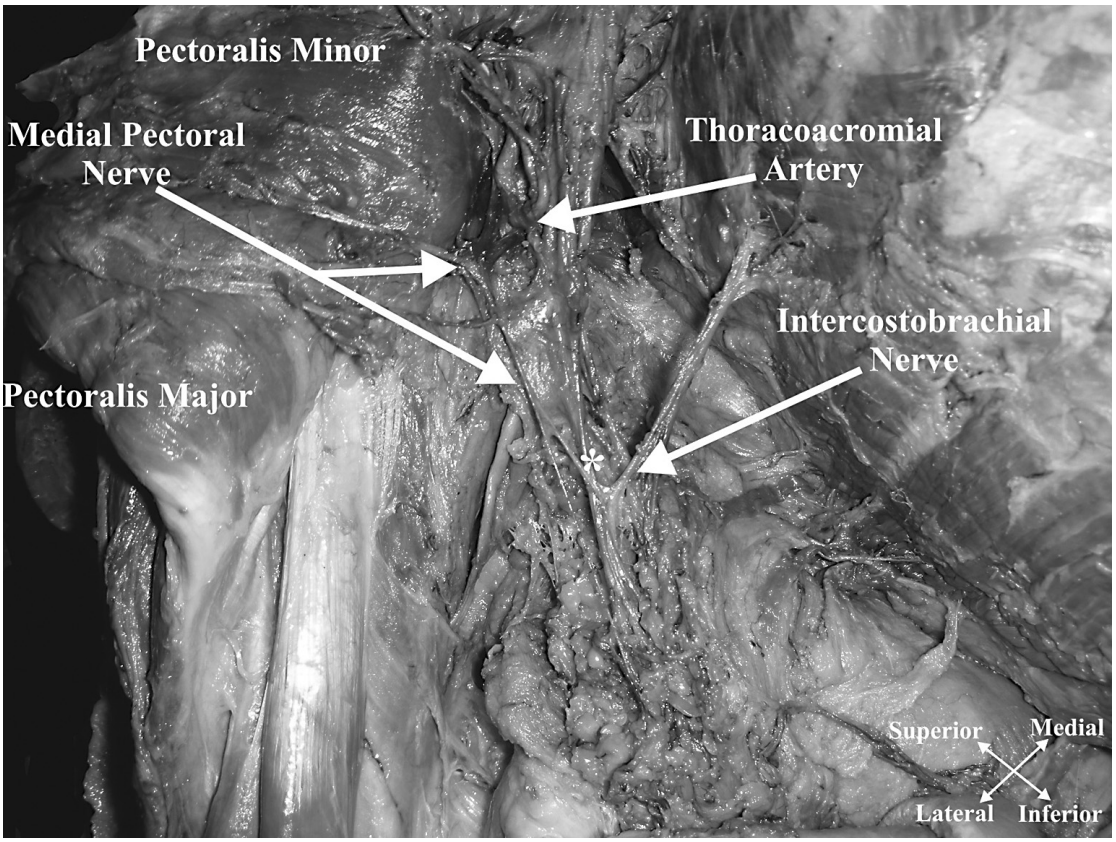

Figure 1. The union of the medial pectoral nerve and the intercostobrachial nerve at the axilla. The asterisk (*) shows the union of the intercostobrachial nerve with the medial pectoral nerve.

After arising at its typical location within the right second intercostal space, the right ICBN traveled for a distance of 3 cm and received a separate distinct medial pectoral branch (MPB) arising from the medial pectoral nerve (MPN). The MPB arose immediately as a distinct branch from the origin of MPN from the brachial plexus. The MPB coursed medially along the inferior border of the pectoralis minor muscle, anterior to the basilic vein, finally to reach ICBN at the central portion of the axilla (Fig. 1). The ICBN united with MPB to form a common trunk, classified as Type I according to the classification proposed by Loukas et al. [12] in 2006.

The MPN was found to pierce the pectoralis minor. The lateral pectoral nerve appeared in its typical location, arising from the lateral cord of the brachial plexus, giving rise to the ansa pectoralis, which communicated with the medial pectoral nerve. All other structures, including the thoracoacromial artery, lateral thoracic artery and the remainder of the brachial plexus, were unremarkable. The left axilla, including ICBN and the brachial plexus, was carefully dissected and no other variations, including MPB, were found.

DISCUSSION

We recently reported a study classifying the anatomy of ICBN into several types [12]. Interestingly, we were not able to identify a union between ICBN and MPB in the axilla. However, we reported a similar case in which the right ICBN gave rise to a medial pectoral branch, which partially innervated both the pectoralis minor and pectoralis major muscles [13]. From a search of the literature we have been able to identify similar cases reported by Japanese researchers. In 1973 Aiyama [2] reported that he had identified in several cases a communication between MPN and the lateral cutaneous branch of ICBN. This communication was named the caudal pectoral nerve and, according to Aiyama [2], is present in 5% of the population. In these cases, if the communicating branch is distributed to the skin, MPN may be thought to contain a cutaneous branch. On the other hand, if this branch is distributed to the pectoralis major muscle, the lateral cutaneous branch of ICBN may be considered as containing a muscular branch to this muscle. Interestingly, in our previous study exploring the clinical anatomy of ICBN in 100 cadavers we were unable to observe any communication of ICBN with MPN [12].

In addition, Chiba [6, 10] reported that in Adachi's type C brachial plexus the ansa pectoralis was absent and a communication between ICBN and MPN was noticed.

Damage to ICBN is a common complication of axillary node dissection during mastectomy. The medial portion of ICBN is encountered during exposure of the long thoracic and thoracodorsal nerves. Identification of this nerve is therefore essential to its preservation [1, 4].

Recent studies have focused on establishing the risks and benefits of ICBN preservation. Abdullah et al. [1] found that ICBN preservation is possible in most patients, but that sacrificing ICBN did not affect shoulder movement or axillary lymphatic drainage. It is interesting to note that the study of Abdullah et al. did not report any cases in which ICBN received branches from MPN [1]. Had a patient with MPB been part of their study, those authors might have noticed effects on shoulder movement secondary to ICBN sacrifice. According to Toressan et al. [20], preservation of ICBN is feasible and leads to a significant decrease in the alteration of pain sensitivity of the arm without interfering with the total time of the surgery, the number of dissected nodes or local relapse rates. Moreover, according to our previous study classifying the variation patterns of the extrathoracic and intrathoracic portions of the brachial plexus, the importance of ICBN preservation increases considerably with the knowledge that this nerve usually carries a T2 contribution to the brachial plexus [13, 14]. Damage to this nerve may therefore have additional consequences beyond the deficits described for the axillary and pectoral regions. For example, if the T2 communication contained motor fibers, there could be some degree of weakness associated with its transection [14].

Freeman et al. [9] reported that preservation of ICBN only marginally increases the surgical time and significantly decreases patient sensory deficits. Considering the increasing awareness of post-operative deficits resulting from ICBN sacrifice, there is now a trend toward preservation of ICBN during axillary surgery [8]. The importance of ICBN preservation increases considerably with the knowledge that branches of this nerve, such as MPB, may provide not only sensory but also motor innervation to muscles of the pectoral girdle. Accordingly, knowledge of the possible existence of these variations, combined with careful axillary dissection, may spare mastectomy or axillary lymphadenectomy patients unnecessary losses, whether sensory or motor [11]. According to Motomura et al. [15], there are many problems associated with nodal dissection and sentinel node biopsy including ideal injection technique, ideal agents, ideal histological detection of sentinel node metastases and possible anatomical variations of ICBN. These issues must be addressed before sentinel node biopsy becomes the standard of care for patients with breast cancer.

CONCLUSION

Although we are unable to determine the actual clinical significance of the variation reported here, it remains important to describe rare variations in order to minimize the risk of iatrogenic injury. This case report indicates the potential of variations of ICBN and suggests that muscular and sensory innervation may be derived from this variant. This observation supports the current trend of preservation of the intercostobrachial nerve during axillary surgical procedures.

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