



MULTIPLE INTERCOSTOBRACHIAL NERVES AND ITS CLINICAL SIGNIFICANCE

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ABSTRACT

All Intercostobrachial nerve is often referred to as the lateral cutaneous branch of 2nd intercostal nerve. Variations in its course although not uncommon, the knowledge about its course and distribution is of importance for operating surgeons. Here in this case we make an attempt to look for the variations in the course of multiple intercostobrachial nerves. We noticed that there were multiple Intercostobrachial nerves arising from T1, T2 and T3 intercostal spaces. They were found supplying the medial and posterior aspects of arm along with medial cutaneous nerve of arm (from medial cord) and posterior cutaneous nerve of arm (from radial nerve), with no communicating branches given to them. This extensive cutaneous supply to arm by intercostobrachial nerves and the variations in their course provides a sound knowledge to surgeons and oncologists during the operative procedures.

Keywords: Intercosto-brachial, Post mastectomy pain, Axillary dissection.

1. INTRODUCTION

Intercostobrachial nerve is often referred as the lateral cutaneous branch of the 2nd intercostal nerve, which traverses and emerges out of the intercostal space by piercing the thoracic wall at midaxillary line and courses along the base of axilla within the central group of axillary lymph nodes to approach the upper and medial part of brachium where it joins with medial brachial cutaneous nerve. AS the nerve crosses the axilla it supplies the skin covering the floor of axilla and then supplies the upper half of the medial and posterior medial parts of the brachium. Enlargement of central group axillary lymph nodes in cancer may cause compression of this nerve resulting in pain in the area of distribution along the medial side of of brachium⁷. This nerve along with long thoracic and thoracodorsal nerves are preserved during modified radical mastectomy⁸ to prevent the complications like loss of sensation in the upper part of brachium. A 2nd intercostobrachial nerve often arises from the anterior part of third lateral cutaneous nerve distributing to axilla and medial aspect of brachium.⁹Variations in distribution of intercostobrachial nerves although common, their course and number are of significance to clinicians and oncologists

2. AIM AND OBJECTIVES

- 1) To present a cadaveric case report of multiple intercostobrachial nerves.
- 2) To look for the variations in their course and distributions.

3. MATERIALS AND METHOD

The adult embalmed female cadaver of unknown age, was dissected during routine dissection for the undergraduate course in Kasturba Medical College, Manipal.

The dissection procedure was followed as per Cunningham Manual of Practical Anatomy by G.J. Romanes (15th edition). The skin was reflected and superficial fascia was cleaned to trace for the cutaneous nerves. The course and presence of communicating branches (if any) was traced and documented.

4. RESULTS

In the present cadaver,

1. Intercostobrachial nerve from T1 with two unequal sized branches (32 and 29 cms) was supplying the medial aspect of skin of arm. The nerve was piercing the thoracic wall 1cm anterior to midaxillary line.
2. Intercostobrachial nerve from T2 with two unequal sized branches (26 and 17 cms) supplying the postero- medial aspect of skin of arm. The nerve was piercing the thoracic wall along the midaxillary line.
3. Intercostobrachial nerve from T3 was undivided (10 cms) and it supplied the proximal portion of medial aspect of arm. The nerve was piercing the thoracic wall along the midaxillary line.

NOTE: All the above nerves ended in arm before reaching medial epicondyle and had no communication with any of the branches of brachial plexus.

Medial cutaneous nerve of the forearm in the given case was present and was emerging from medial cord, having normal course and distribution.

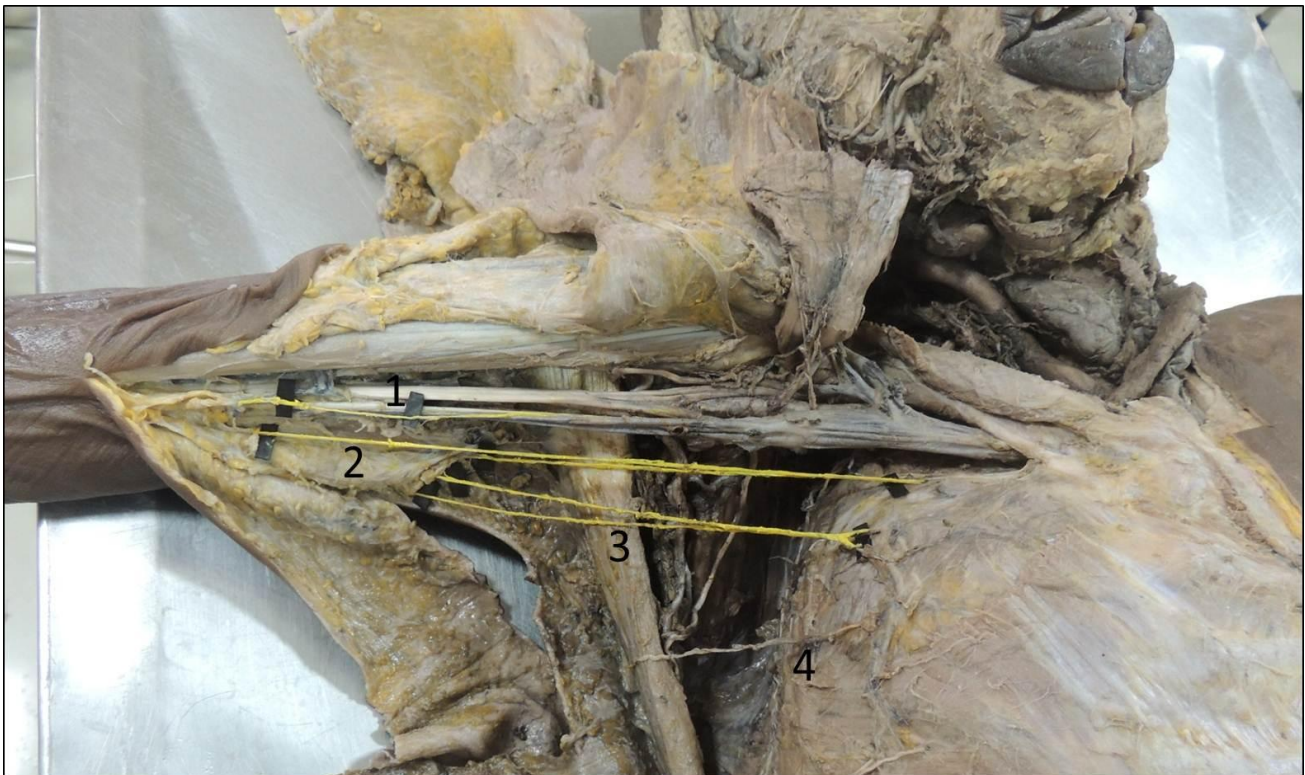


Fig:Dissected cadaver showing the course of multiple Intercostobrachial nerves in the right upper limb.

- 1 – Medial cutaneous nerve of forearm
 2 – Intercostobrachial nerve from 1st intercostal space
 3 - Intercostobrachial nerve from 2nd intercostal space
 4 – Intercostobrachial nerve from 3rd intercostal space

5. DISCUSSION

According to Henry Gray,⁹ the lateral cutaneous branch of 2nd intercostal nerve is called as the intercostobrachial nerve (ICBN). It runs across axilla and medial side of brachium (arm) and joins with medial brachial cutaneous nerve. It pierces the deep fascia and supplies the skin of upper half of the posterior and medial aspects of brachium. Its size is inversely proportional to the size of medial cutaneous nerve of brachium. An additional intercostobrachial nerve often arises off from the lateral cutaneous branch of 3rd intercostal nerve supplying skin of the axilla and medial side of brachium.

O'Rourke MG et al¹⁰ found that in all twenty-eight axillary dissections, the intercostobrachial nerves received contributions from 1st and 3rd intercostal nerves even though the main nerve was found emerging out from 2nd intercostal space (2ICS). The posterior branch to axilla was constant but may divide early, simulating a 2nd nerve. The ICBN had a different relationships to the lateral thoracic vein: front, back or winding around it. In 36%, there was a communication to the medial cord of the brachial plexus in the axilla. In the brachium, the nerve lies in the fat deep to skin; in the majority, it supplied at least the proximal half of the arm and in 1/3rd cases, it reached the level of the elbow joint. In 18% of cases, there was a communication to the medial brachial cutaneous nerve.

Loukas M et al¹¹ dissected bilateral axillae of about 100 adult human cadavers. In all the cadavers, the ICBN was present with variable contributions from the 1st, 2nd, 3rd and 4th intercostal nerves. They have classified communication of ICBN with other intercostal/cutaneous/other nearby nerves as Type I to Type VIII. In the Type I variety (45% of cases), ICBN gave a branch to the posterior antebrachial cutaneous nerve, a branch to the anterior and lateral parts of the axilla, a branch to the medial side of the brachium and also a branch to the medial antebrachial cutaneous nerve. In Type II variety (25% of cases), ICBN gave a branch to join the brachial plexus in axilla. In Type III variety (10% of cases), ICBN was formed by lateral cutaneous branches of 2nd and 3rd intercostal nerves. Branches fused to form a single trunk which had a short course and it immediately divided into many branches after emerging out from the intercostal space. In Type IV variety (5% of cases), ICBN was formed by lateral cutaneous branches of T2 and T3 nerves in lower part of axilla. Here it was an undivided nerve which had few terminal branches at the lower part of brachium. In Type V variety (5% of cases), ICBN was formed by T2 and T3 nerves in the upper part of axilla. In Type VI variety (3% of cases), ICBN had many sensory terminal branches at its proximal course in the brachium. In Type VII variety (5% of cases) ICBN had combination from T3 and it also gave a branch to brachial plexus with multiple terminal branches. In Type VIII variety (2% of cases) ICBN had contribution from T3 and T4 and it also gave a branch to the brachial plexus with multiple terminal branches.

As per the study conducted by Kumar et al,¹² variations of intercostobrachial nerves were more common. He observed the variations in the number and branching of intercostal nerves and their union with the branches of the brachial plexus on each side in 11 cases during routine dissection of 40 adults embalmed cadavers. His study, results are as follows:

- 8/40 cadavers revealed- divided Rami cutanei lateral (lateral cutaneous branch) of intercostal nerve piercing 2ICS at midaxillary plane. The upper branch left the axilla by passing through lower triangular space and finally joined with posterior cutaneous nerve of arm on each side whereas the lower branch passed along the base of axilla to reach the upper and medial part of arm where they join with medial brachial cutaneous nerve on each side. In same cadavers another undivided rami cutanei lateral was seen piercing 3rd intercostal space anterior to midaxillary plane, which had same course as the lower branch of nerve mentioned above.
- 2/40 cadavers revealed- divided lateral cutaneous branch of intercostal nerves piercing the 2nd and 3rd intercostal spaces anterior to midaxillary plane. The upper branch joined with posterior brachial cutaneous nerve whereas inferior branch joined medial brachial cutaneous nerve.
- 1/40 cadaver revealed undivided lateral cutaneous branch of intercostal nerve piercing the 3rd and 4th intercostal space at midaxillary plane, which later joined with the medial cutaneous nerve of arm separately.
- 29/40 cadavers showing undivided Rami cutanei lateral of intercostal nerve piercing 2nd ICS at midaxillary plane, which later joined with medial brachial cutaneous nerve.

As per case reported by Saran et al¹³ (2014) on the left side the medial cutaneous nerve of arm was absent and intercostobrachial nerve after emerging from 2nd intercostal space was found innervating the medial side of the arm.

Bratschi HU and Haller U (1990)¹⁴ found the importance of preserving the intercostobrachial nerve in excision of axillary lymph nodes. They followed up 101 modified radical mastectomy cases with axillary dissections, out the results revealed that among them of which 53 cases (52.5%) had no sensory loss and remaining 48 (47.5%) had sensory loss. The sensory loss occurs in majority of cases after going through surgeries for breast cancers along with lymph nodes excision in axilla. Many a times it could be compression by tourniquet, malignant growth or radiotherapy according to Joao E. Magalhaes et al (2009)¹⁵ and Wood KM (1978).¹⁶

Variations in number of intercostobrachial nerves are most common. Knowledge of the anatomical variations is essential for surgeons and radiologists to prevent complications during diagnostic and therapeutic procedures

6. CONCLUSION

Intercostobrachial nerves are most vulnerable during surgeries for breast cancer by axillary dissection. We know that anatomical course of these nerves are highly variable. About 20-65% of the patients experience post-mastectomy pain¹⁷ the etiology of which can be multi-factorial but could be mostly contributed by injured intercostobrachial nerves in axilla. Therefore a sound knowledge of number, course and distribution of these nerves will guide the surgeons and oncologists during the operative procedures and helps to minimize the risk of post-operative complications

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