



ANSA PECTORALIS – ANATOMY AND APPLIED ASPECTS

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ABSTRACT

Ansa pectoralis is the loop of communication between medial and lateral pectoral nerves, seen anterior to the second part of axillary artery. It carries C7 fibres from the lateral cord to the medial pectoral nerve and supplies sternocostal part of pectoralis major muscle. Its damage can cause weakness of the sternocostal part of pectoralis major muscle. Section of the ansa pectoralis is done as a treatment modality to reduce spasm of pectoralis major after strokes. It is also used as nerve graft. There are only few articles which describe the anatomy of Ansa pectoralis. We conducted a dissection study in 36 pectoral regions of embalmed human cadavers to find out the number, location, formation and branches of Ansa pectoralis. During dissection of the pectoral region, the formation of Ansa was seen to be of four different types. 72.2%(26 out of 36) was either between inferior or deep branch of lateral pectoral nerve and medial pectoral nerve or between the inferior lateral pectoral nerve and medial pectoral nerve (type A). In 6 cases (16.7%) it was between trunk of the lateral pectoral nerve and medial Pectoral nerve (type B). In 3 cases (8.3%), it was arising from lateral cord itself (Type C). In one case (2.7%) it was found to be arising from trunk and inferior branch of lateral pectoral nerve (Type D). The communicating loop was on the axillary artery in about 52.8% percentage of specimens, distal and plastered to the deep surface of pectoralis minor muscle in the 30.5% and multiple in 16.7%. The anatomy of Ansa pectoralis shows many variations. These are important while planning surgeries in pectoral region like breast augmentation, pectoral nerve blocks and harvesting pectoral nerve grafts.

KEYWORDS : Ansa pectoralis, lateral pectoral nerve, dissection, variation, brachial plexus.

INTRODUCTION

Ansa pectoralis is classically described as the loop of communication between lateral pectoral nerve and medial pectoral nerve¹. It is believed to carry C7 fibres from the brachial plexus for distribution to the pectoralis major and minor muscles through medial pectoral nerve which has only C8 And T1 fibres². Medial pectoral nerve supplies the lower sternocostal part of pectoralis major muscle along with the inferior branch of lateral pectoral nerve. Sternocostal part of the pectoralis major muscle is the strongest part of the muscle. The lateral pectoral nerve can be used for nerve transfers in case of injuries to spinal accessory nerve and supra scapular nerve. Thus, the fibers conveyed through the Ansa pectoralis becomes functionally very important in supplying the sternocostal part of the pectoralis major muscle. Hence, it becomes important that the Ansa is not injured when the lateral pectoral nerve is harvested for nerve transfers or graft surgeries. Ansa pectoralis is usually seen anterior to the second part of axillary artery connecting the trunk of the lateral pectoral nerve to medial pectoral nerve near their origins. Scarce literature is there describing variations in formation and position of Ansa pectoralis. The objective of this study is to describe the formation, location, course and variations of Ansa pectoralis.

MATERIALS AND METHODS

This study was conducted over a period of two years in the Department of anatomy, Government Medical College, Trivandrum,. It was designed as a descriptive cross-sectional study and started after obtaining institutional research committee and ethical committee clearances. All the cadavers dissected during the period of study were included. 36 pectoral regions were dissected from 20 embalmed cadavers. After removing skin, superficial fascia and deep fascia, the pectoralis major muscle was exposed. Clavicular and sternocostal heads of the pectoralis major muscle were detached from their origins and the muscle was reflected laterally to expose the clavipectoral fascia and pectoralis minor muscle. Then the pectoralis minor muscle was detached

from its costal origins and reflected towards its insertion. The clavipectoral fascia and the fascia beneath the pectoralis minor muscle was cleaned carefully to expose the neurovascular structures. Lateral cord and medial cord of brachial plexus were identified in relation to the axillary artery.

The lateral pectoral nerve and the medial pectoral nerve were cleaned with meticulous care and their communication looked for. Ansa pectoralis is identified as the nerve loop communicating lateral pectoral nerve or lateral cord to medial pectoral nerve. The number, position and course of the Ansa pectoralis were noted down. The data was entered in Excel sheet. Statistical analysis was conducted to calculate the differential proportion of the findings.

RESULTS

We identified Ansa pectoralis in all our specimens, but the number and location varied. The single lateral pectoral nerve as described in text books was identified only in six specimens which had two branches supplying clavicular and sternocostal heads of pectoralis major muscle. In majority of our specimens (77.8%) there were two lateral pectoral nerves arising separately from the lateral cord, the superior one supplying the clavicular part and inferior one supplying the sternocostal part of pectoralis major muscle.

In two specimens there were more than two lateral pectoral nerves. We could identify the communicating branches from the lateral pectoral nerve or the lateral cord to the medial pectoral nerve in all the specimens. In 30 out of 36 specimens there was only one connection between them. But in six specimens they were connected at more than one site.

The location of Ansa pectoralis was not constant. In 19 specimens it was seen over the second part of axillary artery. In 11 specimens it was seen more distally, plastered to the undersurface of the pectoralis minor muscle. In 6 specimens, there were proximal as well as distal connections (figure 1).

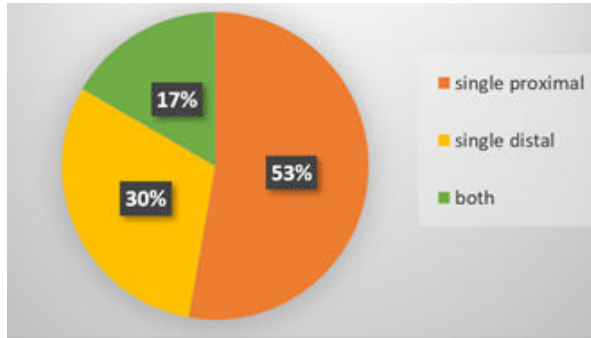


Figure 1: Pie Diagram Showing Number And Location Of Ansa Pectoralis

The point of origin from the lateral cord also varied. Usually, they were seen arising from the inferior lateral pectoral nerve or inferior branch of single lateral pectoral nerve. Sometimes it had its origin from the trunk of lateral pectoral nerve near its origin. It originated from the lateral cord itself in some cases as a separate branch. According to its origin and position we have subdivided the specimens into four groups - type A, where Ansa could be seen connecting the inferior lateral pectoral nerve or inferior branch of lateral pectoral nerve to medial pectoral nerve. This type was seen in 26 out of 36 specimens which forms 72.2 % (table 1). Those arising from the trunk of the lateral pectoral nerve were included under type B and those arising from the lateral cord were included under type C. In one specimen, we could identify two communications, each one arising from the trunk of lateral pectoral nerve and its inferior branch. It was classified as type D. there were six specimens under type B and three specimens under type C. The types of Ansa pectoralis are depicted by a simple diagram below (figure 2).

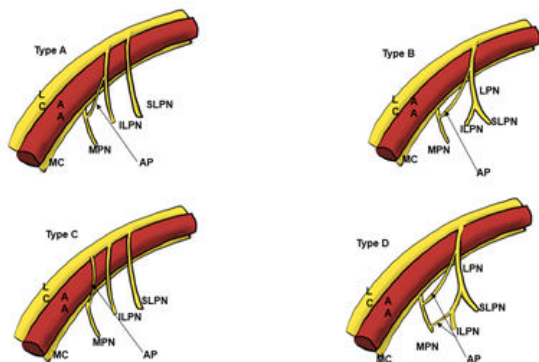


Figure 2: Subtypes Of Ansa Pectoralis. Lc-lateral Cord, Aa-Axillary Artery, Mc,- Medial Cord, Lpn- Lateral Pectoral Nerve, Slpn- Superior Lateral Pectoral Nerve, Iln- Inferior Lateral Pectoral Nerve, Mpn- Medial Pectoral Nerve, Ap- Ansa Pectoralis

Table 1: Differential Distribution Of Subtypes Of Ansa Pectoralis.

Type	Proximal Ansa	Distal Ansa	Both	Total
A	11 (42.3%)	11 (42.3%)	4 (15.4%)	26 (72.2%)
B	5 (42.3%)	0	1 (16.7%)	6 (16.7%)
C	3 (83.3%)	0	0	3 (8.3%)
D	0	0	1 (100%)	1 (2.7%)
Total	19 (52.8%)	11 (30.6%)	6 (16.7%)	36

Among the nerve loops included under type A, 11 showed proximal connection (42.3 %) 11 showed distal connection(42.3%) and 4 were having more than one connection (15.4%). In type B, 5 of them were connected proximally (83.3%) and one was connected distally (16,7%). Among type C all connections were proximal. Total number of specimens with a proximal connection (ansa formed over the

axillary artery) are 19 out of 36 (52.8%) (figure 3) and those showing distal connection (ansa is formed lower down on the deep surface of pectoralis minor muscle) are 11 out of 36 (30.5%) (figure 4). 6 specimens had more than one connection between the pectoral nerves (16.7%)



Figure 3: Ansa Pectoralis Seen Over The Second Part Of Axillary Artery. Lc- lateral Cord, Aa- Axillary Artery, Mpn- Medial Pectoral Nerve, Ap- Ansa Pectoralis

In one third of the specimens there were 2 to 3 branches arising from the Ansa pectoralis, piercing the pectoralis minor muscle to reach the Pectoralis major muscle thus supplying both (figure 4).

In all specimens Ansa pectoralis could be identified lateral to the mid clavicular line. But the distance from clavicle changed according to the position of formation. When the connection was proximal in type A or B the Ansa could be identified within 1.5 cm below the clavicle. But the distance from clavicle increased to 3 to 4 cm when the loop was formed on the deep surface of pectoralis minor muscle (figure 4). When the Ansa was forming beneath the pectoralis minor muscle, usually a Plexus was formed between inferior branch of the lateral pectoral nerve and medial pectoral nerve.



Figure 4: Ansa Pectoralis Seen Plastered To The Deep Surface Of Pectoralis Minor Muscle. Lc-lateral Cord, Aa-Axillary Artery, Mpn- Medial Pectoral Nerve, Ap- Ansa Pectoralis

DISCUSSION

Anatomy of pectoral nerves is recently brought to limelight due to their use as nerve grafts³. But the anatomy of Ansa pectoralis remains vague in most of the studies. There are only few studies concentrating on Ansa pectoralis. The surgical importance of Ansa pectoralis as nerve grafts and its surgical

division in treatment of spasticity is gaining importance⁴. We have studied 36 pectoral regions to describe the anatomy of Ansa pectoralis. Our findings are in variance with the classical teaching of Ansa as a small loop of nerve connecting the medial and lateral pectoral nerves anterior to the second part of axillary artery. We could see that, often the loop is substantial with three or 4 branches arising from it supplying the main muscle mass. The connection between the nerves is also more distal than we assume from the classical books. This is important because during pectoral nerve grafts, if the Ansa should be preserved to maintain the supply to sternocostal part of pectoralis major muscle, the effective length of the graft becomes less, since it can be harvested only from the point of communication of Ansa to the point of entry to the muscles.

In a recent study done by Loukas et al⁵, they have identified only single Ansa pectoralis in all the specimens. But in our study, we have seen two connections forming two different Ansa pectoralis in six specimens (16.7%). Multiple connections between lateral pectoral nerve and medial pectoral nerve were also described by Boers et al⁶, and Gupta et al⁷. The type A Ansa that connects the inferior branch of lateral pectoral nerve to medial pectoral nerve was seen in 72 % of our subjects whereas this was 42% in the study by Loukas et al⁵. In addition to the communication between the two pectoral nerves, we have seen Ansa arising from the lateral cord itself as a separate branch to medial Pectoral nerve. This is also not described by them. But Padur et al⁸, in their study about variations in the lateral cord of brachial plexus has mentioned one specimen with Ansa pectoralis arising from the lateral cord itself in addition to the usual formation from the lower branch of lateral pectoral nerve.

Loukas et al⁵ have seen that 90% of Ansa pectoralis is over the second part of axillary artery. But in our study, only 52.8% of Ansa was seen over the artery whereas 30.5% was seen more distally on the deep surface of pectoralis minor. In 16.7% of cases, both were present. Maud Creze et al.⁴ gave landmarks for identification of the position of Ansa as below the middle third of clavicle which is conforming to our study. But they have given the lower point of identification of Ansa as 2 cm below the inferior border of clavicle but we have seen formation of Ansa at 3 to 4cms below the inferior border of clavicle.

Our unusual finding of muscular branches arising from Ansa pectoralis is also described by Chernet Bahri Tessema in a case study⁹. He also describes four branches arising from the Ansa which get distributed to the pectoral muscles. However Tigga et al.¹⁰ describes an abnormal Ansa pectoralis which becomes the sole supplier of both Pectoralis major and minor muscles. But in our study, lateral and medial pectoral nerves always had other branches which supplied the pectoral muscles in addition to that forming Ansa Pectoralis. The plexus of nerves formed deep to the pectoralis minor along with the formation of Ansa, which we have noted, is also described by Aszmann et al¹¹.

CONCLUSION

The anatomy of Ansa pectoralis is not fully predictable. It differs from the classical description in many aspects. According to its origin it can be classified into four types. The most common type connects the inferior or deep branch of lateral pectoral nerve to medial pectoral nerve. The formation may be lower than expected - up to 3 to 4 cms below the clavicle over the deep surface of pectoralis minor. Surgeons should be aware of these facts to avoid damage which can result in loss of pectoral muscle power and other complications like fibrosis. Another thing to be kept in mind while planning lateral pectoral nerve graft is that there is a possibility of Ansa arising from the distal part of the nerve which can reduce the effective length of the graft.

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