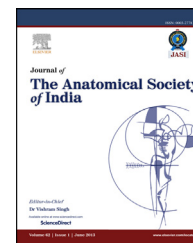


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Original Article

Surface marking of axillary vein



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ABSTRACT

Introduction: Precise identification of axillary vein during axillary lymph node dissection is an important step. Trainees in surgery often find it difficult to identify the exact level of axillary vein because surface marking of axillary vein is not described in most standard textbooks of anatomy and operative surgery.

Methods: We have identified the surface markings for axillary vein on 150 patients undergoing axillary lymph node dissection. We mark the axillary crease of skin between upper arm and axilla and identify two distinct dimples at the anterior and posterior ends of this skin crease. We then place a finger horizontally at the midpoint between the two dimples directed towards lateral edge of pectoralis major muscle. This position of finger marks the surface anatomy of underlying axillary vein.

Results: The axillary vein was found to be located deep to this surface marking. In some patients, the marking was found to overlap the width of axillary vein partially. However, in all cases at least some part of vein lies deep to the midpoint of two axillary crease dimples.

Discussion: A simple and a reliable technique of locating the axillary vein using surface landmarks is described.

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1. Introduction

The axillary lymph node dissection for breast cancer and skin cancers of upper trunk and upper limb entails removal of all the lymph nodes and lymphatics located within axilla. The clearance of nodes is carried out within the following boundaries – Superiorly: lower border of axillary vein, inferiorly: a point just below angular vein joining the thoracodorsal vein, medially: the chest wall formed by first six ribs with intercostal muscles and Serratus anterior muscle and laterally: the anterior border of tendon of Latissimus dorsi muscle. Trainees in surgery often find it difficult to identify the exact level of axillary vein especially in obese patients. Hence, they

sometimes start dissecting quite high in axilla, well above the level of axillary vein. The dissection above the level of axillary vein may be undesirable, as it may sever the lymphatics draining upper limb increasing the risk of lymphoedema. Surface marking of axillary vein is not described in most standard textbooks of anatomy and operative surgery. We describe a simple method of locating the axillary vein using surface landmarks.

2. Material and methods

We have developed a simple method to easily locate the position of axillary vein using surface landmarks. We have

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applied that method on 150 female patients undergoing axillary lymph node dissection for breast cancer.

2.1. Surface marking of axillary vein

Place the patient's arm at right angle to the trunk in supine position on operation table. Mark the axillary skin crease as a crease or fold of skin between the upper arm and the axilla. Identify a distinct dimple at the anterior end of axillary crease (Fig. 1). Locate another dimple at its posterior end. The posterior dimple in some women may not be well marked, in which case take a point at posterior most end of this axillary crease. Select the midpoint between the two dimples. Palpate and mark the lateral edge of Pectoralis Major muscle. Place a finger horizontally at the midpoint between the two dimples, directed towards the lateral edge of pectoralis major muscle. Mark the position of finger with a skin marker. This is the surface marking for axillary vein (Fig. 1). During axillary lymph node dissection, the axillary vein is found just deep to this surface marking (Fig. 2).

3. Results

We have marked the axillary vein on skin in 150 women undergoing axillary lymph node dissection by the above method. The axillary vein was found to be located deep to this surface marking. In some patients, the marking was found to overlap the width of axillary vein partially. However, in all cases at least some part of vein lies deep to the midpoint of two axillary crease dimples.

4. Discussion

The axillary vein is formed by Basilic vein joining the vena comitantes of brachial artery at lower border of Teres Major muscle. It is joined by the Cephalic vein in upper part of axilla



Fig. 1 – Demonstrating two dimples at its anterior and posterior ends of axillary crease and surface marking of axillary vein as a horizontal line one finger in breadth passing midway between anterior and posterior skin dimples.



Fig. 2 – Demonstrating that the axillary vein is located just deep to the skin surface marking—midway between the two axillary crease dimples.

after cephalic vein passes along the deltopectoral groove and pierces the clavipectoral fascia. The axillary vein runs parallel to and antero-medial to axillary artery. During the dissection of axilla from in front, the artery is overlapped by the vein, hence, is not commonly seen in the operative field. The lymph nodes draining the mammary gland are situated below the level of axillary vein. Hence, axillary lymph node dissection for breast cancer is carried out in a pyridimal region starting below the lower border of axillary vein.

The surgical treatment for breast cancer has evolved from radical mastectomy to breast conserving surgery. Axillary lymph node dissection has been considered an important part of breast cancer surgery. With the advancements, incision for axillary lymph node dissections has become progressively smaller leading to limited exposure. This limited exposure might be responsible for axillary vein injury and dissection at inappropriate places like above the axillary vein. If, the surgeon tries to dissect the tissue above the level of vein, there is a risk of damage to branches of brachial plexus and axillary artery. Moreover, some lymphatics draining the upper limb are likely to be severed increasing the risk of lymphoedema of upper limb. These complications during axillary lymph node dissection can be avoided by identifying the surface markings of axillary vein and limiting dissection to only below the level of lower border of axillary vein.

Richard et al have described a method to locate axillary vein by following a small vein along with medial pectoral nerve at lateral edge of pectoralis major muscle.¹ Other authors have tried to locate axillary vein either by ultrasonography or by using X-rays with a contrast. These authors have imaged the axillary vein with an objective of cannulation of central vein for measuring central venous pressure, taking blood samples or providing a route for intravenous alimentation and administration of drugs.^{2,3} Yeow et al described the radiological imaging of axillary vein in 31 patients with fluoroscopic guidance using anterior end of second rib as a venographic landmark.⁴ Sharma and colleagues performed 200 cannulations of axillary vein with the help of sonographic imaging. They successfully cannulated 96% of veins. They

emphasized the fact that anatomical landmark based cannulation is difficult because the landmarks are not easy to feel.⁵ Nickalls⁶ has described landmarks for axillary vein from a single cadaver dissection, as follows: tip of coracoid process, clavicle and pectoralis minor. However, pectoralis minor cannot be felt in life through the intact skin and coracoid process is difficult to feel especially in obese persons. His technique was modified by Taylor and Yellowlees who were successful in cannulating 98 of 102 patients, with 3.9% failure, 5.9% catheter malposition and 4.9% arterial puncture.⁷

The surface anatomy of axillary vein has not been mentioned in any textbook of anatomy.

Most investigators^{8–10} currently recommend ultrasound guidance for identifying and cannulating the axillary vein. However, ultrasound facilities are not readily available at all centers.

The present technique is a simple and reliable method of locating axillary vein, beneficial not only for surgeons but also for anesthetists, cardiologists, interventional radiologists who frequently use axillary vein for implantation of defibrillator and pacemaker leads as well as placement of central venous lines.^{11–13}

5. Conclusion

We describe a simple technique for surface marking of axillary vein. This technique should be beneficial not only for surgeons but also for anesthetists, cardiologists, interventional radiologists during blind puncture of axillary vein.

Conflicts of interest

All authors have none to declare.

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