

# Axillary Dissection

Peter Bird

## Introduction:

Lymph node status in breast cancer is one of the most important prognostic factors. Axillary dissection – not to be called an axillary clearance – is an operation used primarily to assist in staging a patient, and secondarily in controlling the axilla and avoiding local recurrence. It has not been proven to improve survival in itself, although if not done - or not done correctly - it could under-call axillary involvement and thus result in a patient receiving inadequate adjuvant therapy. Patients with early breast cancer – Stage 1 or 2 disease – can often avoid an AD as staging can be done by sentinel lymph node biopsy.

Informed consent must be obtained, including a discussion of potential complications, such as bleeding, infection, seroma, lymphedema, neuralgia, sensory loss in the upper medial arm and shoulder dysfunction.

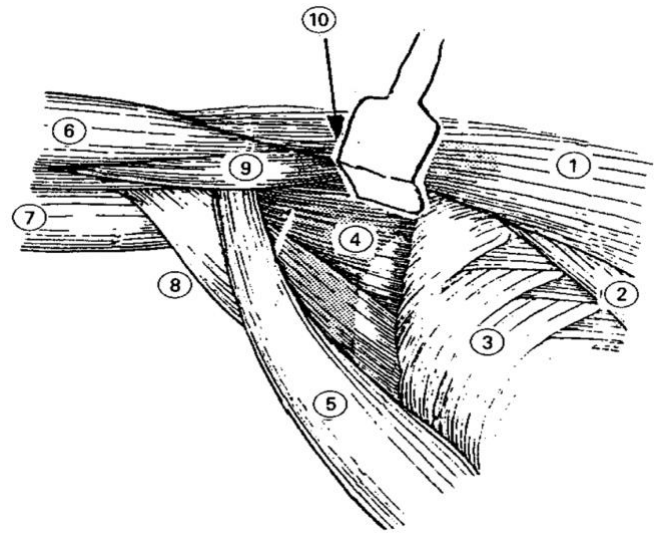
The incision for a stand-alone axillary dissection will lie horizontally across the lower axilla but not coming medial up over the anterior axillary fold. The incision can curve in a vertical direction just behind the anterior axillary fold. Make it large enough to do the operation safely, usually about 8 to 10cm in length. An axillary dissection done in conjunction with a mastectomy will be done after the breast is fully mobilized off the chest wall and usually taken en bloc with the breast. You will need a variety of retractors, some wide and deep.

DO NOT allow the anesthetist to paralyze the patient as you'll want to know when you are dissecting close to important motor nerves. Dissect with diathermy on a low setting. Cauterize even medium sized vessels. Don't waste time tying off vessels, unless large, or big tributaries close to the axillary vein. Use scissors and blunt dissection and tie off all vessels if diathermy is unavailable or you are unfamiliar with its use.

In general, the steps of axillary dissection are:

- Medial dissection: Incision of the clavipectoral fascia, exposure of the pectoralis minor and median pectoral neurovascular bundle, and dissection of the serratus anterior muscle
- Lateral dissection: Elevation of a skin flap down to the lateral edge of the latissimus dorsi

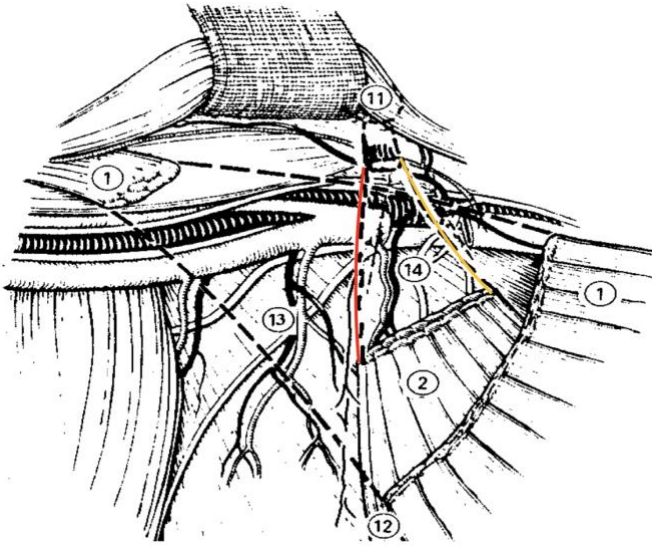
- Superior dissection along the inferior edge of the axillary vein.
- Mobilizing tissue from Level II or occasionally Level III.
- Identification of the long thoracic nerve and further medial dissection
- Further mobilization of axillary tissue downwards with identification of the thoracodorsal nerve
- Completion of the dissection laterally and inferiorly, and removal of the specimen
- Drain placement and closure



*Schematic of the right axilla. Labeled structures are: 1. Pectoralis major, the anterior border of the axillary space. 2. Pectoralis minor. 3. Serratus anterior, the medial border. 4. Subscapularis, the posterior border (with 8.) 5. Latissimus Dorsi. 6. Biceps brachii. 7. Triceps brachii. 8. Teres major, the posterior border (with 4.) 9. Coracobrachialis. 10. Retractor in the apex of the axillary space. Source: Primary Surgery Vol. 1 : Non Trauma <https://global-help.org/products/primary-surgery/>*

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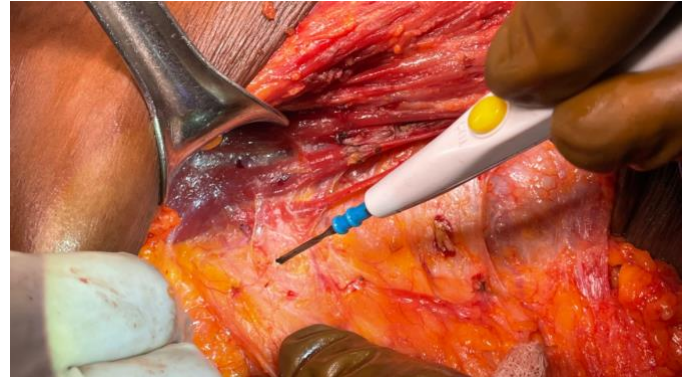
The right axilla. Pectoralis major (1) has been partly removed to expose the axillary contents. 11. Coracoid process, origin of the Pectoralis minor (2.) 12. Long thoracic nerve. 13. Thoracodorsal nerve. 14. Lateral Pectoral nerve.

Lymph node locations are according to their relation to the Pectoralis minor (2.) Nodes lateral to its lateral border (Red line) are in Level I. Nodes directly underneath it (between the Red and Orange lines) are in Level II. Nodes medial to its medial border (Orange line) are in Level III. Source: Primary Surgery Vol. 1 : Non Trauma

<https://global-help.org/products/primary-surgery/>

## Steps:

1. Position the patient supine with the arm abducted to 90 degrees. Prepare and drape the shoulder and axilla, going posteriorly to below the level of the latissimus dorsi fold. It is not necessary to drape the arm in a way that allows it to be mobilized during surgery, but some surgeons prefer this method of draping.
2. Make a horizontal incision across the lower axilla but not coming medial up over the anterior axillary fold. This incision should be about 8-10cm in length, immediately below the axillary hair if this is visible.
3. Start by finding the lateral border of pectoralis major inferiorly and dissect towards axilla, identifying pectoralis minor. It runs deep to and more vertically than pectoralis major (by about 30°).



Right axillary dissection, head is to the left in this picture. Retracting the pectoralis major, divide the fascial attachments to its lateral surface until you see the pectoralis minor muscle (not yet visible in this photo.)

4. Divide the clavipectoral fascia just lateral to pectoralis minor. Note the difference in fat (bigger globules under this fascia).



As you divide the clavipectoral fascia, the pectoralis minor (Black arrow) becomes visible.

5. Dissect superiorly along pectoralis minor and find the medial pectoral nerve neurovascular bundle wrapping around its lateral margin. In 10% of cases, it will perforate directly through pectoralis minor. Follow the medial pectoral nerve neurovascular bundle directly down to the axillary vein taking care not to damage either structure.

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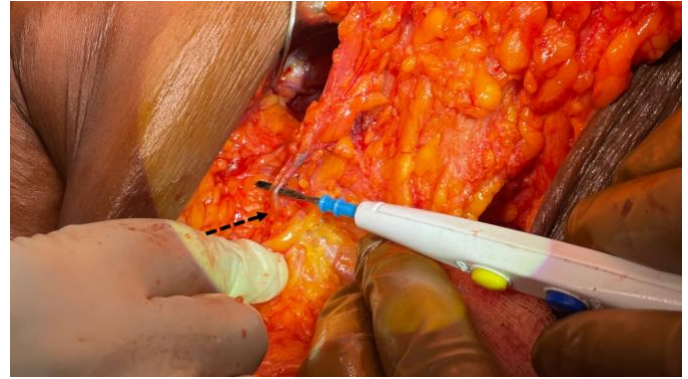
The medial pectoral nerve neurovascular bundle (Black arrow) wraps around the lateral border of the pectoralis minor muscle. The serratus anterior muscle is becoming visible (under the tip of the diathermy pencil) as dissection proceeds posteriorly.

6. Start dissecting down the medial wall of the axilla on the serratus anterior, dividing cutaneous nerves and vessels. Don't go past the mid-axillary line at this time.



Below the pectoralis minor (Black arrow) you'll encounter the medial border of the axilla, the serratus anterior muscle (Purple arrow.) Do not dissect deeper than the point shown in this picture at this time. Note that the diathermy tip is touching the white fascial band of the serratus anterior, the "false nerve" described below in Step #13. The true long thoracic nerve will be much deeper.

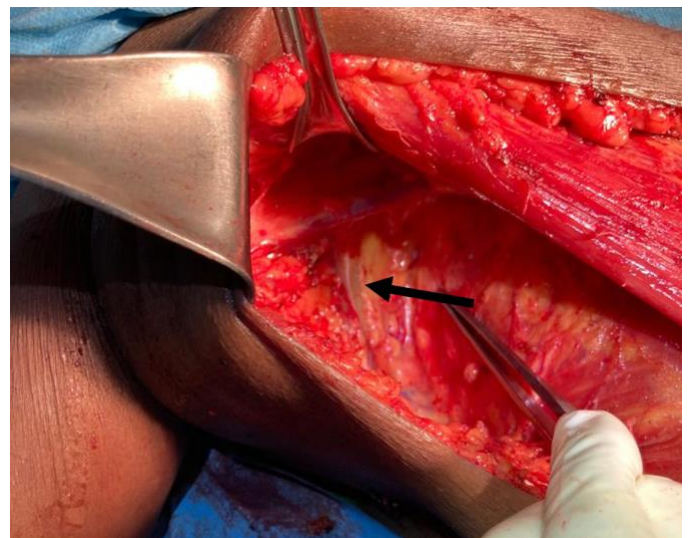
7. Go laterally now and dissect down the skin flap (make it quite thick) and find the lateral edge of latissimus dorsi, dissecting along it towards the axilla



Create the lateral border of your axillary dissection by dissecting a plane deep to the skin, lateral to your incision, preserving fat on the skin, until you reach the lateral border of the latissimus dorsi muscle. As you follow the plane (shown by the Dashed Black arrow) you will encounter perforating vessels and nerves, which can be safely treated with diathermy.



Completed dissection of the lateral axilla. The lateral border of the latissimus dorsi is not visible in this photo but is just beneath the Dashed Black arrow. Do not dissect further on the surface of the latissimus dorsi muscle at this time.



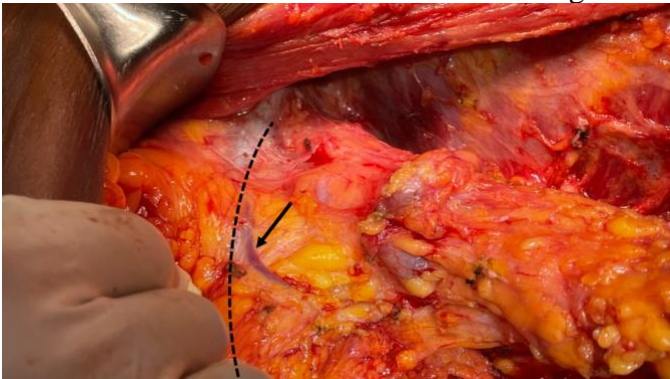
Photograph from a completed axillary dissection on a different patient, showing the position of the thoracodorsal nerve and

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vessels (Black arrow,) medial to the lateral edge of the latissimus dorsi.

8. Go superiorly across the top of the dissection and incise across the tissue, lateral to medial, parallel with the arm, extending deeply down to the axillary vein. You'll encounter at least one significant vessel here. Expose the axillary vein along its inferior border, noting any vein tributaries entering at right angles from below, looking for the thoracodorsal vein lying deeply. Usually there is a tributary directly superficial to the thoracodorsal vein that needs dividing first.



Dissect from medial to lateral along the inferior border of the axillary vein. Usually you can see the axillary vein by pulling gently down on the axillary fat. If you can not, dissect carefully in this area until the vein is seen. A large vein in the superficial lateral axillary fat is usually seen (Black arrow) roughly indicating the location of the thoracodorsal vein beneath it.

9. Dissect medially up to the junction between the medial pectoral nerve neurovascular bundle and the axillary vein. There is a fat pad on top of the axillary vein just distal to this junction which often harbors a node or two. Bluntly take it in continuity with the specimen.



The medial pectoral nerve neurovascular bundle is seen under the Black arrow. The forceps grasp the fat pad, which can now be bluntly dissected downwards and included in the specimen.

10. Dissect up along the lower edge of the axillary vein towards the Level II/III junction. Be careful to preserve the medial pectoral nerve neurovascular bundle. Various small & medium veins will need to be divided so as to take the fat/nodes en bloc.
11. Go back to the medial wall and dissect medially up towards the apex of the axilla.
12. Choose where to stop dissecting superiorly – usually at the medial border of pectoralis minor for a Level II axillary dissection - and divide the axillary fat here, sweeping the tissue down. If nodes are involved in Level III, take these en bloc, using a wide retractor and a strong assistant to pull the pectoral muscles medially and give access (If these nodes are involved it would be wise to feel for and remove any enlarged interpectoral nodes - Rotter's nodes - between pectoralis major and minor.) The goal at Level III is to remove palpable disease, not to “clear” the level.



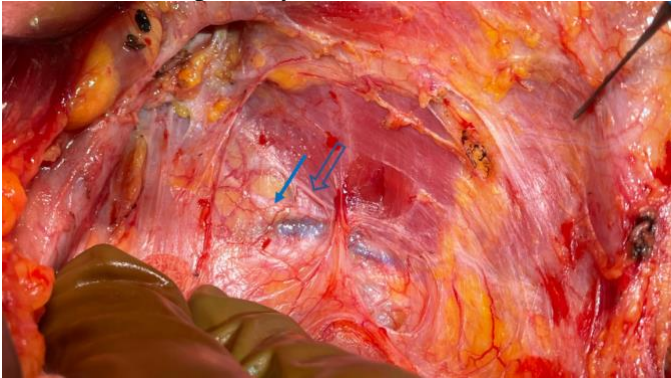
Dissection of the superior medial aspect of the axillary fat, at the level II/III junction. allows downward mobilization of the axillary contents from the area you have stopped dissecting superiorly.

13. Dissect down serratus anterior carefully, looking for the long thoracic nerve innervating it. You will come across the intercostobrachial nerve first – divide it, having already explained to the patient about the resultant upper medial arm numbness which will eventually be insignificant. The long thoracic nerve will be very deep down on the medial wall of the axilla, NOT running directly on serratus anterior, but a few millimeters away from it. Find it by looking for the vasonervorum. Don't be fooled by the white fascial band of serratus anterior, the “false

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nerve.” The long thoracic nerve lies close to the floor of the dissection, the subscapularis muscle. Sweep it bluntly back to the medial wall and follow it superiorly.



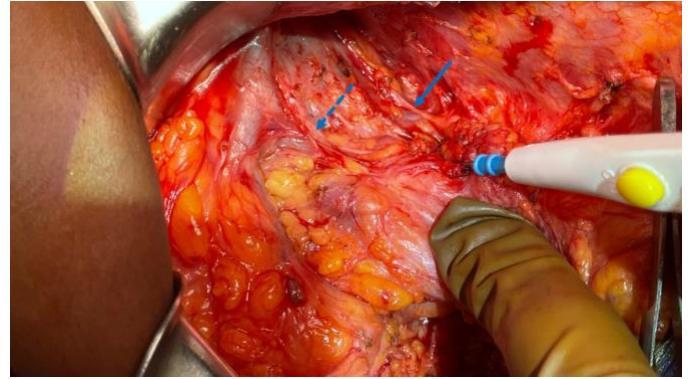
*Dissecting carefully along the serratus anterior, find the long thoracic nerve adjacent to its vessels (Solid Blue arrow.) This can be distinguished from the “false nerve” (Open Blue arrow) by the fact that it usually runs with a vessel, as seen here. As with all nerves, there will be a vasa nervorum, a tiny blood vessel, running on its surface.*

14. As you sweep down, find the thoracodorsal nerve, coming out from under the axillary vein at about the same depth as the long thoracic nerve, joining the thoracodorsal vein and artery, usually medially.



*The depth of the long thoracic nerve (Solid Blue arrow) helps you to identify the thoracodorsal nerve and vessels (Dashed Blue arrow) as you mobilize the tissue downwards. Here, the thoracodorsal nerve has not been definitely identified yet but its large accompanying vein allows the surgeon to mobilize the tissues downwards and locate it.*

15. Sweep down all the fat/nodes lying on subscapularis (floor of the axilla) taking care to see the thoracodorsal nerve and long thoracic nerve at all times! The long thoracic nerve gets pulled into the specimen easily.

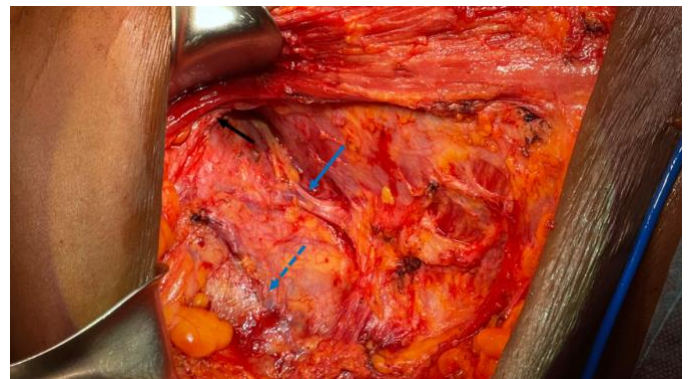


*Continue downward mobilization of the specimen between the long thoracic nerve (Solid blue arrow) and the thoracodorsal nerve (Dashed Blue arrow.)*

16. You will now come across the serratus anterior vascular branches coming off the thoracodorsal vessels. These go across the subscapularis and join with the long thoracic nerve to enter serratus anterior. This marks the inferior extent of the axillary dissection.

17. Now dissect lateral to the thoracodorsal neurovascular bundle from the axillary vein down to the serratus anterior vascular branches. There is often an involved node(s) lateral to the axillary vein – thoracodorsal vein junction.

18. Continue dissecting the fat/nodes en bloc until reaching the lateral border of latissimus dorsi where the dissection ends.



*Completed dissection shows the clear apex of the axilla underneath the pectoralis major and minor (Black arrow) and the preserved long thoracic (Solid Blue arrow) and thoracodorsal (Dotted Blue arrow)*

19. Stop all bleeding, place an 16-18F closed suction drain into the space and close with 2/0 subcutaneous interrupted absorbable suture, and 3/0 absorbable subcuticular continuous suture. Place the dressing and then prime the suction,

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release it and make sure the axilla concavity sucks in.

20. Ensure the nursing staff keep the drain's suction primed and sucking at all times. Leave it in until it produces 30-50cc or less in 24 hours. This may take 7-10 days.
21. Have the patient move the shoulder immediately and give adequate analgesia to allow this. Have physiotherapy help with this and be sure exercises are given on discharge. Frozen shoulder must be avoided!
22. If a seroma develops days after the drain tube is removed, it can be easily aspirated in the clinic, using meticulous sterile technique to prevent infection of the seroma.

### Pitfalls

- A postoperative hematoma can result if a tie slips off a large branch of the axillary vein. If this is large enough to limit mobility it will need to be re-explored and evacuated. Briefly re-inspect all ties that have been placed on large veins prior to closing.
- A postoperative seroma is a very common complication. Our practice is to use a closed-suction drain in the axillary space and remove it after the drainage is consistently less than 30-50cc in 24 hours. Sometimes the patient will need to go home with this drain and instructions on how to care for it and measure its output. If a seroma occurs after drain removal, aspirate in a strict sterile manner and repeat until the seroma does not reaccumulate.
- Numbness of the axilla and sometimes the proximal medial arm is an expected outcome of this surgery, as the intercostobrachial cutaneous nerves run through the specimen. The discomfort associated with this numbness will decrease over time.
- Frozen shoulder is much more difficult to treat than to prevent. Physiotherapy should see the patient as early as postoperative day 1 and instruct shoulder range of motion exercises. Reinforce these instructions by telling and demonstrating exercises to increase shoulder abduction, such as grabbing on to a high object (a doorframe or laundry frame) and passively

stretching the arm over the head as much as possible. Verify the patient's shoulder range of motion on every postoperative visit to reinforce this important concept.

- Lymphedema of the arm occurs after up to 10% of axillary dissections. Preoperative counseling about this complication is important. Its incidence can likely be decreased by avoiding dissection into Level III. If there is no grossly palpable disease in Level III, an axillary dissection should only include Levels I and II. If there is palpable disease in Level III, try to remove only this, rather than attempting to "clear" all lymphatic tissue at this level. Once this complication has occurred, the only real treatment is a compression stocking on the affected arm to decrease swelling and attendant wound healing problems.



*Lymphedema of the right arm years after right Modified Radical mastectomy.*

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