

# SUPRACLAVICULAR REGIONAL ANAESTHESIA REANALYSED: THE CORNISH TECHNIQUE

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This essay is based on a project which has been in progress for about a decade. For those of you tired of reading about yet another technique in an area already overloaded with them, the paradigm upon which this is based is very different to the standard, textbook version. So it might be interesting. Can anything really be new or different? You can judge that for yourself, and for that you will have to read on.

I will try to limit myself to accepted definitions, peer-reviewed publications, and textbook references. A bibliography can be found at the end. It would obviously be more fun to fill this with my opinion, but if you are like me, that will irritate very quickly.

The technique itself is an exercise in applied anatomy, and applying anatomy. So isn't every technique? Maybe - but I am not convinced that our grasp of anatomy is as sound as it could be, and I believe that this leads to errors in the way we approach our task. I hope to prove this in the following paragraphs. Does it matter? – I mean, if the block works, who cares? That is the point – there will be some success irrespective of anatomic knowledge/approach/technique, but to achieve reliability requires a different level of precision. Furthermore, if it is not 100% reliable, then we need to be able to troubleshoot, and if our model is faulty then at this stage the wheels start to fall off. Am I conceding some degree of failure? Yes, everybody fails occasionally – for a whole variety of reasons. I think it is more important to learn to manage the occasional failure on the basis of a high degree of initial success.

## WHY THIS TECHNIQUE?

The 'supraclavicular' approach to the brachial plexus is the most effective technique BUT ... it has a problematic complication profile: *pneumothorax, block of phrenic nerve, sympathetic chain, and recurrent laryngeal nerve.*

***Question: Is it possible to create a 'supraclavicular' technique WITHOUT that complication profile?***

A lot of literature will tell you NO, and obviously I am going to say YES. But if I now give you a set of 'how to do' instructions, you are none the wiser. You won't under-

stand, and hence you can't become reliable. Understanding this technique requires revisiting the basic foundations of regional anaesthesia in the area, and changing the paradigm. Then you will hardly need the instructions.

***Why is a 'supraclavicular' technique so effective?***

1. Brachial plexus' - an 'interlacing network of nerves' FORMED BY the nerve roots C5–T1, GIVING RISE TO the terminal nerves of the upper extremity. The terms 'formed by' and 'giving rise to' are exclusory, so what lies between them is the brachial plexus. The

- interlacing and interconnecting relationships of the plexus give us the trunks, divisions and cords.
- The trunks, divisions and cords (= brachial plexus) are located behind the middle third of the clavicle, where 'supraclavicular' techniques are based.
  - So the reason for efficacy of 'supraclavicular' techniques is simply that they anaesthetise the brachial plexus.

*But doesn't the 'axillary sheath' connect all the nerve elements into a continuum from neck to arm, permitting access to the plexus at multiple levels, & therefore we can modify complication profile simply by putting our needle at a different place ?*

To answer this, let's examine some of these terms:

#### 1. 'Axillary':

- The 'axilla' is an anatomic compartment with 4 sides, an apex and a base.
- The armpit is not the axilla - it is the base of the axilla.
- The neck is not part of the axilla.
- The apex of the axilla, formed by the intersection of first rib, clavicle and scapula, is represented on the skin surface by the supraclavicular fossa. This is where we put 'supraclavicular' blocks. We could equally call them 'apical axillary' blocks.
- As stated above, the base of the axilla is what we often refer to as the armpit, and this is where we put 'axillary' blocks. We could call them 'basal axillary' blocks.
- The anterior wall of the axilla, formed by the pectoral muscles and the clavicle, is where we put 'infraclavicular blocks', or alternatively 'anterior axillary' blocks.
- The difference between a 'basal axillary' block and an 'apical axillary' block is in the nerves which we find at each site - the brachial plexus at the apex and terminal nerves (radial, median, ulnar) at the base.
- The interscalene block aims at nerve roots C5-6. By definition then it is not a brachial plexus block. Because it pierces the prevertebral fascia and puts local anaesthetic between the anterior and middle scalene muscles (lateral vertebral muscles), it is a paravertebral technique.
- You will immediately appreciate a problem with our standard nomenclature.

#### 2. 'Sheath':

- The 'sheath' is a fictional notion. Big statement - read on.
- In the neck, the prevertebral lamina of the cervical fascia covers the scalene muscles, forming the floor of the posterior triangle.
- The scalene muscles are classified as lateral vertebral muscles.

- All the regional techniques in the neck area (interscalene & modifications, deep cervical plexus, subclavian perivascular, intersternocleidomastoid) pierce the prevertebral fascia, are largely contained by it, & hence are paravertebral techniques.
- In the axilla, the neurovascular bundle is enclosed in a series of relatively fragile tissue planes, closely surrounded by rigid/semirigid anatomy which creates the 'axillary tunnel'. The axillary tunnel is largely responsible for containing/directing the injected solution.
- There is connection & continuity between the tissue planes of the axillary tunnel & the prevertebral fascia, but spread between areas depends upon variable interconnections between these soft tissues, & the variable dimensions of the axillary tunnel.
- So far better to deliver the local anaesthetic to exactly where you want it, than to rely upon spread along an unpredictable pathway.

#### 3. 'Permitting access to the plexus at multiple levels':

- In fact, the clinical profiles at different sites (interscalene, supraclavicular/ infraclavicular, axillary - to use familiar terms) are widely accepted as being different.
- This is because these different sites are anatomically different.
- The plexus can be accessed readily at one of these levels.

### A LITTLE MORE ON THE 'AXILLARY TUNNEL'

This was mentioned earlier, and the scientific work related to it was presented at XXIII Annual ESRA Congress Greece 2004. Publication is in progress but in the meantime, a little more information might be of interest:

#### A. The 'Outside Properties' of the Axillary Tunnel:

- The rigid walls of the axillary tunnel are not straight and even throughout - there are 2 points where the dimensions narrow, forming points of resistance. These occur at the apex of the axilla and just lateral to the coracoid process. The spread of an injection will be affected by where the injection occurs relative to these points - injecting on either side tends to restrict flow to the side of injection, whereas within the point of resistance sees even spread either side.

**B. The 'Inside Properties' of the Axillary Tunnel:**

1. The tissue planes within which the neurovascular bundle runs also determine spread of local anaesthetic. Injecting on the outside of the bundle does not guarantee spread across the bundle, whereas injecting in the centre of the bundle provides more certainty of even spread.
2. In some patients, the tissue planes restrict flow and give rise to patchy blocks. This is compartmentalization. Aiming for the nerve you want seems the best way to control for this phenomenon.

If this has been of interest it will be worthwhile chasing up the references at the end. The following pictures will provide some more clues as to how this technique works.

I use it for all upper extremity work. Separate skin cover is required for shoulders with subcutaneous local anaesthetic in the supraclavicular fossa. You do need to get the right twitch for the different territories – superior trunk/posterior cord for shoulders, finger twitches for everything else.

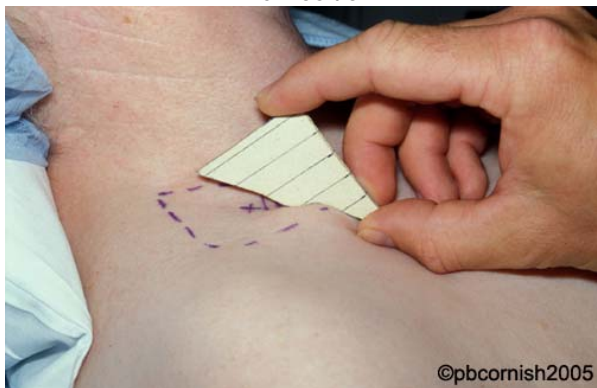
Surgery on bones usually buys a catheter – if you don't these procedures are painful, wait until its your turn. It is worth persevering through the learning curve – remember, fundamentally one technique to get you everything. Good luck, my e-mail is philip.cornish@nmhs.govt.nz if you have any queries.



The Position



Marking the artery



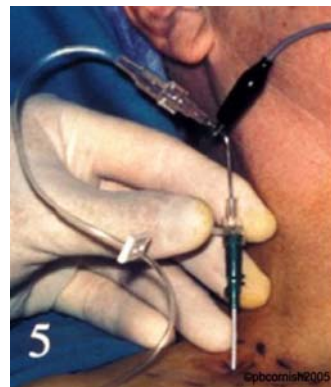
Depth Gauging. 'X' marks Point of Insertion. Plexus 1 cm deep, bend needle at 1 cm from needle tip



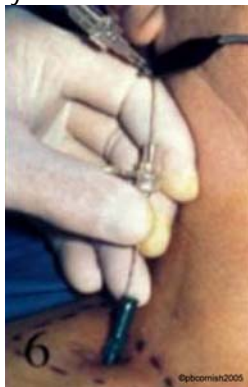
Ready to Insert – from the front



Ready to Insert - from the side



Inserting beyond the bend - needle parallel to neck



Inserting the needle - needle hub has been brought in next to neck, needle being withdrawn



Cannula in situ



Catheter thro' cannula



Withdrawing cannula over catheter



Withdrawing cannula over catheter



Brachial Catheter secured in place

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