Supraclavicular block

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Anatomy

The superior, middle and inferior trunks of the brachial plexus form their anterior and posterior divisions between the clavicle and first rib. Here the brachial plexus is found lateral and posterior to the subclavian artery in a tightly packed bundle of between 2 and 10 nerves. This compact arrangement allows for good spread of local anaesthetic around the nerves. The more superficial nerves in this bundle typically innervate the proximal areas of the shoulder and upper arm, whilst those that are closer to the first rib and lie deeper tend to supply the more distal areas of the elbow forearm and hand.

Indications

Surgery below the shoulder (upper arm, elbow, forearm and hand).

Territories blocked

Often called the spinal of the arm due to its speed of onset and density of sensory blockade, it may however sometimes miss the median and ulnar nerve territories, due to the position of the lateral cord being deeper at the level of the clavicle.

Equipment

- 8-10MHz linear probe + ultrasound machine
- Sterile ultrasound gel
- Sterile probe cover
- 22G 50mm nerve block needle

Local

Anywhere between 10-42mls of local anaesthetic has been reported to be used, take care not to exceed the toxic dose. In our institution we use 20mls of 0.5% Bupivacaine.

Approach

After institution of standard monitoring and insertion of intravenous cannula in the non-surgical arm the patient should be positioned in a semi-recumbent position with head-up 20-450 from the horizontal plane and the head turned to the opposite side. An in-plane approach is recommended due to the proximity of the pleural cupola.
It is useful to perform a “pre-scan”

After application of ultrasonic gel the probe is positioned parallel to the clavicle and adjusted using the “PART” (Pressure, Angulation, Rotation and Tilt) scheme until a view of the pulsating subclavian artery in cross section is obtained, colour Doppler may help to confirm the flow of blood within the vessel.
Usually immediately lateral to the subclavian artery will be found an area of multiple round and oval hypoechoic structures. This is the brachial plexus at the level of the clavicle, the hypoechoic structures corresponding to the trunks or divisions of the brachial plexus as outlined previously.
The surrounding structures of importance should now be identified: The first rib will be seen as a bright hyperechoic line with anechoic shadowing deep to this. The first rib is found deep to the subclavian artery and brachial plexus. The patient should be asked to take a deep breath to differentiate the first rib from another hyperechoic structure – the cervical pleura, which will move with respiration. Adjust the depth of the penetration so that all important structures are within the image.
Once the surrounding structures have been identified, the ultrasound probe may be tracked upwards over the neck to follow the brachial plexus as it lies between the anterior and middle scalene muscles, to confirm that the target is in fact the brachial plexus. After tracking back down the probe should be adjusted to give the optimum image of the subclavian artery, brachial plexus and first rib and pleura.

**Interscalene region**
A reduction in applied probe pressure and the use of colour flow doppler should now be carried out to check the image for any aberrant vessels, and in particular the suprascapular or transverse cervical artery. If this is shown to be present the probe should be adjusted to clear the intended path of the needle so as to avoid coming in to contact with it. If this fails to clear the path an alternative approach to brachial plexus blockade may be the safest option.

After the initial scan, the area of interest should be cleaned and draped and sterile cover placed over the ultrasound probe with sterile contact gel applied to the area to be scanned. Sterile gown and gloves should be worn. Position yourself comfortably with your non-dominant hand holding the ultrasound probe. Adjust the probe to attain the image as before. Ask your assistant to apply colour flow doppler to the image to check that the planned needle path is free for vessels, and then go back to 2D mode.

**Left Supraclavicular Region**

Inject a small amount of subcutaneous local anaesthetic lateral to the lateral aspect of the probe. Ensure that the needle for plexus block has been flushed with the relevant local anaesthetic loaded on the extension tubing. With your dominant hand hold the needle for plexus block and just pierce the skin by inserting the tip perpendicular to it. At this stage adjust the needle to a shallow angle so that you are able to visualise the shaft and tip in the ultrasound
window. Advance the needle carefully toward the plexus trying to visualise the entire structure. The final position of the needle tip should be within the plexus immediately above the first rib and lateral to the artery (the “eight-ball corner pocket” position). A distinct “pop” should be felt as the needle tip transverses the fascial covering of the plexus.

When the needle tip is in the desired position ask your assistant to draw back on the plunger to check for intravascular position and then inject 1-2ml of the local anaesthetic solution. Look for the spread of local anaesthetic on the image, if the needle is in the correct position, this should cause an expansion in the plexus diameter with a hypoechoic substance. It is sometimes necessary to expand the plexus with local anaesthetic before adjusting the position of the needle towards the “corner pocket”.

Ask your assistant to inject the rest of the local anaesthetic in aliquots of 5 mls, aspirating after each aliquot to check for any intravascular position. The needle position may be adjusted after each aliquot if required in order to bathe all the nerves in the plexus.

References