Cervical Plexus Blocks

Anatomy, Landmark and Ultrasound Guided blocks
Indications for cervical plexus blocks

• Carotid endarterectomy***
• Lymph node dissections and plastic repairs (Neck)
• Shoulder surgery (supplement brachial plexus)
• Tracheostomy
• Thyroidectomy and Parathyroidectomy
Indications

• Central venous cannulation via the internal jugular or subclavian routes
• Injuries to the ear, neck and clavicular region including clavicular fractures and acromio-clavicular dislocations
• Cervicogenic headaches
Cervical Plexus

• Formed by the ventral rami of the upper four cervical (C₁-₄) nerves

• The rami emerge between the anterior and posterior tubercles of the transverse processes of the cervical vertebrae, creating a groove on the costo-transverse bars
Ant and Post Relations

• The plexus is related posteriorly to the muscles that arise from the posterior tubercle of the transverse process i.e. the levator scapulae and scalenus medius

• Anteriorly, to the prevertebral fascia, the internal jugular vein and the sternocleidomastoid
The superficial plexus

Branches and the block
Superficial Branches

Superficial (cutaneous) branches, supply cutaneous fibres to the neck

- Ascending branches; Lesser occipital (C₂) and Greater auricular (C₂,₃)
- Transverse branch; Transverse (anterior) cutaneous nerve of the neck (C₂,₃)
- Descending branches; Supraclavicular (C₃,₄)
Lesser Occipital C2

Greater Auricular C2,3

Supra-clavicular Nerves C3,4

Transverse (Ant) Cut Nerves of the Neck C2,3
Superficial Plexus Block

Landmark technique
Superficial cervical plexus block

• The superficial cervical plexus block consists of a subcutaneous injection of local anaesthetic just under the skin

• The landmark is the post border of the sternocleidomastoid muscle (SCM)
Post border of Sternocleidomastoid
Mid-point, post border of Sternocleidomastoid muscle
Superficial cervical plexus block

- The mid-point of the SCM is marked and from this point local anaesthetic is infiltrated subcutaneously along the superior and the inferior border

- Around 7-10 mls is injected along the entire border, another few mls can also be injected at the mid-point itself, assuming that most branches exit from this point
Superficial plexus block

Ultrasound Guided
US Guided

• Not only easy but also increases the success rate
• Avoids too deep needle insertion and/or inadvertent injections into the important surrounding structures in the neck
• Advantage lies in the ability to ensure the spread of local anaesthetic in the correct plane
US Guided

• Transducer is placed over the lateral side of the neck at the midpoint of the posterior border of the sternocleidomastoid muscle (SCM)
• The view should be such that the tapering end of the SCM is visible on the screen
• The needle is introduced from the posterior aspect through the skin and platysma and 5-10 mls of local anaesthetic deposited just behind the posterior border of the SCM
The deep cervical plexus
Loops

Roots

C1

C2

C3

C4

C5

Hypoglossal n

GENIOHYOID

THYROHYOID

DESCENDENS HYPOGLOSSI

DESCENDENS CERVICALIS

PHRENIC NERVE C345

Branches to Sternocleidomastoid

Branches to Trapezius, Levator Scapulae and Scalenus medius
C1

• The anterior primary ramus of C1 is entirely motor. The nerve descends to form a loop with the ascending branch of C2 in front of the transverse process of the atlas

• The majority of the fibres in this loop run forward to join the hypoglossal nerve (XII CN) and through this, C1 supplies the geniohyoid and thyrohyoid muscles, then runs downwards as the *descendens hypoglossi*, from which the nerve to the anterior belly of the omohyoid muscle is derived
Hypoglossal Nerve

C_1

Tongue muscles

C_2

Thyrohyoid

Geniohyoid

C_3

DESCENDENS HYPOGLOSSI

DESCENDENS CERVICALIS

Inferior (Post) belly of omohyoid

Sternohyoid

Superior (Ant) belly of omohyoid

Sternothyroid
Ansa cervicalis

- Descendens hypoglossi joins *descendens cervicalis*, derived from C2 and 3, to form a loop termed the *ansa cervicalis*, which lies on the carotid sheath.

- From the ansa, nerve fibres pass to supply sternohyoid, sternothyroid and the posterior belly of omohyoid.
Loop 2 and 3

• The anterior primary ramus of C₂ divides into an ascending branch, which joins C₁, and a descending branch, which loops to join C₃ (Loop 2)

• Loop 3 is formed by the anterior primary ramus of C₃ and C₄. Branches from this loop join C₅ to give rise to the *phrenic nerve*

• Each root also receives a grey ramus communicans from the superior cervical ganglion
Deep Cervical Plexus
Landmarks

• Complex regional technique, involves blocking the nerve roots of $C_2$, $C_3$ and $C_4$

• Roots of cervical nerves 1 to 7 emerge superior to the transverse process of each cervical vertebra

• In an adult, the larynx overlies cervical vertebrae 4 to 6
Landmarks

- The upper border of the larynx (C4) is palpable as the notch in the thyroid cartilage
- The lower border of the larynx (C6) is the Cricoid cartilage
- The external jugular vein often crosses the posterior border of the Sternocleidomastoid muscle at the level of C6
Classical approach

• Patients' head turned to the contra-lateral side
• Line drawn from tip of mastoid process to transverse process of C₆ (Chassaignac’s tubercle)
• Second line drawn 1 cm posterior and parallel to the first line
• Transverse process of C₂ is located 1-2 cm caudal to the mastoid process on this second line.
• Transverse processes of C₃, and C₄ are at a distance of 1.5cms from C₂ and from each other
Mastoid process

2nd Line, 1cm behind and parallel to the 1st

1.5 Cm

1st Line

1-2 Cm

1 Cm

Chassaignac’s Tubercle

C2

C3

C4

Cricoid
Deep cervical plexus block

- Using a 22G, 1.5 inch needle, the transverse processes are located by entering perpendicular to the skin.
- Depth of the transverse process varies with the body habitus of the patient (1.5 - 3.0 cm deep).
- Once bone is contacted, the needle is pulled back slightly, and directed in the cephalad direction.
- This is repeated until the needle is walked off the bone.
Thyroid Notch

Crico-thyroid notch

C4

C6
3 Injections

- After careful aspiration for blood and/or CSF, 5mls of LA is injected slowly; paresthesia may be obtained but is not necessary for the block.
- This is repeated at the other two transverse processes.
- During injection, the patient should be communicated with continually, to help detect a change in mental status that could occur with intravascular injection.
Single injection technique

• Involves a single injection at the C4 level
• Landmark described for the classical approach can be used or
• Line drawn from the cricoid cartilage to the point where the external jugular vein crosses the posterior border of the sternocleidomastoid, this will be at the level of C6. A line from the thyroid notch is then drawn parallel to the line for C6 to determine the level of C4.
Locating C4

- To mark C4, the mastoid process is located, and a mark is made 1cm posterior to it. A line is then drawn from this mark to intersect at right angles to the line drawn back from the thyroid notch for C4.

- Where these two lines cross is the location of the C4 transverse process.
Single injection

- Using a 22G, 1.5 inch needle, the transverse process of C4 is located by entering perpendicular to the skin and after careful aspiration for blood and/or CSF, 15-20 mls of local anaesthetic solution is injected
Deep Cervical plexus

US Guided
Approach 1

- Takes a very simple view, in this approach LA is deposited just behind the carotid sheath at the level of the carotid bifurcation. The injection is not as deep as described for classical deep cervical plexus block.
- No publications based on this approach, combined with superficial plexus block, this might work very well.
- Advantage is the simplicity and safety (as long as injection into the carotid can be avoided)
Approach 2

• Uses the findings of Winnie and colleagues who suggested following the interscalene groove cranially and depositing the LA anaesthetic in this groove

• For those who regularly perform interscalene brachial plexus block, this is a logical approach, as we all know that the cervical plexus is blocked when LA overspills
Approach 3

- Follows the classical description of deep cervical plexus block and here the C4 level is marked and the transducer is placed laterally at this landmark and moved posteriorly till the transverse process of C4 is identified.

- The needle is then introduced in the long axis from the posterior end of the probe under direct vision. Once the tip of the needle touches the bony part, it is partially withdrawn and after aspiration 10-15 mls of LA is injected, which can be seen spreading along the transverse vertebrae.
Intermediate cervical plexus block
Intermediate Cervical Plexus Block

• Pandit and colleagues in their cadaveric study showed that injections placed below the investing fascia of the neck diffuse into the deep space, whereas injections placed subcutaneously did not

• Injection deep to the investing layer of the neck is termed the “intermediate” cervical plexus block.
• For the intermediate block, after the usual skin prep, the needle is inserted in a perpendicular plane at the midpoint of the posterior border of the sternocleidomastoid muscle until a ‘loss of resistance’ or ‘pop’ is felt as the needle passed the investing layer of the cervical fascia (~1–2 cm depth)

• The needle is then fixed and around 15-20 ml of LA is slowly injected after careful aspiration
US Guided Intermediate block

• The approach is similar to superficial cervical plexus block but involves deeper injection.
• An attempt is made to identify the investing fascia of the neck in the interscalene groove and LA deposited under the fascia.
• A click or “pop” can often be felt when the needle pierces this fascia, 10-15mls of LA is deposited at this level