Neural Blocks in Pain Medicine

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• Stellate Ganglion Block

• Lumbar Sympathetic Block
Requirements

- Diagnosis
- Management plan
- Explanation
- Consent
- Placebo effect
- Anatomy knowledge
- Equipment, location, sterility etc
- Post-operative advice
- Review
Indications for stellate ganglion block

- **Pain:**
  - Acute pain due to herpes zoster
  - Post-herpetic neuralgia
  - Complex Regional Pain Syndrome I,II (CRPS I, II)
  - Cancer pain of head, neck, upper extremities
  - Phantom limb pain
  - Refractory angina

- **Vascular diseases of upper extremities:**
  - Vasospasm
  - Arterial embolus
  - Vascular insufficiency
  - Raynaud’s syndrome

- **Others:**
  - Scleroderma
  -- Hyperhidrosis of face and upper extremities
CRPS involving upper limb
Anatomy of stellate ganglion

- The first thoracic (T1) sympathetic ganglion fuses with the inferior cervical ganglion to make the stellate ganglion, and sits at the top end of the sympathetic chain in front of the C7 vertebra of the neck.

- The ganglion conveys sympathetic nerve messages from the T1 - T6 levels upwards to one half of the head and neck, and the arm on the same side.

- posterior:
  - neck of first rib
  - transverse process of C7

- anterior: subclavian artery

- laterally:
  - intercostal vein
  - intercostal artery
  - ventral ramus of first thoracic nerve

- medially: vertebral body

- inferiorly: pleural cupola over apex of lung
Contraindications for stellate ganglion block

- Vocal cord palsy / recurrent laryngeal nerve palsy.
- Phrenic nerve palsy
- Bilateral block.
- All the other usual contraindications regarding bleeding and infection also apply.
Technique

- The block is performed at the C6 level rather than C7,

- The anterior paratracheal approach of Leriche is the one that is most commonly performed.

- All the usual precautions are taken about resuscitation equipment, fasting, intravenous cannulation, and monitoring.

- Intravenous Sedation is used for patient comfort.

- The patient is positioned on their back (supine) with a small pillow under the shoulders to open up the neck area.

- The local anaesthetic mixture is prepared before the injection. A 23 gauge 1" (blue) needle is attached via connecting tubing to a 10 ml syringe filled with 10 mls 0.5% bupivacaine.

- All air bubbles are removed from the system prior to injection. The assistant operates the syringe plunger.
Technique

- Chaissagnac's Tubercle is identified (tip of the transverse process of C6 opposite the cricoid cartilage), and the needle is inserted between trachea and the carotid artery until it sits on the transverse process of C6.

- To avoid arterial puncture the operator's fingers gently pull the carotid artery away from the midline. The needle tip is then lifted off the bone by 2 - 3 mm and held steady.

- After a negative aspiration for blood and cerebrospinal fluid, the assistant injects 0.5 ml of the mixture.

- The patient is observed for any untoward reaction for a few seconds, and then another aspiration test is performed, followed by another 0.5 ml injection, and the patient observed again. This process is repeated until 5 ml has been injected uneventfully, following which the injection size can be increased to 1 ml bolus, until the whole 10 ml has been injected.

- The patient is closely monitored every 5 minutes for the first 30 minutes.
Signs of a successful block

- Reddening of the conjunctiva in the eye
- Meiosis (constriction of the pupil)
- Ptosis (drooping eyelid)
- Enophthalmos (eyeball sinking back into the eye socket a little)
- One sided nasal stuffiness
- A lump in the throat feeling
- Hoarsening of the voice (recurrent laryngeal nerve block)
- A warm pink arm / hand / face (one sided).
- Rise in skin temperature of the affected arm (at least 2 deg C)
- Relief of the sympathetic pain symptoms
Horner’s Syndrome

Left pupil is constricted (meiosis)
Left upper eyelid droops (ptosis)

Would also expect to observe absence of sweating, dilation of blood vessels in face
Complications

- Bleeding may cause a haematoma
- T1 / T2 neuralgia can cause chest pain radiating down the inner arm.
- Brachial plexus block
- Phrenic nerve block
- Pneumothorax
- Vertebral artery injection causing seizures, loss of consciousness and cardiac arrest
- Total spinal injection caused by injection into the cerebrospinal fluid
- Oesophageal puncture
Indication for lumbar sympathetic block

- Lumbar sympathetic blockade is indicated for diagnosis, prognosis, and therapy of circulatory and painful conditions such as:
  
  **Circulatory**
  - Inoperable peripheral vascular disease and vasospastic disease of the lower extremities

  **Pain**
  - Neuropathic pain
  - Complex regional pain
  - Urogenic/Pelvic pain
  - Cancer pain
  - Phantom pain
  - Herpes Zoster involving the lower extremities
Contraindications for lumbar sympathetic block

- Patients on anticoagulant therapy
- Hemorrhagic disorder
- Allergies to medications injected
- Local infection
- Local neoplasm
- Local vascular anomalies
Anatomy

- The lumbar sympathetic chain:

  - consists of three to five ganglia
  - lie anteriorly to the L2, L3, and L4 vertebral bodies
  - are anterior to the psoas muscle margin and fascia
  - are usually posterior to the vena cava on the right
  - is posterior to the aorta on the left
Drugs

- Volume of at 15 – 25ml must be injected

- Short-acting local anesthetic, such as 1% lidocaine, is commonly used for diagnostic sympathetic block

- 0.5% bupivacaine is used for both diagnostic or therapeutic block

- For Neurolytic Blockade: volume of 2 – 4ml at both L3 and L4, using 6 – 10% phenol or 50 – 100% alcohol
Technique

- The patient lies prone with a pillow under the lumbar spine

- **Topographical Landmarks**
  - Spinous process of L2 and L3 are identified and marked
  - A horizontal line is drawn through the midpoint of the L2 interspace and extended 5cm to the right and left of midline
  - An “X” marks these spots (which should overlie the space between the transverse process of the 2\(^{nd}\) and 3\(^{rd}\) vertebrae or the cauded edge of the 2\(^{nd}\) transverse process)
Technique

- Skin and deeper tissues infiltrated with local anesthetic at the “X”
- A 10cm 22 g needle is inserted on each side through the “X” and angled 30-45 degrees cephalad.
- Advance until the needle comes in contact with the transverse process. Mark the depth of the needle.
- Withdraw slightly, angle caudad, and walk inferiorly off the transverse process (usually in a direction perpendicular to the skin). A slight medial angulation is used in hope of contacting the vertebral body.
- Once contact is made with vertebral body, anterior repositioning of needle is made to walk off that body (the needle tip should remain close to vertebra).
- “Pop” felt as needle passes through psoas fascia
Lumbar sympathetic block
Confirmation of block

- Vasodilation
- Increased skin temperature
- There should be a minimum change of 2 degrees C if there is a proper block

**Psychogalvanic Reflex**
- Two electrodes (ECG) for each channel attached to each foot (dorsal and plantar)
- Ground lead attached to any body surface
- Measures changes in electrical resistance of the skin
- After stimulation, the side with blockade of sympathetic fibers will demonstrate no ECG deviation

**Sweat test**
- Cobalt blue test – filter papers which are saturated with cobalt blue; sweat changes paper colour to pink
- Starch-iodine test – relies on colour change

**Pain assessment**
- Post-block pain relief provides indication of sympathetic blockade
- Pain relief can be immediate or delayed for several hours
Complications

- Blockade of L2 somatic nerve root
- Injection into the subarachnoid, epidural space or intravascular
- Damage by needle or neurolytic solution to the kidneys, renal pelvis, ureters, intervertebral discs
- Infection
- Mild backache
- Retroperitoneal hematoma
- Neuropathic pain - cramping or burning pain in anterior thigh
- Sympathectomy-mediated hypotension