Occipital Nerve Block with Ultrasound

14

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Abstract

The greater occipital nerve (GON) is a purely sensory nerve that originates from the medial branch of the C2 dorsal ramus and innervates the scalp on the vertex, over the ear, over the parotid gland, and the inferolateral occipital area. The GON is also targeted for treating various complex headache syndromes including cervicogenic headache, tension headache, occipital neuralgia, and migraine due to synapse of the C1, C2, and C3 spinal nerves onto second order neurons in the trigeminocervical nucleus (Baek et al., J Pain Res 11:2033–2038, 2018).

Evidence suggests improved success rate and fewer complications with ultrasound guided GON block than the landmark technique (Kissoon et al., Clin J Pain 38(4):271–278, 2022). The GON is blocked at the C2 level with cadaveric evidence suggesting that with does around 5 ml the clinical effect likely comes from a more widespread blockade of nerves in the suboccipital area—not just blocking of the GON (Baek et al., J Pain Res 11:2033–2038, 2018).

Ultrasound guided pulse radiofrequency ablation (RFA) of the GON is a safe and effective treatment for patients with refractory chronic migraine (Guner and Eyigor, Acta Neurol Belg, 2022). As opposed to the continuous electrical simulation in conventional RFA, pulsed RFA has a rest phase that limits structurally damaging heat production. Instead, it works by repolarizing unmyelinated C fibers thereby modulating pain signal transmission (Cahana et al., Pain Med 7(5):411–423, 2006).

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Keys to Procedure
– Sterile technique with ultrasound usage.
– Understanding cervical musculature anatomy as well as sonographic landmarks.
– Vasculature identification and avoidance.

What You Will Need

- Sterile towels
- Chlorhexidine-based soap or topical iodine
- 18G needle to draw up medications
- 25G 1.5″ needle or echogenic ultrasound needle for injectate
- 5 cc syringe for injectate
- Bupivacaine 0.25% or Ropivacaine 0.2%—3 ml
- Methylprednisolone 40 mg or Dexamethasone 10 mg—1 ml.

Injectate: Anesthetic choice (3 ml) with steroid (1 ml) into 5 cc syringe and 25G 1.5″ needle.

Ultrasound Materials

- Linear transducer
- Sterile probe cover
- Sterile ultrasound gel

Patient Positioning

- Seated upright (pull up hair to move out of way if long) or prone position. Prone position may allow easier ergonomics for holding ultrasound and performing injection.

How to Perform the Procedure

1. Sterile prep occipital area of the head. The C2 area usually lies approximately at the hairline, and the area above the hairline should also be palpated.

2. Place ultrasound gel over upper cervical area and position linear transducer caudal and lateral to the occipital protuberance with the lateral aspect of the transducer rotated up to the C1 transverse process (just inferomedial to the mastoid process) and the medial aspect of the transducer over the C2 spinous process (Image 14.1).
3. Identify the fascial separations of the semispinalis capitis and trapezius muscles superficial to the greater occipital nerve and the obliques capitis inferior beneath (Image 14.2).
4. Use doppler to verify vasculature locations.

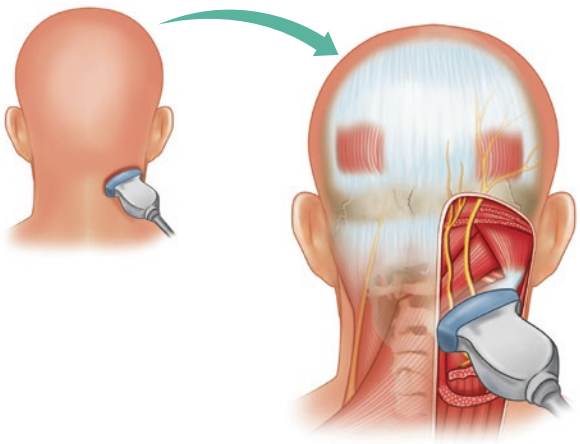

Image 14.1 (Left): Correct transducer oblique angle over occiput and C2 area

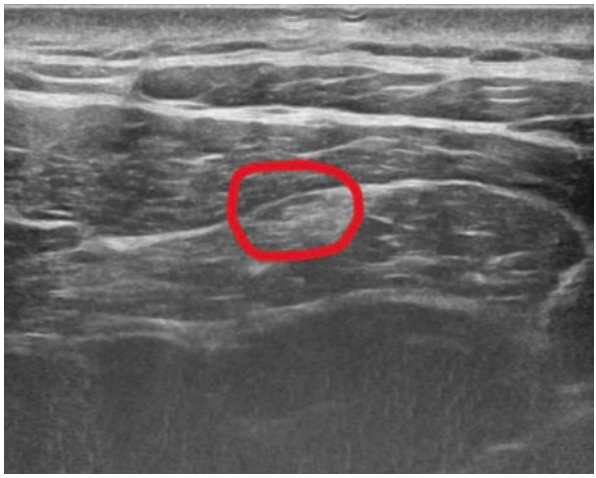

Image 14.2 Greater occipital nerve (red circle) is seen between the semispinalis capitis muscle (superficial) and obliquus capitis inferior muscle (deep)

5. Advance needle adjacent to greater occipital nerve location (mindful of vasculature).
6. Administer nerve block injectate (approximately 4 ml).
7. Remove needle and clean site. Hold light pressure for hemostasis.

Checkpoints to Mastery

Beginner

- Prepare a sterile field for the injection.
- Properly position the patient either in a sitting or prone position while holding the ultrasound probe at an appropriate upper cervical level.

Intermediate

- Identify the C2 spinous process under ultrasound, as well as the trapezius, semispinalis capitis, and the obliquus capitis inferior muscle deep to the greater occipital nerve.

Advanced

- Insert needle in an appropriate in-plane view of the fascial plane and neurovascular bundle between the semispinalis capitis and the obliquus capitis.
- Take all necessary safety precautions with local anesthetic injections, including verification of doppler ultrasound for vascular structures and appropriately dosing of local anesthetics.

Pearls and Pitfalls

- Avoid: foramen magnum, vertebral artery, occipital artery, and other incidental blood vessels.
- In plane ultrasound view is preferred to optimize view.
- The spinous process of the upper cervical vertebrae are the most important osseus sonographic landmark for image acquisition if have difficulties. The oblique trajectory of the obliquus capitis inferior muscle will be at the level of the C2 process.

References

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