CORE
Metadata, citation and similar papers at core.ac.uk
Provided by The Research Repository @ WVU (West Virginia University)

Faculty & Staff Scholarship

2016

Ultrasound-Guided Greater Auricular Nerve Block as Sole Anesthetic for Ear Surgery

Michael K. Ritchie
West Virginia University

Colin A. Wilson
West Virginia University

Brian W. Grose
West Virginia University

Pavithra Ranganathan
West Virginia University

Stephen M. Howell
West Virginia University

See next page for additional authors

Follow this and additional works at: https://researchrepository.wvu.edu/faculty_publications

 Part of the Medicine and Health Sciences Commons

Digital Commons Citation

Ritchie, Michael K.; Wilson, Colin A.; Grose, Brian W.; Ranganathan, Pavithra; Howell, Stephen M.; and Ellison, Matthew B., "Ultrasound-Guided Greater Auricular Nerve Block as Sole Anesthetic for Ear Surgery" (2016). *Faculty & Staff Scholarship*. 2341.
https://researchrepository.wvu.edu/faculty_publications/2341

This Article is brought to you for free and open access by The Research Repository @ WVU. It has been accepted for inclusion in Faculty & Staff Scholarship by an authorized administrator of The Research Repository @ WVU. For more information, please contact ian.harmon@mail.wvu.edu.

Authors

Michael K. Ritchie, Colin A. Wilson, Brian W. Grose, Pavithra Ranganathan, Stephen M. Howell, and Matthew B. Ellison

This article is available at The Research Repository @ WVU: https://researchrepository.wvu.edu/faculty_publications/2341

Ultrasound-guided greater auricular nerve block as sole anesthetic for ear surgery

Michael K. Ritchie, Colin A. Wilson, Brian W. Grose, Pavithra Ranganathan, Stephen M. Howell, Matthew B. Ellison

Department of Anesthesiology, West Virginia University School of Medicine, Morgantown, WV, USA

Abstract

A greater auricular nerve (GAN) block was used as the sole anesthetic for facial surgery in an 80-year-old male patient with multiple comorbidities which would have made general anesthesia challenging. The GAN provides sensation to the ear, mastoid process, parotid gland, and angle of the mandible. In addition to anesthesia for operating room surgery, the GAN block can be used for outpatient or emergency department procedures without the need for a separate anesthesia team. Although this nerve block has been performed using landmark-based techniques, the ultrasound-guided version offers several potential advantages. These advantages include increased reliability of the nerve block, as well as prevention of inadvertent vascular puncture or blockade of the phrenic nerve, brachial plexus, or deep cervical plexus. The increasing access to ultrasound technology for medical care providers outside the operating room makes this ultrasound guided block an increasingly viable alternative.

Introduction

The greater auricular nerve (GAN) is the major sensory branch of the cervical plexus.[1] Its innervation includes the inferior part of the ear and the skin over the mastoid process, parotid gland, and angle of the mandible.[1,2] The GAN is readily amenable to local anesthetic blockade as it lies in a superficial location passing over the sternocleidomastoid muscle. While anatomical landmarks can guide a field block technique, the use of ultrasound for needle guidance may improve block success.[1] A GAN block can be used for multiple urgent care, emergency department and surgical procedures to enhance patient comfort, decrease pain, and decrease the need for intravenous anesthetics.[3] Despite its utility and the relative ease of blockade, limited literature is available describing use of the technique. We describe the case of an 80 year-old male with multiple comorbidities who successfully underwent surgical resection of an ear skin lesion using ultrasound-guided GAN block.

Case Report

An 80-year old, 92-kg male presented for resection of right posterior-auricular and left infra-orbital skin lesions. The patient was initially assessed by the faculty anesthesiologist upon arrival to the pre-operative area the day of surgery. He had an extensive past medical history including diabetes mellitus-type I, previous myocardial infarction which resulted in cardiac stent placement, congestive heart failure, pacemaker placement, mitral valve disease, hypertension, hypercholesterolemia, obstructive sleep apnea, and gout. Because the patient was at increased risk for complications from a general anesthetic, local or regional anesthesia was considered. After a discussion with the patient and surgeon, we decided to perform an ultrasound guided GAN block for excision of the skin lesions, allowing the patient to avoid general anesthesia. The patient was taken to the operating room and standard monitors were placed. A high frequency linear ultrasound (Sonosite S-Nerve Ultrasound with L25x 13-6 Megahertz transducer; Sonosite, Inc., Bothell, WA, USA) was used to image the superficial cervical plexus posterior to the midpoint of the sternocleidomastoid muscle. The GAN was identified by moving the ultrasound probe cranially as it arose from the cervical plexus and coursed in an anteromedial direction to lie on the anterior surface of the sternocleidomastoid (Figure 1). Once identified, the GAN was blocked using a 22 gauge B-bevel needle (Stimuplex Ultra 22 Gauge x 2 inch Echogenic Needle; B. Braun Medical, Inc., Bethlehem, PA, USA) and 100 milligrams of 1% lidocaine with 1:400,000 epinephrine. Next, a right infra-orbital nerve block was performed by infiltration of 60 milligrams of 1% lidocaine with 1:400,000 epinephrine near the infra-orbital foramen. After several minutes, satisfactory anesthesia was achieved. The surgery was performed uneventfully using only the nerve blocks and a small 12.5 microgram bolus of intravenous fentanyl.

Discussion

The GAN is the principal sensory branch of the cervical plexus and is comprised of the second and third cervical nerves. It provides sensory innervation to segments of the external ear including the tail of the helix, the antitragus, and the lobule of the auricle with variable supply to the spine of the helix, the tragus, and the concha (Figure 2).[1] Although the greater auricular nerve block was described over five decades ago, it has traditionally involved blockade of the entire superficial cervical plexus at the border of the sternocleidomastoid muscle utilizing large local anesthetic volumes rather than the selective procedure.[4,5] Landmark techniques for selective blockade of this nerve have been attempted with varying degrees of success with different volumes of local anesthetic. The greater auricular nerve ranges in diameter from 1.4-2.0 mm with a median size of 1.7 mm in anatomical studies.[1,6] The wide availability and utilization of ultrasound has provided physicians with the ability to directly image small peripheral nerves and perform blockade with reduced volumes of local anesthetic. Because of its superficial location on the anterior surface of the sternocleidomastoid muscle, ultrasound acquisition of the GAN is relatively easy to perform yielding excellent imaging. Thallaj and colleagues noted a success rate of 100% in identifying the GAN using ultrasound imaging with a block success rate of near 100% when pinprick testing was performed and compared to the contralateral ear. It should be noted that the Thallaj study was performed on healthy male volunteers and increased difficulty in nerve identification may be encountered in obese patients.[1] Selectively identifying the GAN *versus* a field blockade of the entire cervical plexus may result in decreased incidence of complications and side effects including vascular puncture, blockade of the phrenic nerve, brachial plexus or deep

Correspondence: Matthew B. Ellison, Department of Anesthesiology, West Virginia University School of Medicine, PO Box 8251, 1 Medical Center Dr, Morgantown, WV, USA.
Tel.: +1.304.598.4000 / ext. 7.5135 -
Fax: +1.304.598.4930.
E-mail: ellisonma@wvumedicine.org

Key words: Ear surgery; greater auricular nerve block; ultrasound; cervical plexus; ambulatory surgery.

Contributions: the authors contributed equally.

Conflict of interest: the authors declare no potential conflict of interest.

Received for publication: 22 April 2015.
Accepted for publication: 3 May 2016.

This work is licensed under a Creative Commons Attribution NonCommercial 4.0 License (CC BY-NC 4.0).

©Copyright M.K. Ritchie et al., 2016
Licensee PAGEPress, Italy
Clinics and Practice 2016; 6:856
doi:10.4081/cp.2016.856

Non-commercial use only

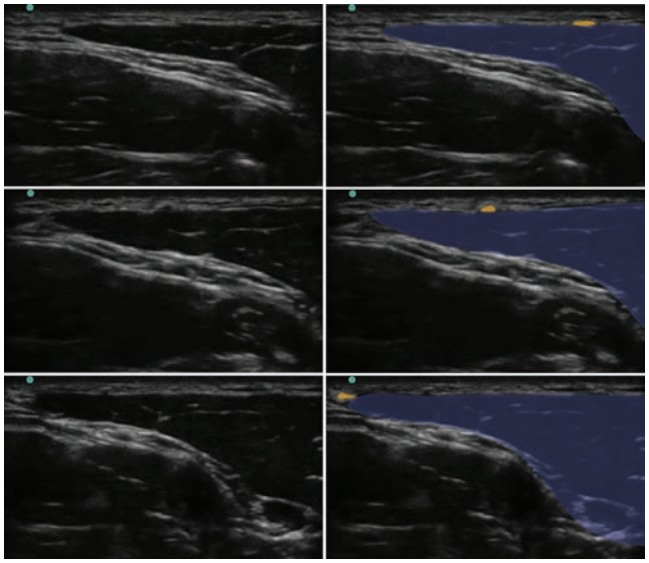

Figure 1. Image showing course of greater auricular nerve (GAN) from inferior (bottom image) to superior (top image) with unenhanced images on left and enhanced images on right. As the ultrasound probe is moved superiorly along the sternocleidomastoid (blue highlighting), the GAN (yellow highlighting) is best visualized passing from the lateral border of the muscle across its superficial surface in a medial direction.

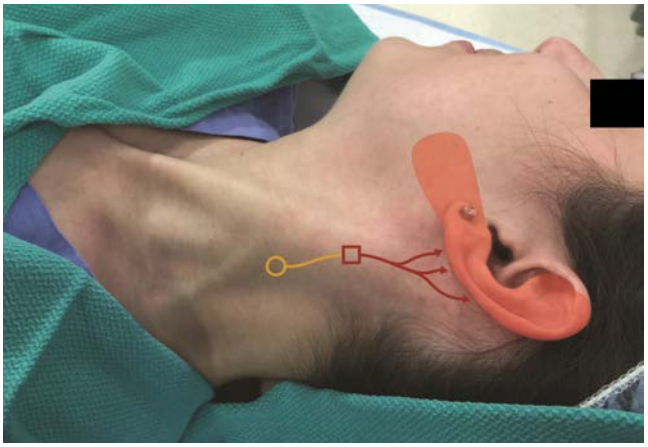

Figure 2. Image depicting origin of greater auricular nerve (GAN) in cervical plexus (yellow circle), typical location of ultrasound guided nerve block (red square), and areas anesthetized by the GAN block (highlighted area). Image published with permission from volunteer model.

cervical plexus.[5] Volumes as low as 0.1 mL have been shown to be effective if administered under ultrasound guidance whereas classic descriptions of the superficial cervical plexus blockade describe the usage of 15-20 mL of local anesthetic.[1,4] One study also reported the successful use of transcutaneous nerve stimulation in combination with ultrasound to improve the identification of the great auricular nerve in patients with challenging anatomy.[2] Imaging and blockade of the GAN for multiple surgical procedures and conditions has been described including uncommon syndromes such as tic douloureux and red ear syndrome.[7] Surgical anesthesia or supplemental pain control can be provided for any surgery involving the inferior portion of the external ear, the area overlying the mastoid process, procedures of the parotid gland, or procedures involving the angle of the mandible. In patients with multiple comorbidities, such as in the case described above, GAN block can serve as the sole anesthetic for a procedure minimizing or eliminating intravenous sedatives and opioids. Outside of the operating room environment, greater auricular nerve block has potential uses for excision of lesions in any of the above mentioned areas, drainage of auricular hematoma, laceration repair, removal of retained ear-rings, or cyst removal in the emergency room or office environment.[3,6,8] Physicians in multiple specialties should become familiar with both anatomic and ultrasound-guided techniques to perform this safe and effective nerve block.

Conclusions

The GAN has predictable anatomy and is readily amenable to local anesthetic blockade by both anatomical landmark and ultrasound-guided techniques. Ultrasound imaging may improve success and allow for the use of much lower volumes of local anesthetic, which may lead to reduced side effects and increased safety. GAN block techniques are relatively easy to learn and have a variety of uses both in the operating room and outpatient environments for all practitioners.

References

1. Thallaj A, Marhofer P, Moriggl B, et al. Great auricular nerve blockade using high resolution ultrasound: a volunteer study. Anaesthesia 2010;65:836-40.
2. Christ S, Kaviani R, Rindfleisch F, Friederich P. Brief report: identification of the great auricular nerve by ultrasound imaging and transcutaneous nerve stimulation. Anesth Analg 2012;114:1128-30.
3. Herring AA, Stone MB, Frenkel O, et al. The ultrasound-guided superficial cervical plexus block for anesthesia and analgesia in emergency care settings. Am J Emerg Med 2012;30:1263-7.
4. Choi DS, Atchabahian A, Brown AR. Cervical plexus block provides postoperative analgesia after clavicle surgery. Anesth Analgesia 2005;100:1542-3.
5. Pandit JJ, Satya-Krishna R, Gration P. Superficial or deep cervical plexus block for carotid endarterectomy: a systematic review of complications. Br J Anaesth 2007;99:159-69.
6. Thallaj A. Ultrasound guidance of uncommon nerve blocks. Saudi J Anaesth 2011;5:392-4.
7. Selekler M, Kutlu A, Uçar S, Almaç A. Immediate response to greater auricular nerve blockade in red ear syndrome. Cephalalgia 2009;29:478-9.
8. Gleeson AP, Gray AJ. Management of retained ear-rings using an ear block. J Accid Emerg Med 1995;12:199-201.

Non-commercial use only