

## Neuromodulation of the Great Auricular Nerve Foad Elahi MD; Chandan G. Reddy MD

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**Introduction:** Headaches are often difficult to treat, particularly since significant symptomatic overlap amongst primary headache syndromes makes establishment of an accurate diagnosis challenging. Electrical neuromodulation of the C2-C3 branches within the great auricular nerve (GAN) distribution was proposed as a potential long-term treatment for chronic, intractable headaches

**Methods:** In this case series we will discuss clinical presentation of patients having several prior headache attacks successfully aborted with ultrasoundguided GAN blocks underwent permanent peripheral neurostimulator implantation.

**Results:** At 6-month follow-up post permanent neurostimulator implantation, the patients reported significant, sustained pain alleviation, with daily baseline pain scores averaging one to two on the NRS scale. Overall patients satisfaction were 95%. **Conclusions:** Although fewer case reports discuss neuromodulation for patients with cervicogenic and C2-mediated headaches, evidence in support of this use also exists. [2, 3] The most commonly accepted mechanism of action for this treatment is believed to involve stimulation of the distal branches of C2 and C3 that convergence with the trigeminal system, possibly inhibiting central nociceptive processing. [4] Since favorable pain alleviation results have been seen with neurostimulation of the occipital nerve, we considered neurostimulation of the great auricular nerve-which is also composed of branches from C2 and C3-to see if similar pain alleviation effects would be produced. With the implementation of multidisciplinary and multimodal approaches, only a small minority of chronic migraine patients remain refractory to treatment. This select group of migraine patients may potentially be appropriate candidates for electrical neuromodulation treatment.

**Learning Objectives:** There is growing evidence that the upper cervical nerves may play a significant role in migraine and cluster headache, and that these nerves may be important therapeutic targets for these and other primary headache disorders

## Unltrasound image - 1



Ulta sound picture; cross section of GAN in approximatley 1 cm lateral to Superficial Jugular Vein



Surface Anatomy, image-2

On surface anatomy, GAN emerges onto the anterior surface, approximately at onethird the distance from either the mastoid process or the external auditory canal to the clavicular origin of the Sternocleidomastoid. Iirrespective of the neck length

References: 1. Saper JR, Dodick DW, Silberstein SD, McCarville S, Sun M, Goadsby PJ. Occipital nerve stimulation for the treatment of intractable chronic migraine headache: ONSTIM feasibility study. Cephalgia 2011;31(3):271-85. 2. Rodgrigo-Royo, Azcona JM, Quero J, Lorente MC, Acin P, Azcona J. Peripheral Neurostimulation in the Management of Cervicogenic Headache: Four Case Reports. Neuromodulation 2005,8:241-248 3. Melvin EA, Jordan FR, Weiner RL, Prim D: Using peripheral stimulation to reduce pain of C2-mediated occipital headaches: a preliminary report. Pain Physician 2007,27:153-157 4. Goadsby JP, Bartsch T, Dodcik D. OccipitalNerve Stimulation for Headache: Mechanisms and Efficacy. Headache. 2008;48:313-318 5. Bartsch T, Goadsby PJ. Stimulation of the greater occipital nerve induces increased central excitiability of dura afferent input. Brain 2002; 125:1496-509 6. Ashkenazi A, Blumenfeld A, Napchan U, et al. Peripheral nerve blocks and trigger point injections in headache management - a systematic review and suggestions for future research. Headache 2010;50:943-952. 7. Kaube H, Hoskin KL, Goadsby PJ. Activation of the trigeminovascular system by mechanical distension of the superior sagittal sinus in the cat. Cephalalgia. 1992;12:133-136. 8. Henry Gray, Anatomy of the Human Body. Page 1396, Published May 2000 ISBN1-58734-102-6.