

Introduction

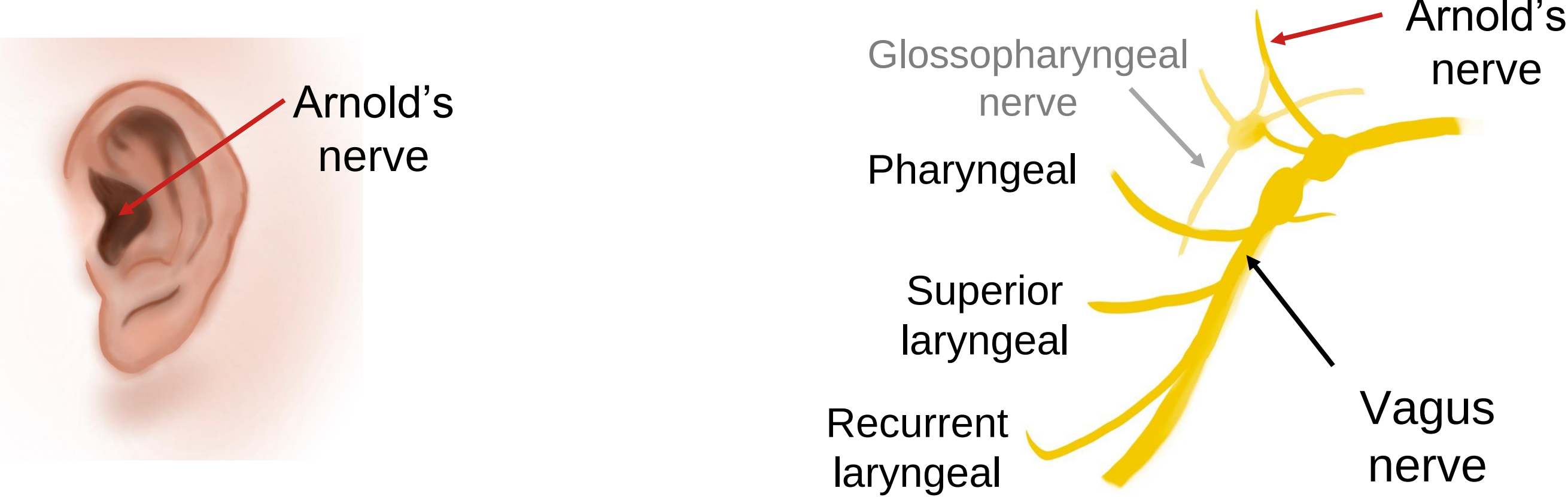
Chronic otalgia is an uncommon condition that has been associated with damages to sensory innervations in the ear, such as the vagus nerve.¹ While very few cases of chronic ear pain have been reported, studies have highlighted the auricular vagus nerve (Arnold's nerve) as a possible player in the development of ear canal pain.² Auricular vagus nerve stimulation is a minimally-invasive procedure that has been used for the treatment of pain that uses neuromodulation to disrupt pain signals to the central nervous system.³ This type of nerve stimulation has been shown to decrease inflammation and pain with effectiveness against fibromyalgia, pelvic pain, and headaches; however, there is yet a study to be done on treating ear canal pain, specifically.^{3,4,5} In this case, we present a patient with chronic ear pain of unclear etiology who was successfully treated with a therapeutic nerve block of the right auricular branch of the vagus nerve (Arnold's nerve).

Case Presentation

The patient is a 29-year-old female with unremarkable medical history, referred from otolaryngology to a multispecialty pain clinic for evaluation of **right ear canal pain**. Initially, she experienced subjective ear fluid sensation after a shower, persisting for weeks. Of note, a chiropractor performed neck adjustments a month prior. While antifungal drops alleviated fluid sensation, they triggered escalating ear pain. The patient denied pain in the tragus or temporal regions and denied shooting pain along trigeminal nerve pathways. The pain transitioned from intermittent to constant and sharp. Due to escalating symptoms, CT imaging was acquired, which **raised concern for Eagle syndrome**. However, the patient denied ear/sinus surgery and exhibited unremarkable auditory exam results. Prescribed **gabapentin** at bedtime provided substantial relief for around 9 hours. A year later, another otolaryngologist **dismissed Eagle syndrome** due to unclear etiology despite initial CT findings. The **absence of typical throat-to-ear pain and tonsil tenderness** led to an alternate diagnosis. Considering neck muscle contractions and pain improvement with gabapentin, musculoskeletal nerve pain was hypothesized. Surgery's unfavorable risk-benefit balance and low pain improvement likelihood were recognized. Negative imaging findings suggested glossopharyngeal neuralgia, leading to referral to a pain clinic.

Pain Clinic Intervention

The patient underwent **diagnostic and therapeutic block of the right auricular branch of the vagus nerve (Arnold's nerve):**

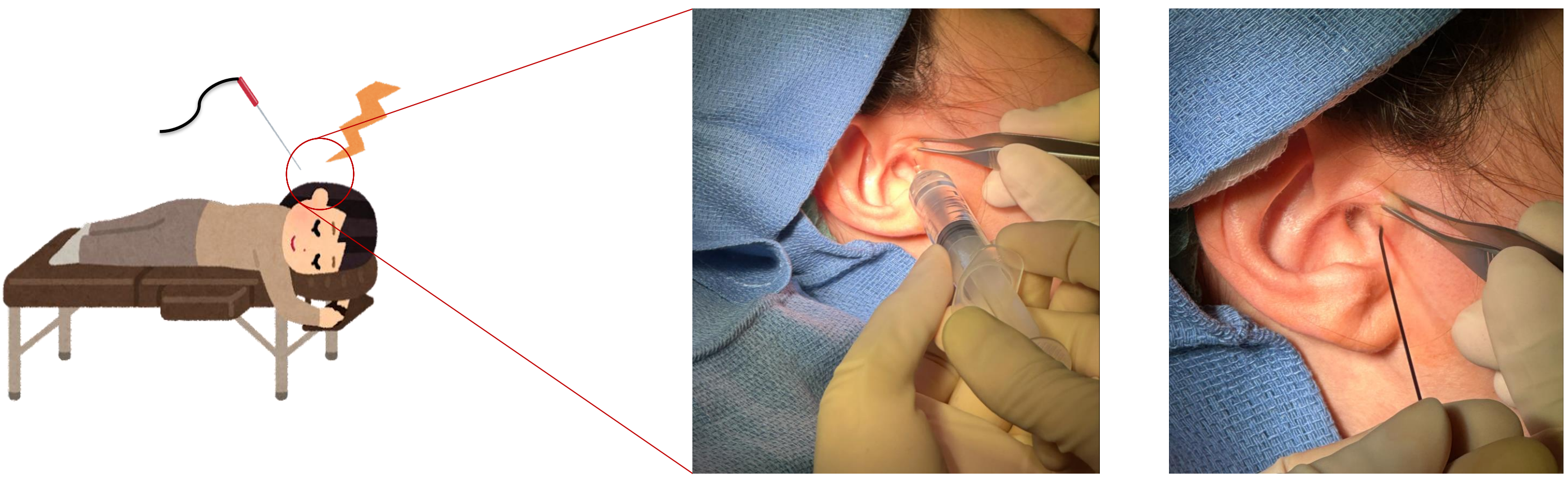


- Right tragus prepped and everted
- Injected 0.1mL 0.5% bupivacaine and 0.1mL dexamethasone (10mg/mL) with 30G needle

Immediate 100% relief and eventual 60-70% relief at two-week follow-up

Gabapentin discontinued, pain worsens
Repeat nerve injection done, producing similar effects as before

Pulsed radiofrequency of auricular branch of the vagus nerve:



- Right ear prepped, tragus everted, 22G needle with 5mm active tip placed
- Sensory stimulation at 0.5 V
- Pulsed radiofrequency at 42°C for 200 seconds upon confirming tingling/vibratory sensation location, resistance parameters in the range of 200-500 Ohms
- Repeat process twice

Two months later: 40-50% pain intensity reduction, 10-15% decrease in pain frequency

Discussion

- We present a case of a patient who presented initially to otolaryngology with a complaint of ear pain that was originally thought to be due to Eagle syndrome but was concluded to be secondary to irritation of the auricular vagus nerve.
- To our knowledge, this is the first case reported on chronic ear canal pain that was due to irritation of the auricular vagus nerve and the first to have successfully alleviated the pain through auricular vagus nerve stimulation.
- This case illustrates the complexity in differential diagnoses for chronic ear canal pain, which, in our case, included Eagle syndrome, glossopharyngeal neuralgia, and auricular vagus neuralgia.
- Importantly, our case shows how a lack of structural causes of pain on imaging could suggest auricular vagus neuralgia, a cause of pain that is uncommon and often overlooked.
- Our case not only highlights the importance of considering auricular vagus nerve damage in patients with an unclear etiology of chronic ear canal pain, but it also underscores the potential for stimulation of the auricular vagus nerve to be an effective modality for treatment.

Conclusion

It is vital to keep auricular vagus neuralgia on the differential for patients with ear canal pain of unclear etiology and to have a low threshold for trialing nerve stimulation as a treatment method.

References

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