

PERIPHERAL NERVE STIMULATION OF THE PHRENIC NERVE FOR INTRACTABLE HICCUPS: A NOVEL USE CASE SERIES

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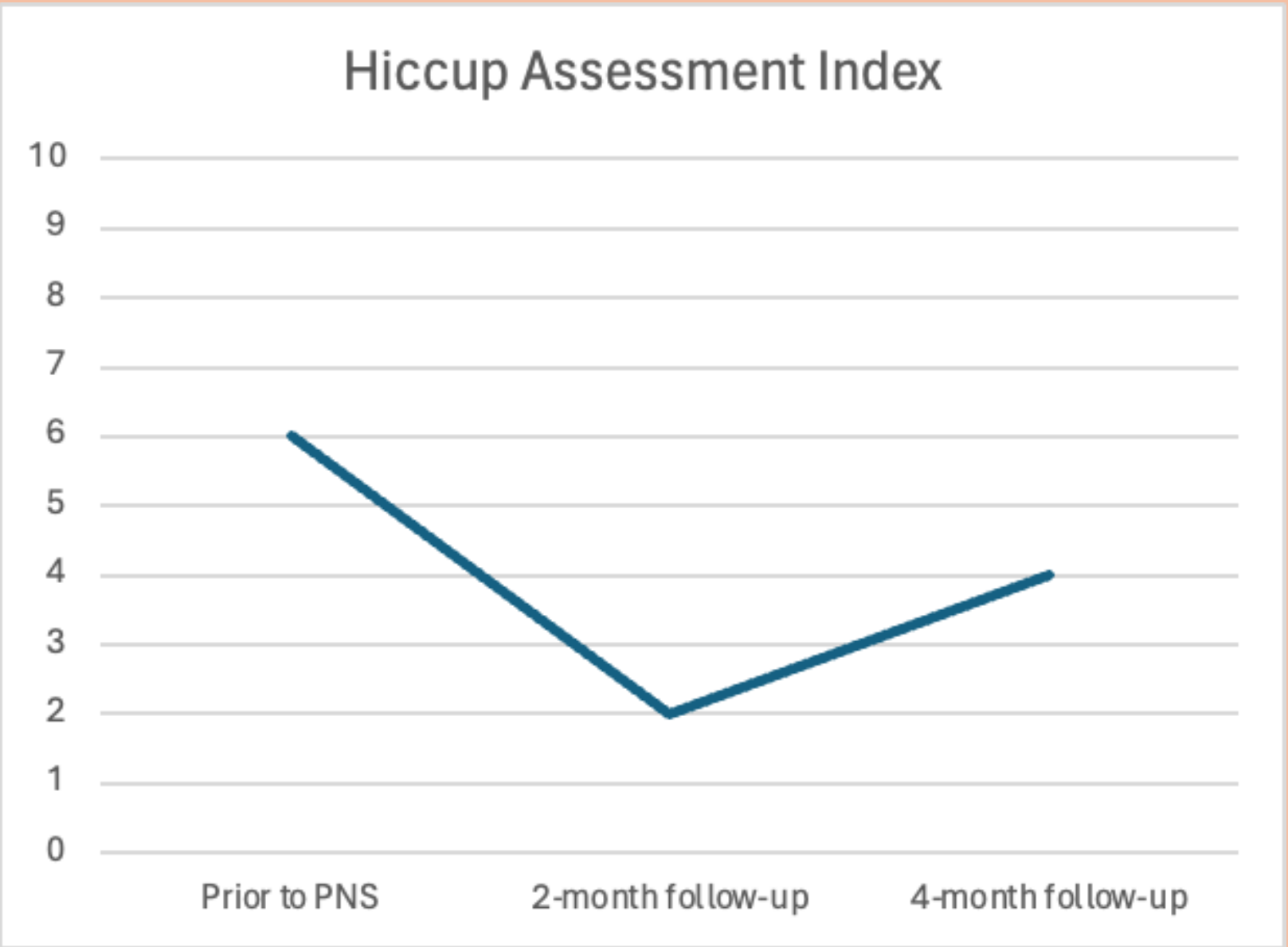
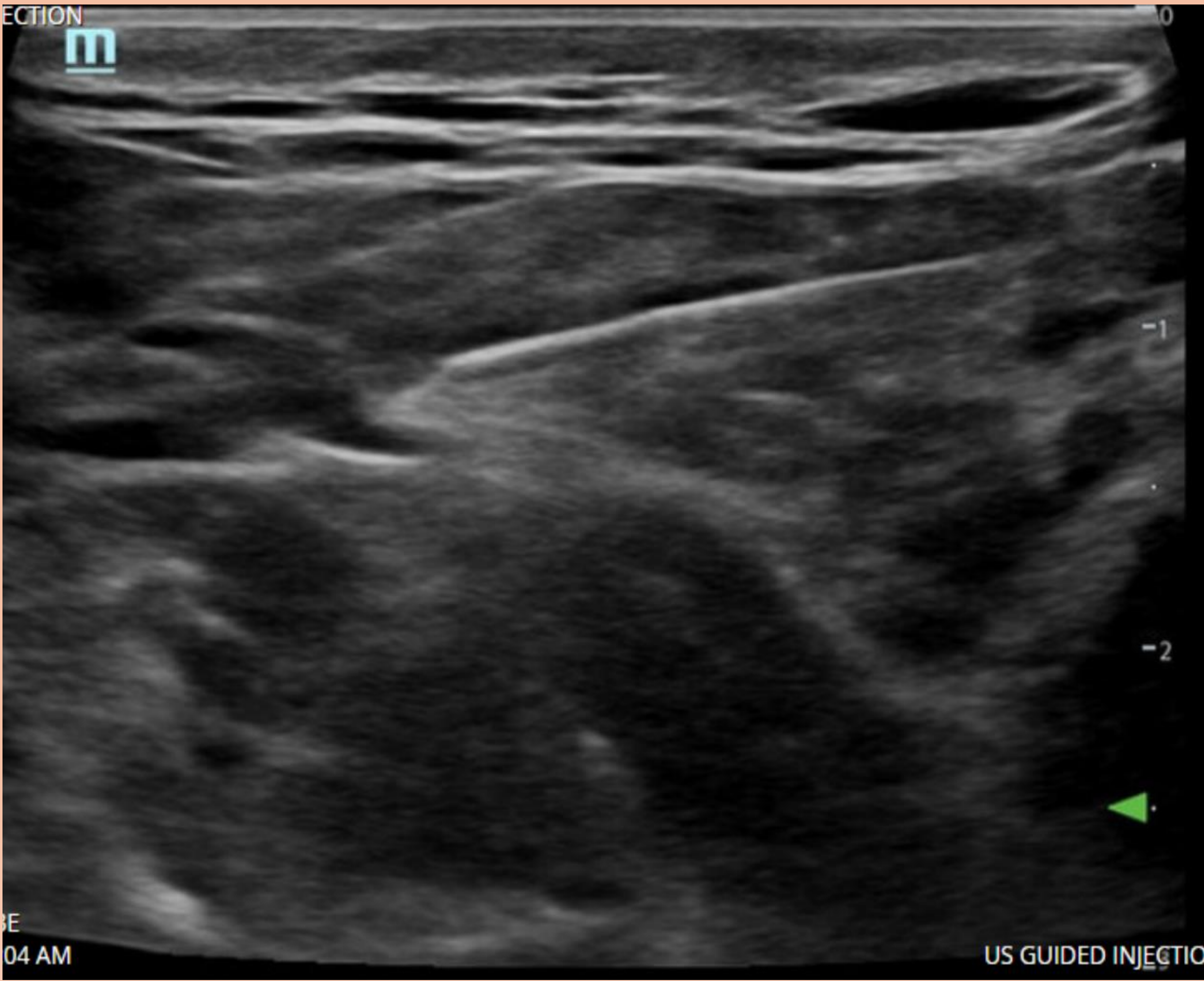
BACKGROUND

- Intractable hiccups, though rare, are associated with significant morbidity, often leading to considerable physical and psychological distress for patients¹
- Management frequently presents a significant clinical challenge, requiring innovative approaches beyond conventional treatments
- Emerging studies have indicated the moderate efficacy of phrenic nerve (C3-5) blocks as well as vagus nerve (CN-X) targeted neuromodulation techniques^{2,3,4}
- This case report highlights the novel use of phrenic nerve peripheral neuromodulation to manage a patient with intractable hiccups
- The relevance of this case report lies in the pioneering nature of the procedure and the rarity of the condition, contributing to both clinical practice and scientific knowledge

CASE REPORT

- A 73-year-old African American male with intractable hiccups presented exhibiting symptoms that hindered his ability to eat, induced regurgitation, severely impaired his speech, and disrupted his sleep, allowing only 2-3 hours of rest at a time
- Despite undergoing various treatments, including bilateral phrenic nerve and stellate ganglion blocks, external vagal nerve stimulation, and medications such as proton-pump inhibitors, gabapentin, and chlorpromazine, there was no improvement
- He then underwent bilateral phrenic nerve ultrasound-guided PNS implantation
- The Hiccups Assessment Instrument (HAI), which subjectively measures hiccup severity⁵, initially scored the patient's hiccups as a moderate 6 out of 10
- Following the PNS implantation and its subsequent removal, the patient's HAI score significantly improved to a mild 2 out of 10
- The decrease in hiccup severity was clinically meaningful to the patient, as he reported enhanced functionality and quality of life including the ability to speak in full sentences for the first time in six years, sing at church, and have extended conversations with family members

Bilateral phrenic nerve stimulation led to significant improvement in severity of intractable hiccups



PNS introducer needle and stimulating probe visualized percutaneously along the intended course of the right brachial plexus confirmed with ultrasound

DISCUSSION

- Intractable hiccups lasting over one month are rare and resistant to standard treatments, posing significant management challenges
- This case report highlights the first successful use of phrenic nerve PNS for managing chronic, debilitating hiccups that were refractory to multiple therapies
- Conservative treatments, including medications like baclofen, metoclopramide, and chlorpromazine, often show limited efficacy and come with side effects
- Despite multiple conventional and invasive therapies (e.g., phrenic and stellate ganglion nerve blocks, vagal nerve stimulation), the patient's symptoms persisted, highlighting the inadequacy of these treatments in severe cases
- The chosen phrenic PNS system offered a minimally invasive option with adjustable stimulation parameters, which led to long-term improvement in hiccup severity and quality of life
- PNS is theorized to modulate neural activity at the phrenic nerve level, potentially resetting the hiccup reflex arc and providing therapeutic relief
- Postoperative hiccups can lead to complications such as wound dehiscence, and phrenic PNS could be considered in high-risk thoracic surgeries to avoid such risks
- Future research should focus on the long-term efficacy and safety of PNS for hiccups, optimal patient selection criteria, and refining stimulation parameters

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