A Newly Discovered Frontotemporal Nerve: Implications in Treatment of Migraine Headache and Migraine surgery

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Introduction

Migraine headaches affect 37 million people in the US, with an incidence of 18% for women and 6% for men. Due to incomplete efficacy of traditional medications, patients often seek more invasive treatments. Decompression and avulsion of peripheral cranial and spinal nerves at several anatomically studied trigger sites has demonstrated significant efficacy in bringing permanent relief to migraine sufferers. However, some patients who undergo surgery still have residual pain. Up to 17.8% of patients have postoperative emergence of pain at a secondary site. A theory to explain incomplete surgical outcome is failure to identify and release unknown culprit nerves. As major migraine trigger sites are released, more minor trigger sites can be revealed as postoperative residual headaches. Due to increased interest in surgical management of migraine headaches, several anatomical studies have been done in the past decade. Major discoveries detailed the anatomy of cranial and cervical nerves newly associated with migraine generation, such as the zygomaticotemporal branch of the trigeminal nerve. In our experience doing endoscopic frontal nerve surgery with high definition (HD) cameras, we noticed a previously undescribed accessory nerve in the frontotemporal area as well as other minor accessory nerves. The significance of this nerve is not only clinically impactful to surgical approach but also other treatments that target nerves, such as onabotulinumtoxinA injection. This study reports the incidence and location of this previously undescribed accessory nerve.

Methods and Results:

Methods

A retrospective review of 103 patients who underwent migraine decompression surgery at UT Southwestern from July 2011 to May 2016 was done. All nerve decompressions were done by a single surgeon. For the included 76 patients, measurements of this nerve had been taken intraoperatively using high-definition endoscopic assistance and topographic measurements where correlated with endoscopic location of the nerve. Demographic data were recorded as well as intraoperative findings of the presence of the frontotemporal nerve and other accessory nerves, its laterality, presence of accompanying vessels, location, and size.

Results

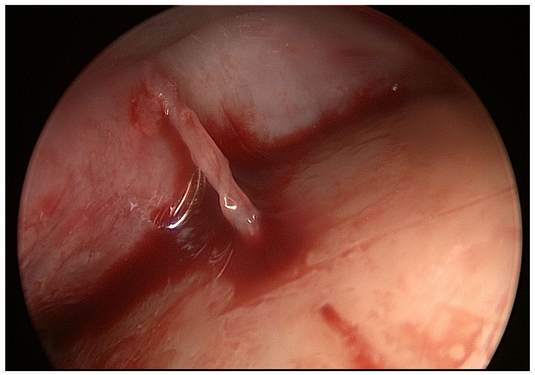
Of the original 103 patients reviewed, 76 patients had received frontal endoscopic decompression. Of that group, 56 were female. The newly discovered frontotemporal nerve was present in 55%, and bilateral incidence was 57% of those. An accompanying vessel was also present 81% of the time. Both nerve and vessel varied in size. Consistently, the nerve exited a foramen in the frontal bone on average 3.4 cm (SD = 0.47 cm) superior to the lateral canthus. Other minor accessory nerves were not present in a single consistent location.

PATIENT CHARACTERISTICS	
Number of Patients	76
Average Age	37.7 years
Female	56 *(73.7%)*
% of those with nerve that were female	*69%*
Male	20 *(26.3%)*
% of those with nerve that were male	*31%*
FRONTOTEMPORAL NERVE	
Present	42 *(55.3%)*
Accompanied by Vessel	*34/42 (81.0%)*
Bilateral	*24/42 (57.1%)*

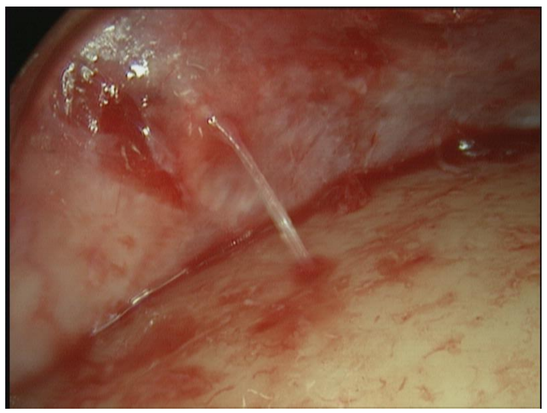
Table 1. Patient characteristics

FRONTOTEMPORAL NERVE CHARACTERISTICS	
BILATERAL	24 (57.1%)
ACCOMPANYING VESSEL PRESENT	34 (81.0%)
AVERAGE DISTANCE ABOVE LATERAL CANTHUS	3.4 cm (SD=0.47)
SIZE	
Small Nerve	15/42 (32.6%)
Average Nerve	25/42 (54.3%)
Large Vessel	6/42 (13.0%)

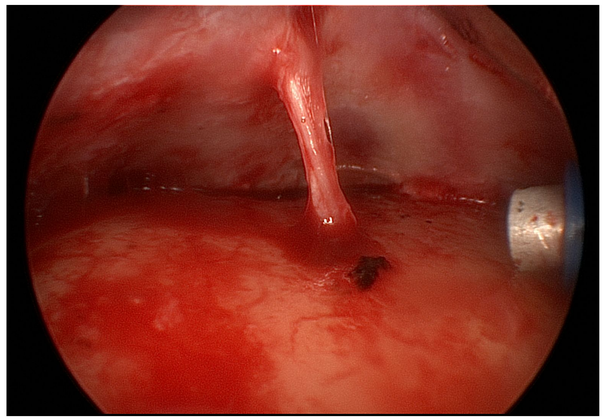
Table 2. Intra-operative frontotemporal nerve anatomy



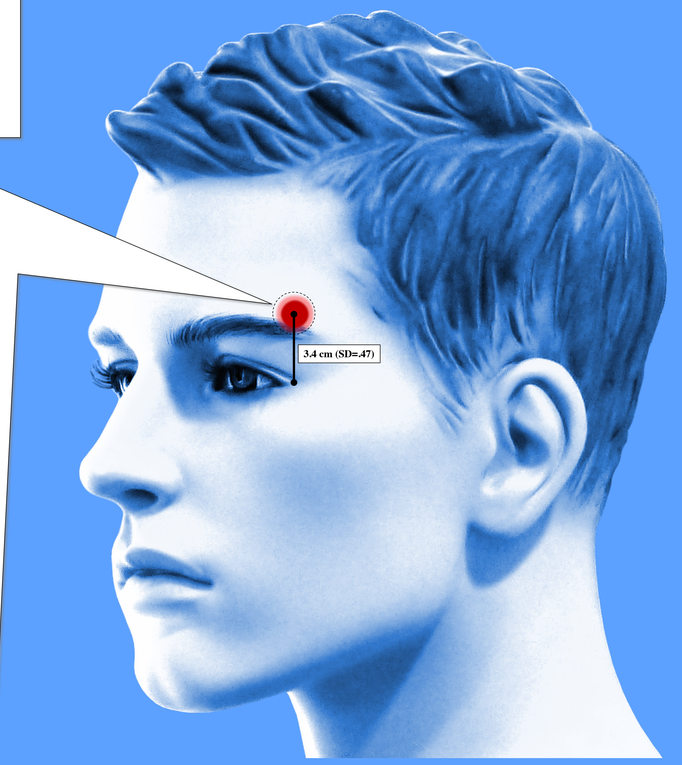
Unilateral Left x2, Average Size, Vessel



Small Size Nerve, No Vessel



Large Size Nerve and Vessel



Conclusion

The identification and avulsion of this newly described sensory frontotemporal nerve may lead to better surgical response rate during migraine surgery. Additionally, this nerve should be considered during nerve block and onabotulinum toxin injections to improve outcome and accuracy of migraine treatment. A review of available anatomical textbooks and current literature did not yield a nerve similar to the one described here, and our description of this newly discovered nerve may have implications for other anatomical and surgical uses.

References

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