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Editorial

Nerve Decompression Surgery in Patients Suffering from Chronic Migraine

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A major research interest of mine is in the treatment of migraines with surgical techniques. First discovered by Dr. Guyuron, as a side effect of forehead rejuvenation surgical nerve decompression in select patients has shown tremendous promise in alleviating symptoms of patients previously diagnosed with migraines. There is now significant clinical evidence to demonstrate the effectiveness of these procedures when properly indicated. The health burden of migraine headaches makes additional research in this area indicated. Estimates point to up to 35 million Americans and 1 in 4 households affected [1,2]. Further, up to one third of patients are refractory to traditional treatments. Economic burden estimates of migraine patients on the American population are vast. It has been estimated that 112 million workdays and $14 billion dollars in productivity are lost per year [3]. Patients incur yearly costs that range from 552 to 7089 U.S. dollars [4].

The full health burden, in terms of quality of life on migraine patients is difficult for to estimate. Thus, we have used standardized utility metrics to study the health-related quality of life in patients with refractory migraine headaches seeking surgical treatment. Results showed the subjective health burden scoring similar to that of deformities causing a need for face transplant and chronic kidney disease requiring hemodialysis [5,6].We are currently awaiting results of a survey to the general population to assess their idea of the health burden migraine patients have. Since Guyuron's initial study into the relationship between corrugator supercilii muscle resection and migraine headaches, renewed focus on patients with possible peripheral neuropathy that contributes to their symptoms has led to renewed vigor investigating newer methods of treatments. It has been proposed that compression of trigeminal and cervical nerve branches may in some patients lead to a process similar to other compression neuropathies such as carpel tunnel syndrome. Multiple trigger sites leading to migraine symptoms have been identified through various anatomical studies and diagnostic tools. These include frontal, temporal, occipital, and intranasal sites.

Contributing to this theory of nerve compression is the efficacy of Botox as a treatment for migraine headaches. Botox is a presynaptic nerve inhibitor, an effective treatment of refractory migraine headaches [7-9], and it is now FDA-approved for this indication. Botox has also been used as a diagnostic tool to determine patients suitable for migraine surgery, leading to improved outcomes [10].Current literature supports that approximately 80% of migraine sufferers who qualify will experience significant improvement in symptoms after undergoing this procedure [11]. This has been shown in retrospective and prospective studies[12]. Seven studies (four prospective, two retrospectives, and one randomized controlled trials were reviewed in a meta-analysis in 2011 and showed response rates from 67 to 92% [13]. Five-year outcome studies demonstrated long-lasting and stable relief [14]. Further, Faber's socioeconomic analysis of migraine surgery patients showed nearly $20,000 U.S. dollar savings per patient in 5 years and about 40 fewer doctor visits and 40 fewer missed workdays lost to illness. A 2016 analysis investigated patient Facebook group responses to their experiences with migraine surgery. Member posts were analyzed with the idea that social media presents a unique opportunity to analyze unsolicited responses to the surgery. 81% of patients reported complete or partial improvement of symptoms, comparable to the range of efficacy found in previous literature. At Massachusetts, General Hospital, a proper algorithm for patient selection was investigated that involved identification of trigger points with clinical evaluation and diagnostic testing. Critical analysis of migraine headache surgery highlights the need to adhere to well-validated algorithms for patient selection and close collaboration with patients' neurologists [15].

The highly successful run of trials and analyses has led to increased research into the role peripheral nerves may play in migraine physiology and the surgical treatment of migraine head-

aches. Trigeminal nerve branches in patients with and without migraines suggested evidence of axonal abnormality and deregulation of myelination using both proteomic and electron microscopy analysis; this serves as the first objective study supporting the peripheral nerve compression theory of migraine headaches [16]. A 2010 study used the NIH Interview Survey to analyze data from over 25,000 respondents and show an association between carpel tunnel syndrome and migraines. CTS prevalence in patients with migraine headache was 8% compared with 3% in those without migraine headache, furthering the theory of a peripheral nerve compression contribution to the migraine population[17].Hagan et al described a new term, "Supraorbital Rim Syndrome" or SORS to establish a more consistent nomenclature for a constellation of frontal trigger sites causing frontal headaches. They further proposed that the best approach for these patients is the transpalpebral approach due to its direct exposure of all SORS anatomical sites and easily concealed incision. In conclusion, this is a heavily researched, but still evolving new treatment to help people with high disease burden that significantly affects quality of life. The efficacy of this procedure is based on sound evidence, is safe, effective, and can result in significant cost saving. Still, there is much work to be done to improve outcomes and better select appropriate patients. The scientific community and vast migraine patient population will benefit from these further studies.

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