

Endoscopic forehead surgery for migraine therapy

Personal technique



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AIM: The aim of this study is to prove the therapeutic effectiveness of nerve decompression, performed endoscopically for frontal migraine and by open surgery for occipital migraine.

MATERIALS AND METHODS: Twenty patients were enrolled and underwent surgery for endoscopic resection of the glabellar muscle group, including the corrugator supercilii, depressor supercilii, and procerus muscles, while the occipital decompression was performed in open surgery through decompression of occipital nerves from occipital, semispinalis capitis, trapezius and sternocleidomastoid muscles. Every patient was diagnosed with: migraine without aura, chronic tension-type headache and new daily persistent headache, refractory to medical management.

RESULTS: Analyzing the answers given by the patients to validated questionnaires, 9 referred alleviation of migraine symptoms (45%), 8 described elimination of their migraine headaches (40%) while 3 didn't report any improvement.

DISCUSSION: Our data confirmed the results of previous studies, pointing out the effectiveness of trigeminal branches and occipital nerves (trigger points) decompression from the surrounding muscles. Moreover, our technique has the same results but it's less invasive and has less collateral effects.

CONCLUSIONS: Our results highlight migraine surgery as an effective treatment for patients with migraine headaches who do not tolerate or do not wish to continue medical interventions.

KEY WORDS: Endoscopic surgery, Headache migraine

Introduction

Migraine headache is a primary neurologic disorder that is characterized by recurrent and debilitating episodes of headache accompanied by a variety of symptoms including nausea, vomiting, photophobia, phonophobia, sen-

sory auras, and even aphasia, hemiplegia, or vertigo¹. Only in the United States, the prevalence of headache migraine is approximately 18 percent in women and 6 percent in men¹. One-third of migraine sufferers are not helped by standard therapies, and even the most effective medical protocols can only reduce the headache attacks frequency and intensity, but can not lead to a complete healing¹⁻². The traditional etiology for headaches migraine has always been thought to be related to central neurovascular phenomena³. Only in 2000, when Guyuron et al.² described elimination or improvement in migraine headaches after corrugator supercilii muscle resection in patients undergoing forehead rejuvenation surgery, took step the idea that migraine etiology could be peripheral and determined by overstimula-

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tion of nerve branches (trigger points). From that moment on, many studies had been carried out ⁴⁻⁵, which confirmed the efficacy of surgical deactivation of migraine trigger points (i.e. forehead headache: supraorbital and supratrochlear nerves; occipital headache: great and lesser occipital nerves) ⁶.

In early 2005, treatment protocols were as follows ⁷: patients with frontal migraines underwent resection of the glabellar muscle group, including the corrugator supercilii, depressor supercilii, and procerus muscles, using a palpebral incision to access to the supraorbital and supratrochlear nerves; for migraines originating from the occipital region, a small portion of the semispinalis capitis muscle surrounding the greater occipital nerve was removed and the nerve was shielded from the muscle with a subcutaneous flap. At the end of the same year, Walden *et al.* ⁸ highlighted through cadaver studies that using a palpebral access, the glabellar muscles resection was not completely performed, since more than one-third of the corrugator supercilii muscle remained in place.

Materials and Methods

PATIENTS SELECTION

In this study, 20 patients were enrolled, 16 female and 4 male, age ranged from 27 to 72 years, and underwent bilateral resection of the corrugator supercilii, depressor supercilii, and procerus muscles performed endoscopically and/or selective occipital myotomy of occipital, semispinalis capitis, trapezius and sternocleidomastoid muscles. Selected patients were diagnosed with ⁹: migraine without aura with more than 15 days per month of headache, lasting for more than 6 months; chronic ten-

sion-type headache with more than 15 days per month of headache, lasting for more than 6 months; new daily persistent headache attacks with more than 15 days per month of headache, lasting for more than 6 months. Patients diagnosed with cluster-headache, episodic tension-type headache, secondary headaches and affected by major psychiatric disease were barred from this study.

SURGICAL PROCEDURE

Local anesthesia was injected in the occipital region or in the forehead, depending on which area had to be treated; the first injections were where the affected nerves are supposed to be, in order to lower the pain. Useful landmarks to find the supraorbital and supratrochlear nerves are the mid-pupil and the mid-face lines: the supraorbital nerve is at 2.7 cm from the mid-face line, approximately on the mid-pupil line; while the supratrochlear nerve can be found 1.7 cm medially¹⁰. In the surgery of the forehead, two 1-cm incisions were made symmetrically above the frontal hairline, both were positioned 4 cm from the mid-line. At present, we have reduced the number of incisions, performing only one 1.5 cm incision on the mid-line, behind the frontal hairline. Then, starting from the incisions, the skin and the frontal muscle were undermined to reach the glabellar region, in order to show the insertions of the corrugator supercilii, depressor supercilii, and procerus muscles. Now the glabellar muscle group was bilaterally resected. All the procedure was performed endoscopically, so that the surgeon was able to perform a complete decompression of the supraorbital and supratrochlear nerves, since he was able to clearly see them. Before introducing the endoscope, the surgeon positioned three suture



Fig. 1: Lifting suture stitches. Before introducing the endoscope, the surgeon positions three suture stitches for each side, in the space between the two nerves, in order to lift the skin and have a clear intraoperative view.

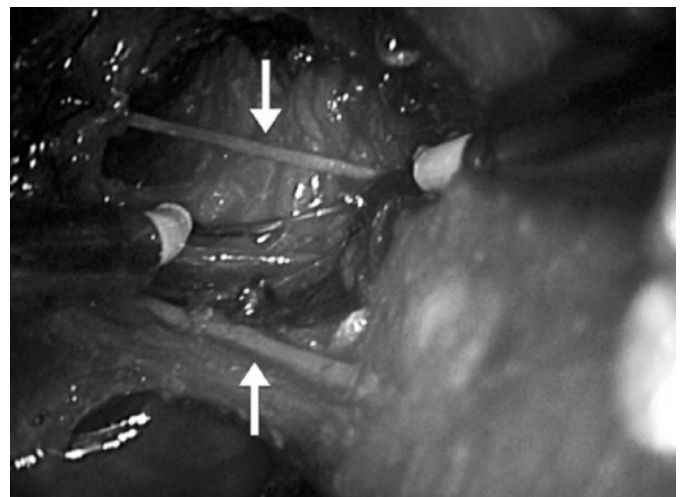


Fig. 2: Intraoperative endoscopic view of the right side of the forehead. From the top to the bottom, the arrows are pointing at the supratrochlear and supraorbital nerves, respectively.

stiches for each side, in the space between the two nerves, in order to lift the skin and have a better view.

In the occipital surgery, having the pulse of the occipital arteries as landmarks, a 5 cm incision was made at the level of the superior nuchal line. Mosser SV *et al.*³ have performed anatomical studies over 20 cadavers in order to describe the course of the great occipital nerve which should be located 3 cm under the occipital bulge and 1.5 cm laterally to the midline. The surgery involved the decompression of both great and lesser occipital nerves through selective resection of occipital, semispinalis capitis, trapezius and sternocleidomastoid muscles.

Both the procedures ended suturing the skin incisions.

Results

Seventeen (85%) patients reported an improvement after surgery, 9 referred alleviation of migraine symptoms (45%), 8 described elimination of their migraine headaches (40%) while nothing had changed for 3 (15%) of them. Three out of four patients, who underwent occipital surgery, completely healed (75%).

Discussion and Comments

The results have been obtained from the answers given by the patients to validated questionnaires, filled at 6 months from surgery. A longer follow-up is then necessary. In 2011, Guyuron *et al.*⁶ reported an 88% success rate after a five-year follow-up of patients which underwent surgery; 29% completely healed, 59% gained improvement, 12% did not show any change. Nevertheless, despite the good results obtained, 5% of the patients that underwent trans-palpebral access surgery or received septoplasty and turbinectomy may be exposed to higher percentage risk for intra-operative bleeding, more noticeable scars, and to a more invasive procedure than if it would have been performed endoscopically; not taking into account the lower compliance of the patients to receive an open surgery¹¹. Moreover the endoscopic technique has already been described for the forehead asymmetry and forehead rejuvenation surgery¹¹. Our results, in agreement to what described by Guyuron¹², comparing the open surgery technique with the endoscopic one, confirmed that the magnification offered by the endoscopic technique provides a better means to preserve the nerves, resect the muscles and identify secondary nerve branches.

Conclusions

Taking into account the possibility, offered by the endoscopic approach, to perform a more complete muscles dissection and the reported good results after a 6-month

follow-up, in our opinion the endoscopic approach for headache migraine therapy has proven to be an effective alternative to the open surgery technique. The advantages⁷⁻¹¹ are a lower risk of bleeding and a better aesthetic outcome of the scars; moreover, it's a less invasive procedure and offers a greater magnification of the treated area¹², which results in a higher success rate. Moreover, this technique can be easily performed under local anesthesia with reduced cutaneous incisions. For these reasons, the endoscopic approach should be considered as first choice¹³.

Riassunto

Da recenti studi volti ad investigare la patogenesi dell'emigrania, è emerso come questa possa essere secondaria ad un meccanismo di ipereccitabilità e infiammazione neuronale conseguente alla compressione di alcuni nervi periferici cranio-facciali, i quali, agendo come "trigger point", possono essere decompressi mediante terapia chirurgica. Scopo di questo studio è stato da un lato quello di valutare i risultati ottenuti, confrontandoli con quelli della letteratura, dall'altro di proporre un approccio personale, endoscopico, mini-invasivo.

In base alla localizzazione della cefalea, la tecnica chirurgica è stata differente. In caso di cefalea frontale, la decompressione dei nervi sopraorbitario e sovraclaveare è stata effettuata mediante una personale procedura endoscopica modificata di miotomie selettive frontali del muscolo corrugatore del sopracciglio, depressore del sopracciglio e del muscolo procer. Per quanto riguarda invece l'emigrania occipitale, la decompressione dei nervi piccolo e grande occipitale è ottenuta attraverso miotomie selettive dei muscoli occipitale, trapezio, semispinale della testa e sternocleidomastoideo. Venti pazienti sono stati inclusi nello studio e sottoposti ad almeno una delle precedenti procedure. In seguito al follow-up a 6 mesi si è osservato che: 9 hanno percepito una sensibile riduzione nella frequenza e/o severità degli attacchi (45%), 8 sono guariti completamente (40%) e 3 non hanno tratto alcun beneficio (15%), per un totale di 85% di pazienti che hanno beneficiato dell'intervento. I dati ottenuti evidenziano l'efficacia dell'approccio chirurgico nella terapia dell'emigrania; inoltre si sottolinea come la tecnica endoscopica permetta di acquisire gli stessi risultati, rispetto alle metodiche tradizionali, con una procedura a minor invasività e a minor rischio di effetti collaterali.

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