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**Greater occipital nerve block using local anesthetics alone or with triamcinolone
for transformed migraine: A randomized comparative study**

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ABSTRACT

Objective: To determine whether adding triamcinolone to local anesthetics increased the efficacy of GONB and trigger point injections (TPIs) for transformed migraine (TM). **Methods:** TM patients were randomized to receive GONB and TPIs using lidocaine 2% and bupivacaine 0.5% + either saline or triamcinolone 40 mg. We assessed the severity of headache and associated symptoms before and 20 minutes after injection. Patients documented headache and associated symptoms severity for 4 weeks after injections. Changes in symptom severity were compared between the two groups. **Results:** Thirty seven patients were included. Twenty minutes after injection, mean headache severity decreased by 3.2 points in group A ($p<0.01$) and by 3.1 points in group B ($p<0.01$). Mean neck pain severity decreased by 1.5 points in group A ($p<0.01$) and by 1.7 points in group B ($p<0.01$). Mean duration of being headache free was 2.7 ± 3.8 days in group A and 1.0 ± 1.1 days in group B ($p=0.67$). None of the outcome measures differed significantly between the two groups. Both treatments were well-tolerated. **Conclusions:** Adding triamcinolone to local anesthetics when performing GONB and TPIs was not associated with improved outcome in this sample of transformed migraine patients.

INTRODUCTION

Migraine is a common neurovascular disorder characterized by episodes of headache, autonomic nervous system dysfunction, gastrointestinal symptoms and, in some patients, aura consisting of transient neurological symptoms.¹ Although typically an episodic disorder, migraine may progress in some patients to a type of chronic daily headache (CDH) called transformed migraine (TM).² The management of patients with TM is challenging. Many of them overuse pain medications, suffer from psychiatric comorbidity and are significantly disabled.³

Greater occipital nerve block (GONB) has been widely used in the treatment of headaches.⁴ The greater occipital nerve (GON) is composed of sensory fibers that originate predominantly at the C₂ level. Its cutaneous distribution covers the posterior part of the head up to the vertex. GONB is frequently combined with trigger point injections (TPIs), done by injecting local anesthetics to tender areas in the cervical paraspinal or trapezius muscles. The use of corticosteroids for GONB and TPIs is controversial. Subcutaneous injections of corticosteroids may result in local (alopecia, cutaneous atrophy) or systemic (Cushing syndrome) adverse effects.^{5,6} It is therefore important to determine whether corticosteroids are beneficial when performing a GONB for headaches.

The aim of this study was to determine whether adding triamcinolone to local anesthetics increased the efficacy of GONB and TPIs in patients with TM.

METHODS

This study was approved by the Institutional Review Board for Studies in Human Subjects of Thomas Jefferson University. All patients provided a written informed consent prior to enrollment. Outpatients with TM who were candidates to receive GONB and TPIs were screened. Included patients were men or women, 18-65 years old, who had TM as defined by Silberstein and Lipton (≥ 15 headache days/month and at least one of the following: a. history of episodic migraine as defined by the international headache society (IHS); b. history of increasing headache frequency and decreasing headache severity; c. current headaches meet the IHS criteria for migraine other than duration) for at least 3 months prior to enrollment.^{2,7} Patients were required to have headache of at least moderate intensity (≥ 5 on an 11 point scale) and occipital tenderness at the time of treatment. They were allowed to use headache preventive drugs during the study period. Patients who had used acute pain medications during the 24 hours prior to the study visit were excluded, as were those who had had any invasive procedure in the occipital area. Other exclusion criteria were impaired sensation in the occipital area, any neurological or dermatological disease that may have affected skin sensation, and cluster headache. Patients were enrolled from June 2005 until March 2006.

A 10 mL syringe containing 4.5 mL of lidocaine 2%, 4.5 mL of bupivacaine 0.5% and 1 mL of either saline (group A) or triamcinolone 40 mg/mL (group B) was prepared for each patient. Patients were given bilateral GONB and TPIs in the cervical paraspinal and trapezius muscles bilaterally. Using a 25 gauge needle, 2 mL were injected to each GON at the medial third of the distance between the occipital protuberance and the mastoid process. In addition, 0.5 mL was injected to each of the twelve trigger points. The total injected volume was 10 mL. Patients were randomly assigned to either group A or group B and were blinded to the type of treatment they received. All patients were injected by a single physician (AA), who was not blinded to the type of treatment given. Demographic data were collected. Headache severity was assessed on an 11-

point scale. Neck pain, photophobia, phonophobia and nausea/vomiting severity were assessed on a 4-point scale. Patients were assessed prior to being injected and 20 minutes thereafter. Patients were given a calendar to document headache, neck pain, associated symptom severity and use of acute pain medications on a daily basis for four weeks after treatment. We calculated the time of being headache-free and the duration of headache response (defined as a decrease in headache severity from severe to moderate, mild, or none; or a decrease from a moderate headache to mild or none) after treatment. Within each group, symptom severity and acute pain medication use (measured as number of doses per month) were compared to a historic baseline of four weeks prior to treatment.

Changes in symptom severity and other measured parameters were compared between the two treatment groups, both at the 20-minute and at the four-week time points. The primary outcome measure was the change in mean headache severity from before injection to 20 minutes after in the two groups. Secondary outcome measures were: the change in mean neck pain, photophobia and phonophobia severity from before injection to 20 minutes after in the two groups, the duration of treatment effect on headache in the two groups, and the change in acute pain medication use at the four-week time point compared to baseline in the two groups.

Statistical analysis

Fisher's exact test was used to compare nominal variables between groups. Interval and ordinal variables were compared between independent groups using the Wilcoxon rank-sum test and between dependent or paired groups using the Wilcoxon signed-rank test. A p value of <0.05 was considered to reflect statistical significance.

RESULTS

Thirty seven patients were included (18 in group A and 19 in group B). There were no significant between-group differences in age, gender, disease duration and prevalence of medication overuse (table 1).

	All patients (n=37)	Group A (local anesthetics alone) (n=18)	Group B (local anesthetics plus triamcinolone) (n=19)	p value
Age (years) mean±SD	41.1±10.0	41.9±11.3	40.3±8.9	0.402
Median	41.0	46.0	41.0	
Range	19-61	19-61	23-58	
Gender - % (n)				
Female	83.8 (31)	77.8 (14)	89.5 (17)	0.405
Male	16.2 (6)	22.2 (4)	10.5 (2)	
Disease duration (years) mean±SD	19.9±12.8	23.1±13.0	16.9±12.2	0.094
Median	17.0	20.0	15.0	
Range	2-52	3-52	2-47	
Medication overuse headache - % (n)	54.1 (20)	50.0 (9)	57.9 (11)	0.746

Twenty minutes after injection, mean headache severity decreased by 3.2 points (7.1 ± 1.9 to 3.9 ± 2.8 , $p < 0.01$) in group A and by 3.1 points (6.3 ± 1.5 to 3.2 ± 2.6 , $p < 0.01$) in group B (figure 1). Mean neck pain severity decreased by 1.5 points (2.3 ± 0.5 to 0.8 ± 0.7 , $p < 0.01$) in group A and by 1.7 points (2.2 ± 0.6 to 0.5 ± 0.8 , $p < 0.01$) in group B. Mean photophobia level decreased by 0.6 points in both groups (1.5 ± 1.1 to 0.9 ± 0.9 , $p < 0.01$ in group A; 1.4 ± 1.0 to 0.8 ± 1.0 , $p < 0.05$ in group B). Mean phonophobia level decreased by 0.3 points (0.9 ± 1.0 to 0.6 ± 1.0 , $p = 0.24$) in group A and by 0.6 points (1.1 ± 0.9 to 0.5 ± 0.7 , $p < 0.01$) in group B. Mean nausea/vomiting severity did not change significantly after injection in either group. The changes in symptom severity from baseline to 20 minutes after treatment did not differ significantly between the two groups.

Twenty-four patients (65%) returned the four-week symptom calendar (11 [61%] from group A and 13 [68%] from group B). The mean duration of being headache free was 2.7 ± 3.8 days in group A and 1.0 ± 1.1 days in group B ($p = 0.67$). The mean duration of headache response was 14.3 ± 15.1 days in group A and 5.5 ± 4.9 days in group B ($p = 0.60$). Mean use of analgesics decreased by 19.3 doses per month in group A and by 10.9 doses per month in group B. None of these outcomes differed significantly between the two treatment groups. The results were robust to adjustment for age, gender and disease duration. Both treatments were well-tolerated, with no adverse events being reported by any patient.

DISCUSSION

The rationale of performing a GONB for the treatment of headache is based on the anatomical connections between trigeminal and upper cervical sensory fibers at the level of the trigeminal nucleus caudalis.^{8,9} Few studies thus far have examined the efficacy of GONB in the treatment of headaches.¹⁰⁻¹⁵ Although generally positive, the methodologies of some of the studies were limited by the lack of a standardized treatment protocol or a retrospective design.

In our study, adding triamcinolone to local anesthetics when performing GONB and TPIs did not result in improved outcome. In both groups, the procedure resulted in significant and rapid relief of headache, neck pain, photophobia and phonophobia. Nausea and vomiting did not improve, possibly because some patients feel transiently nauseated after the injections.¹⁶ Four-weeks post treatment, there were no significant differences in symptom relief between the two groups, although the response to treatment of patients who received triamcinolone tended to be shorter than that of patients who received local anesthetics alone. The duration of response to treatment in our study was shorter than that observed by Afridi et al.¹⁵ This may be explained by a difference in the patient population and in the type of corticosteroid used in the two studies. We did not require that the patients report on cranial anesthesia following GONB. Supporting our methodology, a recent study showed that an anesthetic effect of GONB was not predictive of a positive outcome, whereas the presence of occipital tenderness was.¹⁵

This study has several limitations: 1. The injecting physician was not blinded to the type of treatment administered. 2. The follow-up assessment was done at 4 weeks, based on our clinical

experience with the duration of GONB effects. A longer follow up may have detected significant between-group differences in outcome measures. 3. Given the lack of scientific data as to the optimal corticosteroid to use in this setting (if any), the choice of triamcinolone was empiric. 4. With the obtained number of subjects, our study could only provide 80% power to detect a large (i.e., 0.80 standard deviation) difference in means between groups.¹⁷ Since we hypothesized that there would be no difference between the groups, however, it would have been preferable to power the study to detect a minimal (e.g. 0.20 standard deviation) difference. Our study provides preliminary data that should be confirmed by further, larger studies.

STATEMENT:

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FIGURE LEGENDS:

Figure 1: mean headache severity before and 20 minutes after treatment in the two groups.

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