The Effect of Bilateral Block of Greater Occipital Nerve on Chronic Migraine

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ABSTRACT

Objective: The purpose of this study is to examine the effect of bilateral block of greater occipital nerve on chronic migraine pain level.

Methods: To achieve the purpose of the study one group pretest-posttest quasi-experimental design was used. Thirty patients participated in the study during their regular visits to the pain clinic in King Hussein Medical Center. All participants received Greater Occipital Nerve Block by steroids and a local anesthetic agent injection. The pain intensity was measured by the Numeric Rating Scale.

Results: The study showed that Greater Occipital Nerve Block significantly reduce migraines pain levels.The mean of pain intensity decreased from 7.33 to 4.80, on a scale of 0 to 10, and lasting to a significant level out to three months ($P<0.001$). The average of weekly number of total migraine attacks also declined significantly from 4.15 to 1.56 attacks per week.

Conclusion: Despite current advancements in oral medications, migraine pain is still undertreated. Greater Occipital Nerve Block can be used to relieve migraine induced pain and improve patients' function and quality of life.

Key Words: Greater Occipital Nerve, Migraine, Pain management

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Introduction

Migraine is a chronic primary headache disorder that is caused by an inflammatory process that affects both neural and vascular functions of the brain (Levy, 2009; World Health Organization [WHO], 2016). The prevalence of migraines is age and gender related; it is more common among females than males and people with age cohort between 35 to 45 years (Lipton, et al. 2001; Stewart, Lipton, Celentano& Reed, 1992; WHO, 2016). Migraine headaches have many recognizable features such as chronic recurrent pain attacks ranging from moderate to severe in its intensity and pulse-like pain. Usually associates with nausea, involves unilateral side of head, and its duration and frequency are widely different ranging from hours to days (WHO, 2016). Patients with migraines report several life problems due to the existence of pain. These problems may change the entire life style of the patients by causing substantial limitation in their physical and functional activities (Lipton, et al. 2001). Examples of migraine related side effects are impaired quality of life, decreased productivity level, complete bed rest, job loss, school and work absenteeism, social isolation, and inability to do free time activities (Dueland, Leira, Burke, Hillyer&Bolge, 2004; Terwindt, et al. 2000) Health care providers help patients

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to relieve migraine pain and mitigate their suffering by providing medications that have the highest level of evidence, when appropriate (Bigal, et al. 2008). Although oral medications is the typical treatment, sometimes these medications fail to relieve migraine pain and patient's suffering continues (Saracco, Valfre, Cavallini&Aguggia, 2010). Greater Occipital Nerve Block (GONB) is an alternative treatment option that showed to be an effective migraine pain reliever (Ashkenazi & Levin, 2007; Khatir, Panahkhahi, Nasiri, Ramim, Toghae, 2012). The reasoning for utilizing GONB in migraine headache treatment stems from the anatomical connections between both upper cervical sensory fibers and trigeminal fibers. The connection occurs at the level of trigeminal nucleus caudalis neurons and the junction of sensory input to trigeminal nucleus caudalis neurons from both cervical and trigeminal fibers(Ashkenazi & Levin, 2007; Piovesan, et al. 2001). However, the objective of a GON block is to block the pain messages sent to the brain along the GON. The mechanism of GONB in relieving migraine headaches is unknown (Ashkenazi & Levin, 2007). However, a hypothesis suggested that GONB includes inhibition of the excitability of electrical stimulation of the GON by local anesthetic agents with steroids (Bartsch& Goadsby, 2003). There is an evidence has suggested that pain relief in migraine headaches can be achieved by local injections of local anesthetics, steroids, or a mixture of both in the area of the greater occipital nerve (Ashkenazi & Levin, 2007; Khatir, et al. 2012; Lavin & Workman, 2001). GONB can be performed by headache specialists, neurologists, pain management specialists or anesthetists (Khatir, et al. 2012; Lavin & Workman, 2001).

Research hypotheses

Two hypotheses were tested in this study. The first hypothesis was that participants receiving the GONB procedure would have less migraine pain after the block. The second hypothesis was that decreased pain level will persist until three months after doing the procedure.

Methods

Study design

This study used one group pretest-posttest quasi-experimental design to evaluate the effect of GONB on the chronic migraine pain level. The researchers used this design due to its property to examine the differences between the baseline pain intensity scores before the study intervention, which is GONB, and pain intensity scores after the intervention. In other words, this design helps to highlight the benefits of GONB itself for the same patients (Polit& Beck, 2010).

Setting and samples

Study participants were selected through convenience sampling method. Study participants were invited to participate in the study during their regular visits to the pain clinic in King Hussein Medical Center. The inclusion criteria were (1) patients with age of eighteen years or more (2) being diagnosed with chronic migraine (3) having no history of psychiatric disease (4) having no contraindication of GONB (e.g. head injuries, thrombocytopenia, and uncontrolled hypertension) (5) sign a consent form of the procedure.

Study Procedure

All participants who agreed to participate received GONB, which was carried out by an anesthetist who is an expert in conducting nerve blocks. Steroids with a local anesthetic agent were injected into each GON at the medial third of the distance between the occipital protuberance and the mastoid process. Particularly, a 10-ml syringe containing 4.5 ml of lidocaine 2%, 4.5 ml of bupivacaine 0.5% and 1 ml of methyl prednisolone 40 mg/ml was prepared and given for each patient. Pulse rate, blood pressure and blood oxygenation were monitored during the procedure. The pain intensity was measured by the Numeric Rating Scale (NRS) (0–10 scale; where 0 = no pain and 10 = most severe pain). The efficacy of

treatment was evaluated by (1) the number of total headache attacks per week before and after GONB, (2) pain scores before GONB, (3) pain scores after thirty minutes of GONB (4) pain scores after three months of GONB.

Statistical analysis

Data analysis was done using Statistical Package for Social Sciences version 19 (SPSS Inc., Chicago, IL, USA).A paired t-test was used to assess differences in participants' self-reported pain severity level in three periods of time: (1) before GONB, (2) after procedure, and (3) three months of doing GONB. Unless otherwise stated, data were presented as mean (standard deviation) and P< 0.05 was statistically significant.

Ethical considerations

Research ethical principles were effectively adhered to and all strategies that safeguard the rights of the study participants were preserved. For that, ethical approval was obtained from the Royal Medical Services' IRB and informed consent forms were signed by each participant with a guarantee of anonymity and confidentiality.

Results

Table I shows that thirty patients participated in the study (18 males and 12 females). Mean age was 33.5 years. 22 patients were affected by migraine with aura and 8 by migraine without aura. The onset of migraine ranged from 4 years to 20 years of age. The mean of migraine headache attacks was 4.15 weekly. The mean of reported pain severity levels before GONB was 7.33 (on a scale of 0 to 10). Most of the patients were receiving oral medications to treat their migraines when participating in the study. The results of analysis indicated that three measures of pain severity were significantly different from each other (P < 0.05). The study showed that pain level was significantly reduced after thirty minutes of the blockade (P = 0.035). The mean of pain intensity decreased from 7.33 to 4.80, on a scale of 0 to 10, and lasting to a significant level out to three months; mean of pain scores was 3.45 (*P*<0.001). The average of weekly number of total migraine attacks also declined significantly from 4.15 to 1.56 attacks per week.

Table I: Study Participants' Characteristics, and Differences in Migraine Severity and Attacks Before and After GONB (N = 30).

Variable	Frequency (%)	Mean (SD)	*P*-value*
Gender			
Males	18 (60%)		
Females	12 (40%)		
Migraine with aura	22 (73%)		
Migraine without aura	8 (27%)		
Participants' age		33.5 (±4.20)	
Migraine episodes/ week before GONB		4.15 (±1.34)	
Migraine episodes/ week after GONB		1.56 (±1.12)	0.035
Pain severity before GONB		7.33 (±1.50)	
Pain severity after thirty minutes of GONB		4.8 (±1.2)	0.020
Pain severity after three months of GONB		3.45 (±1.34)	<0.001

Note. * P-value is significant if P < 0.05. GONB: Greater Occipital Nerve Block

Discussion

Findings of this study showed that the study participants reported a relatively high baseline migraine induced pain level (Mean=7.33±1.50). Although most of them were receiving oral medications, the reported level of pain showed that oral medications alone could not be effective enough to control migraine induced pain. Consistent with that, there are several research findings thathave supported the evidence of the superior effectiveness of GONBover the oral medications in chronic migraine treatment (Caputi&Firetto, 1997; Çatav, Alkaya, &Kırdemir 2017; Cook et al.

2006; Tobin &Flitman, 2009; Ünal-Artık, İnan, Ataç-Uçar, &Yoldaş, 2017).Most patients in this study reported a substantial pain relief immediately after the procedure. The mean of pain level decreased from 7.33 to 4.80, which was measured by NRS. Significant immediate pain relief after the procedure indicated a significant effectiveness of GONB procedure to control migraine headache. This result is consistent with other studies' findings (Caputi&Firetto, 1997; Cook et al. 2006; Ünal-Artık, et al. 2017). Cook et al. (2006) studied the effectiveness of GONB in relieving migraine headaches among 25 patients diagnosed with chronic migraine. The study showed that pain declined about 64% after 5 minutes of the procedure. Similar findings were also revealed by Çatav, et al. (2017). The researchers found that the average migraine pain level declined from 9.28 to 2.96 after the GONB. Another remarkable finding which was revealed by this study was the sustainable pain reduction effect of the GOMB. The study found that the effect of GONB persisted significantly for a follow upperiod of three months. The long term effect of GONB, was also reported by other research (Caputi&Firetto, 1997; Çatav, et al. 2017; Nurten, Inan, Coşkun, Tuğba, &Ilhan, 2016;Okmen, Dagistan, Dagistan, Kaplan, & Cancan, 2016). The long term effect of GONB can be presented by decreasing in the level of pain or decreasing in the total number of migraine attacks. Caputi&Firetto (1997)found that the total number of migraine attacks decreased significantly throughout the six months after GONB, among a sample of 29 patients. Also, Nurten, et al. (2016) found a significant decrease in number of migraine attacks after the GONB. Specifically, the number of migraine episodes reduced from 15.73 to 4.52 after three months of the treatment (Nurten, et al. 2016). In addition to pain relieve effect, Okmen, et al. (2016) found that GONB improved the total patients' conditions in terms of enhancing their abilities to perform their daily activities normally.

Conclusion

Despite current advancements in oral medications, migraine pain is still under treated. Greater Occipital Nerve Block can be used to relieve migraine induced pain and improve patients' function and quality of life.

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