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Interventional Techniques for Chronic Low Back Pain and Migraine Headaches: Development of Educational Pamphlets

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Executive Summary

Introduction of the Problem

Millions of Americans are affected by chronic low back pain and migraines. According to the Centers for Disease Control and Prevention (CDC), chronic low back pain affects over 50 million adults in the United States, while migraines affect more than 39 million Americans. (CDC, 2018; Migraine Research Foundation, 2019). In the U.S., the annual cost of low back pain and migraines is greater than $150 billion, mainly due to lost productivity (Legget et al., 2014; National Headache Foundation, 2019). The recent opioid epidemic has created more demand for alternative pain management remedies. In 2017 alone, nearly 50,000 people died due to opioid overdose (CDC, 2019).

For many patients, the terminology of healthcare is difficult to understand. The limited amount of time spent with practitioners is not adequate to facilitate proper education. On the other hand, some practitioners may be unaware of the non-opioid therapies that are available. To address these problems, we collaborated with a critical access hospital in rural Illinois to create and distribute educational materials in the form of pamphlets to patients regarding interventional techniques for the management of chronic back pain and migraine headaches. Additionally, a presentation on available alternative interventions and their benefits was given to practitioners who will potentially refer patients to the pain clinic.

Literature Review

Rhizotomy, another term for Radiofrequency ablation (RFA), is a minimally invasive procedure that uses radiofrequency waves delivered through a needle to interrupt pain from being sent to the brain (Lockeretz,2019). Low back pain affects up to 90% of the population today, making it the most common type of pain in modern times (Rimalpudi & Kumar, 2017).

Lower back pain can be caused by injuries to several structures, including lumbar vertebral bodies, intervertebral discs, facet joints, spinal nerves, the surrounding muscles, and ligaments. Sacroiliac joint (SIJ) dysfunction affects up to 30%, while lumbar facet joints affect up 40% of people with back pain (Rimalpudi & Kumar, 2017). About 10 percent of these patients' back pain becomes chronic (Choi et al., 2016; Rimalpudi & Kumar, 2017).

The target structures of RFA include the lateral branches of the sacral rami, the dorsal ramus of L5, and the ligamentous structures overlying the joint (Choi et al., 2016). To perform successful RFA, the nerve that is responsible for the pain pathway must be identified. As such, it is imperative that proper differential diagnosis of the exact source of the back pain is conducted for more precise identification of the pain generator nerve (Ibrahim et al., 2019). Utilization of peripheral nerve blocks and intra-articular steroid shots is not only useful in short term pain relief but also as a good predictor of RFA success (Choi et al., 2016). To ensure effective RFA, it is recommended to denervate multiple potential sources of pain, including the intra-articular joint, lateral sacral branches of S1–3, and the L5 dorsal ramus (Choi et al., 2016).

RFA intervention has been attributed to a significant long-term reduction in chronic low back pain (Ibrahim et al., 2019; Rimalpudi & Kumar, 2017). Following three-month interval follow-ups, patients who underwent RFA for low back pain continued to report a reduction in the severity of their pain for up to two years (Ibrahim et al., 2019). Further, patients who received RFA were able to distinguish secondary pain that was previously masked by primary back pain (Rimalpudi & Kumar, 2017). It is important to note that pain relief from RFA may be temporary, necessitating additional treatments within six months to a year (Jeong et al., 2014).

This phenomenon is attributed to the ability of the medial branch of the dorsal ramus to regenerate after RFA denervation (Jeong et al., 2014).

Migraine headaches affect roughly 11 to 15 percent of the world's population (Castaldo et al., 2019; Binfalah et al., 2018). It is a debilitating condition that can last for days. There are a variety of treatments available to patients, such as nonsteroidal anti-inflammatory drugs, acetaminophen, analgesics, triptans, and antiemetics. Many of these medications carry unwanted side effects, and their efficacy is less than optimal (Binfalah et al., 2018). For those reasons, alternative remedies such as greater occipital nerve blocks, sphenopalatine ganglion nerve blocks, and Botox injections are used in the treatment of migraine headaches.

Greater occipital nerve blocks are an opioid-sparing, nonpharmacological method for the treatment of migraine headaches. The greater occipital nerve originates from the C2 dorsal root and is the primary sensory nerve in the occipital zone (Chen et al., 2018; Aledo-Serrano et al., 2017). Administration of local anesthetics and corticosteroids, such as 2ml of 0.5% bupivacaine, 1ml of 2% lidocaine, and 0.5ml (20mg) methylprednisolone are administered through a needle introduced into the inferolateral facet of the occipital protuberance (Allen et al., 2018). With greater occipital nerve blocks, afferent input to the trigeminal nucleus caudalis is decreased (Allen et al., 2018). This reduces neuronal hyperexcitability in the second-order neuron through central pain modulation (Allen et al., 2018). Two double-blind, randomized, placebo-controlled clinical trials by Cuadrado et al. (2017) and Kashipazha et al. (2014) showed migraine improvements with greater occipital nerve blocks. The average pain scores decreased with treatment and the number of headache days went down as well (Kashipazha et al., 2014).

Sphenopalatine blocks target the sphenopalatine ganglion, which is located within the pterygopalatine fossa (Cady et al., 2015). It is posterior to the middle turbinate and is the largest

extracranial collection of neurons (Cady et al., 2015; Mehta et al., 2019). The trigeminal nerve provides innervation through the maxillary division to the sphenopalatine ganglion (Cady et al., 2015; Robbins et al., 2016). Transnasal and suprazygomatic are two approaches to anesthetizing these nerves. The easiest approach is transnasal with cotton pledgets or cotton swabs soaked with local anesthetic. The patient is placed in the supine position, and the cotton swabs are advanced roughly 6cm into the nares for 5 minutes (Grosh & Ayubcha, 2018). This is usually repeated three times each visit, and patients can have the procedure done frequently, even twice a week. (Grosh & Ayubcha, 2018; Charlestion et al., 2015). A double-blind, placebo-controlled study by Cady et al. (2015) used 0.3ml of 0.5% bupivacaine and saline as a placebo. Twelve series of treatments were performed over six weeks on patients. The study by Cady et al. (2015) had baseline pain scores for the treatment group and control group that were nearly equal before the procedure. By the 12th week, pain scores for the treatment group were lower than baseline and lower than the control group as well (Cady et al., 2015). The suprazygomatic technique is considered to be more accurate than the trans nasal technique (Mehta et al., 2019). However, it is more challenging and carries more risk (Mehta et al., 2019). Caution when performing these techniques is essential to avoid palsies of the abducens and facial nerves (Mehta et al., 2019). A retrospective study by Mehta et al. (2019) evaluated the effectiveness of the suprazygomatic sphenopalatine block. In the study, results showed a statistically significant decrease in inpatient pain scores, with a decrease in the median pain score from eight to two on the Likert pain scale (Mehta et al., 2019).

Onabotulinumtoxina, also known as Botox, is a neurotoxin that inhibits nerve impulses by blocking presynaptic acetylcholine release (Ninan & Sayyed Farhan, 2009; Lyseng-Williamson & Frampton, 2012). This results in decreased muscle contractions related to the

blockade of overactive nerve impulses (Lyseng-Williamson & Frampton, 2012). Various studies have demonstrated the effectiveness of onabotulinumtoxina in reducing pain associated with migraine headaches such as Aurora et al. (2010). It is theorized that the inhibition of nociceptive mediators released from afferent neurons is responsible for decreasing pain (Blumenfeld et al., 2017). Onabotulinumtoxina is administered in 7 different muscle groups (Blumenfeld et al., 2017). These seven muscles include the corrugator, frontalis, temporalis, occipitalis, cervical paraspinal, and trapezius muscle (Blumenfeld et al., 2017). A large double-blind, randomized placebo-controlled study by (Aurora et al., 2010) suggests injecting 155 units of onabotulinumtoxina in 31 sites across these seven muscle groups. Results from Aurora et al. (2010), Ninan & Sayyed Farhan (2009) showed that onabotulinumtoxina for migraine treatment is effective at reducing pain and the number of headache days.

Methodology

The purpose of this project was to educate healthcare providers and patients about alternative therapies for migraine headaches and chronic low back pain. Numerous studies such as Aurora et al. (2010), Cady et al. (2015), Choi et al. (2016), Kashipazha et al. (2014), & Rimalpudi & Kumar (2017) suggest that these treatments may help alleviate pain while reducing the number of opioids that are being prescribed to patients. To curb the rampant opioid addiction crisis, it is crucial to offer alternative opioid-sparing therapies. A presentation was held at a critical access hospital in Central Illinois. It outlined the evidence surrounding greater occipital nerve blocks, sphenopalatine blocks, and Botox for the treatment of migraine headaches, as well as radiofrequency ablation for the treatment of chronic low back pain. Pamphlets related to these alternative therapies were distributed to the providers so that they can give them to their patients who are considering such treatments. We hope the brochures will enhance patient knowledge

about the alternatives to opioid medications and help combat the ongoing opioid epidemic crisis. The presentation was for healthcare workers only, such as primary care physicians, ER Physicians, and nurse practitioners. These healthcare workers are in direct contact with the public, which allows them to refer any potential candidates to the pain clinic. Following the end of the presentation, a survey was administered to healthcare workers.

This project is a quality improvement project, and it was deemed exempt by the Institutional Review Board (IRB) at Southern Illinois University Edwardsville as a non-research-based project. It did not involve any interactions with patients or the collection of patient information. To minimize potential risks to participants, no personal identifiers were collected other than participant title.

Evaluation

This project evaluated physicians, CRNAs, and other healthcare workers' knowledge related to alternative therapies for migraine headaches and chronic low back pain available at the hospital's pain clinic. A presentation was delivered to health care providers at a rural critical access hospital in the Midwest. Informational pamphlets were distributed following the presentation. A post-presentation survey was administered to all providers who were in attendance. The survey contained a series of Likert items in addition to open-ended qualitative questions. Items were formatted to ascertain knowledge of available treatments at the hospital and the overall impression of the education pamphlets. The following three outcomes were set to measure the success of the project: 70% of participants are able to identify the opioid sparing interventions available at the hospital, participants indicate that they are more likely to refer patients to the clinic after the presentation, and participants express satisfaction with the overall quality of the educational pamphlets.

Survey data revealed that 45.5% (n=5) of the participants correctly answered which treatments are available at the hospital. We explored the possibility that our presentation may have been ineffective at educating the participants about available interventional treatment options for chronic pain. Notably, half of the participants that answered incorrectly were not referring providers. Furthermore, the nature of the environment during the presentation could have hindered the effectiveness of our presentation. It was conducted during lunch hour when people were moving around, eating lunch, and socializing. A quieter venue would have allowed for a more attentive audience, which may have aided in better information recall. A pre and post-test design that compares pre- and post-knowledge of available treatment options for chronic back pain and migraine headaches might have provided for a more conclusive analysis.

Nevertheless, the data from the Likert scale questions were favorable. All questions had a mean score at or above 6.27 on a 7.0 scale. Based on the data from the survey, the pamphlets were a success and received a mean score of at or greater than 6.3 on a 7.0 scale. Among the participants, 90.9% selected that they agree or strongly agree that they are more likely to refer patients to the pain clinic. By all accounts, the project proceeded as planned and was free of major setbacks.

Impact on Practice

The purpose of this project was to educate healthcare providers and patients about alternative therapies for migraine headaches and chronic low back pain. The hospital has various interventions available such as radiofrequency ablation for chronic back pain and three different treatments for migraines. These interventions include greater occipital nerve blocks, sphenopalatine ganglion blocks, and Botox. Prior to the implementation of the project, there were no educational pamphlets available to distribute to patients regarding interventional

techniques for migraine headaches and chronic low back pain. It is estimated that nine out of ten people have a deficiency in health literacy (Department of Health & Services, 2010). Pamphlets are useful in facilitating patient education (Adirim et al., 2012). After discussing treatments with providers, pamphlets can be handed out to reinforce the information that was discussed in the office. The pictures and diagrams can help facilitate a better understanding of the treatments and encourage the patients to ask providers more questions. This in turn, may result in a better-informed patient population and further enhance patient compliance.

Results from the survey showed that an overwhelming majority of the participants expressed that the pamphlets would help facilitate patient education. The data on provider's knowledge of available interventions is likely skewed by the fact that half of the participants that answered incorrectly were not providers. While only 45.5% (n=11) of the participants successfully identified available opioid sparing interventions available at the pain clinic when filtered for physicians and APPs that number increased to 72.7%. Consequently, they indicated that they are more likely to refer patients to the pain clinic for such treatments. This is beneficial to the community because it may decrease the number of people who are opioid dependent, and further reduce the incidence of opioid overdose. Over time, the number of opioid prescriptions at the hospital for chronic pain management should be expected to decrease as more patients opt to receive opioid-sparing interventions. The pain clinic may see growth due to increased referrals from providers and an overall surge in demand from satisfied patients.

Conclusion

Evidence-based research indicates that RFA for lower back pain and pain interventions for migraine headaches are options for patients whose pain is not adequately controlled by conventional therapies such as exercise, opiates, and non-opiate medications. In light of the

current opioid epidemic, minimally invasive interventions with relatively low risk and high efficacy can be expected to become more popular. Proper education for both providers and patients can result in a better understanding of such interventions. The results of this project suggest that practitioners are more likely to refer patients to the pain clinic and distribute the pamphlets to patients following the educational presentation. Ultimately, with the rise in the awareness of minimally invasive interventions for chronic back pain and migraines headaches, such services will become more accessible to patients.

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