Spring 5-6-2022

Development of a Protocol to Manage Postdural Puncture Headache

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Postdural Puncture Headache:

Development of a Protocol for Treatment

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Introduction of the Problem

According to census data by the United States Department of Health and Human Services (US DHHS), in 2019, over 3.7 million births occurred in the United States. Neuraxial analgesia or anesthesia, including epidurals, spinals, or combined spinal epidurals (CSE), were utilized to improve the labor process in over 2.8 million patients (76%). The US DHHS reported over 140,000 births in Illinois in 2019. Over 96,000 (69%) of the Illinois obstetric patients enhanced their labor process with neuraxial analgesia or anesthesia (US DHHS, 2020). Neuraxial procedures are not without risk. Accidental dural puncture (ADP) is a potential risk with any epidural procedure carrying an overall estimated incidence in the United States of 0.5-4%. In 2020, the American Society of Anesthesiologist (ASA) reported 45-85% of this percentage of obstetric patients who experience an ADP, will develop a postdural puncture headache (PDPH) A postdural puncture headache can be mild to debilitating, even life-threatening, prompting medical attention and treatment. Numerous provider-specific techniques and non-standardized treatment options yield a variety of patient outcomes. Thus, the development of a postdural puncture headache treatment protocol was initiated to improve patient safety and standardize patient care.

Literature Review

The exact mechanism of PDPH remains unclear. Postdural puncture headache results from deficiencies in cerebrospinal fluid (CSF) volume. The loss of CSF creates a tugging effect

on the meningeal vessels, and upper cervical and cranial nerves (Omole & Ogunbanjo, 2015). The presentation of PDPH is commonly described as a dull, throbbing, headache worsening upon standing and relieved with supine positioning (Patel et al., 2020). Symptoms reportedly subside within 14 days when left untreated, although those two weeks are described as miserable by patients (Patel et al., 2020).

The risk of PDPH may be reduced by administering intravenous fluids, utilizing pencil-point needles, and avoiding cutting needles (Kasson, 2018). Patients at the greatest risk for developing PDPH are women 31-50-years of age with a history of headaches or a history of a previous PDPH (Patel et al., 2020). Symptoms of PDPH may range from mild to debilitating and develop within five days of an accidental dural puncture (ADP). In addition to reporting the severe headache, patients may exhibit one or more of the following symptoms: neck stiffness, tinnitus, hearing loss, photophobia, and/or nausea. These symptoms restrict the mother's ability to care for and bond with her newborn (Vaida & Prozesky, 2016).

A variety of treatment options exist for PDPH ranging from conservative to invasive. Conservative management and medication therapies are instituted as primary interventions yet are not always effective in providing headache relief. Conservative management includes bedrest, fluid therapy, and the use of an abdominal binder (Patel et al., 2020). If a provider is faced with an ADP and the patient remains asymptomatic, treatment options include, cosyntropin, magnesium sulfate, and epidural morphine (Omole & Ogunbanjo, 2015). If a provider accidentally punctures the dura and the patient reports symptoms of PDPH prior to delivery, treatment options include two methods for regional analgesia, a sphenopalatine ganglion block or greater occipital nerve block (Puthenvettil et al., 2018). If a postpartum patient reports symptoms of a PDPH, a variety of medication options are available. Evidence-based

therapies include acetaminophen, non-steroidal anti-inflammatory drugs, neostigmine and atropine, sumatriptan and fioricet, aminophylline, gabapentin, and opioids (Harrington & Reina, n.d.). Patients who continue to suffer from symptoms of PDPH despite multimodal approaches may require an epidural blood patch (EBP). Epidural blood patch remains the gold standard treatment for PDPH (Verma & Armstrong, 2016).

Project Methods

The development of this PDPH treatment protocol utilized a nonexperimental, single group, posttest design for an evidence-based quality improvement initiative. Objectives included reviewing current evidence-based literature on the treatment of PDPH, generating a facility-specific treatment algorithm, and presenting the customized protocol to the anesthesia staff. A PowerPoint presentation served as an educational module to increase knowledge and encourage protocol adoption.

The setting of this project was a small general acute care hospital in central Illinois. A non-experimental single group pre and post-test was utilized to assess voluntary participants content and treatment knowledge. Participants in the study included, one physician anesthesiologist, seven certified registered nurse anesthesiologists, and one student registered nurse anesthesiologist.

This project was deemed exempt by Southern Illinois University Edwardsville's Institutional Review Board (IRB). The project was a quality improvement design and did not include patient information or involve human subjects. Once exempt, the host facility approved the project.

Evaluation

There were nine anesthesia providers present for the educational presentation. The years of professional experience ranged from zero to greater than twenty. The pre and post-survey measured anesthesia providers' knowledge of various PDPH treatments. The evaluation survey consisted of demographic information, multiple-choice, and true or false questions. The post-evaluation was collected following the educational PowerPoint presentation to analyze knowledge gained. Overall participants improved their rates of correct responses. According to the analysis of survey responses, the educational PowerPoint presentation was an effective teaching instrument used to improve provider knowledge.

Impact on Practice

The purpose of this project was to introduce a standardized evidence-based treatment protocol for patients suffering from PDPH. Prior to project implementation, the host facility lacked a standardized approach to PDPH treatment. Anesthesia providers employed a variety of different treatment modalities for PDPH patients. According to the post-education results, participants supported the implementation of the PDPH treatment protocol. Fortunately, PDPHs are not a frequent occurrence at the host facility. A standardized, evidence-based protocol will give anesthesia providers a pathway of preventive therapies, an algorithm for symptom management, and treatment options should the issue arise.

Conclusion

This project provided a standardized, readily accessible protocol with a myriad of treatment options for PDPH with application for the parturient through the postpartum period. This project educated anesthesia providers on current practice guidelines and evidence-based treatments for PDPH. With the creation of an evidence-based protocol, there will be a

standardized approach to patients suffering from PDPH. The inclusion of this protocol can have a significant positive impact on patient outcomes and anesthesia practice at this hospital.

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