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BUPIVACAINE HYPERBARIC 0.5%: SPINAL ANESTHESIA IN CHILDREN AN OPERATION THEATRE-BASED OBSERVATIONAL STUDY FROM PEOPLE'S UNIVERSITY OF MEDICAL AND HEALTH SCIENCES HOSPITAL SHAHEED BENAZIR ABAD (NAWAB SHAH) SINDH, PAKISTAN

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ABSTRACT

Bupivacaine is a local anesthetic agent with multiple uses the current study was focused on its use in spinal anesthesia in children that a is very important aspect in this field from multiple perspectives.

Study Objectives: This scientific piece of research work aimed at evaluating the effectiveness of bupivacaine as spinal anesthesia in children.

Study place and duration. This work was accomplished at anesthesia department of People's University of Medical and Health Sciences, Shaheed Benazir Abad, Sindh, Pakistan from November 2023 to November 2024. **Methodology:** Male and female child patients were selected through inclusion and exclusion criteria requiring spinal anesthesia after written and informed consent process. Presurgical, surgical and postsurgical observations were recorded on the study proforma. There were 300 patients registered out of 212 were male while 88 were female, the mean age of study participants was 2.5 $\pm$ 0.5 years where the mean weight was 10.3$\pm$1.3 Kg. Data was analyzed for frequency and percentage.

Results: The nature of surgeries were as Lower limb surgeries were 50 (16.67%), the cases of Hydrocele were 99 (33%), Vesical Calculus cases were 69(23%) and there were 82(27.33%) cases of Inguinal Hernia. Drugs which were used as preoperative medicine were Glycopyrrolate 299(99.67%), Dexamethasone 04(1.33%) and Midazolam 197 (65.67%) and Ketamine156 (52%). Drugs were used as post-operative analgesia Diclofenac Sodium Suppositories 17(5.67), Paracetamol 295(98.33%) and Nalbuphine14(4.67%). Time duration for Spinal Anesthesia with Bupivacaine were as follows time taken for Spinal Anesthesia was 6 minutes while time taken for motor block was 75 Seconds while time taken for sensory block was 40 Seconds. The average time duration for surgeries was45.25$\pm$10.30 Minutes. Time taken for recovery of sensory block was 72 Seconds whereas the Time taken for recovery of motor block was 105 Seconds. There were no intra-operative and post-operative complications noted and reported.

Conclusion: Bupivacaine is the safest and best spinal anesthetic agent in children

KEYWORDS: Bupivacaine, Midazolam, Ketamine, Local anesthesia, Nalbuphine

INTRODUCTION

Bupivacaine is a local anesthetic agent which is preferred for pudendal nerve block, it provides intense relief in severe pain, it blocks the sodium channels as well as NMDA receptors to do so. The Combination of steroids and bupivacaine

is assumed to provide better analgesic, anti-inflammatory and anesthetic effects [1]. Spinal type of the anesthesia has been proved to be a useful and technique in performing surgeries of the abdominal region and the lower extremities as well as a preferred method in patients belonging to child age group to avoid the cardiovascular, respiratory and CNS complications associated with general anesthesia [2]. Although the use of spinal route of anesthesia is very old but Benjamin and his teammates are thought to be those reporting the successful use of spinal anesthesia in premature infants [3]. Local anesthetics are more readily absorbed in neonates and infants in comparison to adults due to higher turnover and production of CSF [3]. So, the local anesthetic medicines are required at some relatively higher dose to get adequate anesthesia in infants that is from 0.5 to1.0 mg bupivacaine per kg of the body weight in comparison to adults where the does is 0.1mg-0.2mg per Kg usually [4]. Milder injection complication like post-dural puncture headache TNS (Transient Neurological symptoms) require analgesics along with fluid intake as well as bed rest following spinal anesthesia [5]. The time duration prolongation for the spinal anesthesia can be achieved by the concurrently using the clonidine at a dose of 1 mcg/kg which is quite safe in terms of side effects profile [6]. Other medications like fentanyl, adrenaline and morphine are also documented to increase the duration of spinal block when used in combination with local anesthetics [7,8]. The current work is aimed at assessing the effectiveness, operative and post-operative side effects of hyperbaric bupivacaine in children at Nawab Shah, Sindh Pakistan with hope it will further ease the path for research community working in this field as well as the doctor and patient community at large.

METHODOLOGY

This work was accomplished at anesthesia department of People's University of Medical and Health Sciences, Shaheed Benazir Abad, Sindh, Pakistan from November 2023 to November 2024. As a total sample 300 Male and female child patients were selected through inclusion (Children with abdominal or lower limb surgeries) and exclusion criteria (Adults and Surgeries of thorax and upper limbs) requiring spinal anesthesia after written and informed consent process. Pre-surgical, surgical and post-surgical observations were recorded on the study proforma. All procedures were under taken according to international and national guidelines for operation theater and anesthesia. Pre-operative medicines like ketamine, midazolam, dexamethasone and glycopyrrolate were used to facilitate the procedure, Bupivacaine Hyperbaric 0.5% was used as local anesthetic agent. Certain agents like paracetamol, diclofenac sodium and Nalbuphine were used post-operatively to reduce the pain. The required data was filled on a study proforma designed for study and the data thus obtained was analyzed on SPSS Version 22 for frequency and percentage while the results were compiled in tables and figures for representation.

RESULTS

There were 300 patients registered out of 212 were male while 88 were female, the mean age of study participants was 2.5 $\pm$ 0.5 years where the mean weight was 10.3$\pm$1.3 Kg. The nature of surgical cases were as Lower limb surgeries were50 (16.67%), the cases of Hydrocele were 99 (33%), Vesical Calculus cases were 69(23%) and there were 82(27.33%) cases of Inguinal Hernia. Drugs which were used as preoperative medicine were Glycopyrrolate 299(99.67%), Dexamethasone 04 (1.33%) and Midazolam 197 (65.67%) and Ketamine156 (52%). Drugs were used as post-operative analgesia Diclofenac Sodium Suppositories 17(5.67), Paracetamol 295(98.33%) and Nalbuphine 14(4.67%). Time duration for Spinal Anesthesia with Bupivacaine were as follows time taken for Spinal Anesthesia was 6 minutes while time taken for motor block was 75 Seconds while time taken for sensory block was 40 Seconds. The average time duration for surgeries was45.25$\pm$10.30 Minutes. Time taken for recovery of sensory block was 72 Seconds whereas the Time taken for recovery of motor block was 105 Seconds. There were no intra-operative and post-operative complications noted and reported.

Table-1: Frequency and percentage of various drugs used pre-operatively

Drugs used Preoperatively	Frequency/Percentage
Glycopyrrolate	**299(99.67%)**
Dexamethasone	**04 (1.33%)**
Midazolam	**197 (65.67%)**
Ketamine	**156 (52%)**

Table-2: Frequency and percentage of Drugs used post-operatively

Post-Operative analgesia	Frequency /Percentage
Diclofenac Sodium Suppositories	**17(5.67)**
Paracetamol	**295(98.33%)**
Nalbuphine	**14(4.67%)**

Table -3; Nature of surgeries

Nature of surgery	Frequency/Percentage
Lower limb surgeries	50 (16.67%)
Hydrocele	99 (33%)
Vesical Calculus	69(23%)
Inguinal Hernia	82(27.33%)
Total	300 (100%)

Table -4: Time duration of various events following spinal anesthesia

Spinal Anesthesia with Bupivacaine	Time duration as a mean
Time taken for Spinal Anesthesia	6minutes
Time taken for motor block	75 Seconds
Time taken for sensory block	40 Seconds
Duration of surgery	45 Minutes
Time taken for recovery of sensory block	72 Seconds
Time taken for recovery of motor block	105 Seconds

DISCUSSION

Our results were consistent with the results of by Verma et al (2014) where ketamine was used in 54.9% patients as pre-anesthetic medication along with midazolam. However, they used propofol during the surgical procedure but we didn't use [2]. Blaise and Roy (1984) report 11.76% of their study participants needed general anesthesia as a result of LP (Lumber puncture) failure and the age range in their study was 7-13 years which was inconsistent with our results [9]. Sedation in pediatric patients undergoing spinal anesthesia is suitable to avoid movements and eases the lumbar puncture procedure usually acquired by administration of ketamine airway secretions were controlled by Glycopyrrolate in our study [10]. Hermanns et al (2006) in their research work also recommended the use sedating agents to facilitate the spinal anesthesia pediatric patients [11]. Ahmed et al (2010) in their study on 78 children with age range 2-6 years undergoing surgeries under spinal anesthesia reported shivering, vomiting and hypotension post-operatively in few patients but we didn't experience any such condition in our participants [12]. Kokki and Hendolin (2000) in their comparative research study in 7-18 years age group using hyperbaric bupivacaine 0.5% with 0.9% glucose solution and bupivacaine with 8% glucose solution and reported a non-significant difference in motor block between the two [13]. Corticosteroids e.g dexamethasone when combined with local anesthetics may provide prolonged analgesic and anti-inflammatory effects but we didn't combine it actually we used steroid as pre-anesthetic medication [14-16]. We used paracetamol, diclofenac sodium suppositories and nalbuphine as needed for analgesia.

CONCLUSION

Bupivacaine hyperbaric 0.5% has excellent results as spinal anesthesia in pediatric surgeries with better outcomes and no significant side effects.

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