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Use of Spinal Anaesthesia in Children of 5-12 Years Instead Of General Anaesthesia for Performing Lower Abdominal Surgery.

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Abstract
Background: *Paediatric spinal anaesthesia has been used since the early 20th century, but it is not common in our country. Spinal anaesthesia can be given in neonates and children for lower abdominal surgery with an expert anesthesiologist.*
Objective: *The objective of this study was to establish spinal anaesthesia as a safe and effective method in children aged 5-12 years.*
Materials and Method: *This study was done in the anaesthesia and intensive care unit department of Bangladesh Shishu Hospital and institute from June 2012 to May 2014. A total of 40 patients with age 5-12 years with ASAI and ASAII were selected. After proper evaluation anaesthesia was given 5% hyperbaric bupivacaine was injected at L4/L5 or L5/S1 level with sptho caine needle. After the establishment of the designed block, surgery was performed d.*
Results: *Almost all patients achieved the designed block within 5-10 minutes. The success rate was 98% only 2% required G/A. Hypotension, shivering and nestlemnes occur in few.*
Conclusion: *Spinal anaesthesia produces a reliable and profound block with rapid onset, good muscle relaxation and good haemodynamic stability.*
Keywords: *Spinal anaesthesia, children, pediatric spinal anaesthesia.*

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I. Introduction

Because of its simplicity, spinal anaesthesia is an easy regional technique to use in paediatric patients. Because ambulation is not necessary for the paediatric patient, this technique provides postoperative analgesia for outpatient lower extremity and perineal operation postoperative apnoea is a life-threatening complication such as apnoea, hypoxia, restlessness, etc. [1] Spinal anaesthesia is also a choice for a patient who has a difficult airway, malignant, hyperthermia, hepatitis patient and respiratory disease patients. Spinal anaesthesia has been proposed as the single anaesthesia technique to reduce postoperative apnoea. Early surgical intervention might be necessary for some pathologies, such as tracheoesophageal fistula (TEF), diaphragmatic hernia, and abdominal wall defects. This should not come at the expense of thorough screening of other associated anomalies that may be associated with these entities. As such, meticulous physical examination, careful cardiac evaluation with echocardiography and ultrasound examination to screen for associated congenital anomalies is key. For example, associated anomalies in TEF occur in around 50% of the patients. Therefore, the conditions within the VACTREL association should be looked for, including vertebral, anal, cardiac, renal as well as limb malformations [2]. Similarly, the diaphragmatic hernia is associated with other anomalies in 40% of cases and can present with respiratory distress at birth; therefore, they require optimization of their cardiopulmonary status as well as control of pulmonary hypertension before embarking on surgical repair [3]. Lastly, congenital abdominal wall defects particularly omphalocele is associated with chromosomal, cardiac, and renal malformations [4]. Given the possible associated anomalies and the limited physiologic reserve that pediatric patients have, some require preoperative optimization before the surgical intervention. For instance, evaluation and pre-operative correction of electrolytes and fluid status are crucial in cases of pyloric stenosis to avoid

perioperative ventilatory and circulatory complications [5]. Pediatric patients include neonates and infants and span up to adolescence and often the cutoff is set at 21 years of age [6]. Despite this seemingly wide continuum, the smaller the patient's size, the more restricted is the working space during surgery, including laparoscopy [7]. Additionally, due to the high surface area to body mass ratio in the younger patients, it is imperative to regulate intraoperative temperature to avoid the sequel of hypothermia [8]. We designed this study to analyse the success rate, complications and hemodynamic stability related to spinal anaesthesia in paediatric patients of 5-12 years.

II. Material And Methods

The study was conducted in the Department of Anaesthesiology and intensive care unit of Bangladesh Shishu Hospital and institute during the period if June 2012 to May 2014. A total of 40 patients aged from 4-to 10 years with the American Society of Anaesthesiologists ASA-I and ASA-II were selected.

Informed written consent was obtained from the parents of each patient and various adverse effect associated with sab arachnoid block was explained to the parents. Standard preoperative fasting was followed before surgery. There is import anatomical difference between adults and children. Children's spinal cord is highly vascularised which allows high clearance of local anaesthetic agents. Some children were not cooperative during the operative procedure, these patients were sedated with Diazepam (1 – 2 mg/kg), and propofol (2 – 4 mg/kg). The patient receives spinal anaesthesia in midline approach under aseptic precaution with lateral position. After getting free flow of CSF, hyperbaric bupivacaine heavy (0.5%) was injected in subarachnoid space, in a dose of 0.5 mg/kg for children < 5 kg, 0.4 mg/kg for children 5 – 15 kg, 0.3 mg/kg for children > 15 mg/kg. Proper sensory tests (skin pinch, thermal response) and motor tests were performed to establish a perfect block. After the establishment of the desired block, surgery was performed. All vital parameters heart rate, volume, rhythm, sensory and motor block were monitored and recorded.

III. Results

In this study, the mean age of the subject was years (5 to 12 years), 25 (62.5%) subjects were male and 15 (37.5%) subjects were female. The mean weight of the subjects was 27.91±6.32 (18 - 40) kg. Spinal anaesthesia was given for different types of surgeries. The mean duration of surgery was 55.63±16.93(40 – 120) minutes. The mean pre-anaesthetic fasting period was 5.90 ± 0.87 hours. On the operation table. 38 (95%) patients receive sedative drugs such as (Diazepam, propofol etc.) due to prevent untoward movement. Baby saline was given through a 1/v operative procedure, to almost all patients. Lumbar puncture was done in the first attempt in 35 patients (87.57%) and 5 (12.5%) patients need a second attempt. There was no significant hemodynamic change, no respiratory pattern change and Oxygen saturation fall throughout the operative procedure. However, the mean pulse rate showed no significant change from baseline afterwards. Only 3% of patients had a single episode of hypotension after 8 minutes of SAB, which was successfully managed. After sometimes of SAB 95% of patients achieved desired pick sensory level at T10 and the Bronage score of 3 surgeries was completed in all patients without any complications. The success rate was 95% and only 2 cases (5%) require GA.

Table-1: Distribution of study subjects according to the type of surgeries (n - 40)

Types of Surgeries	Number	Percentage
Circumcision	15	37.5%
Lower Limb Surgeries (Anal fistula, hernia, undescent testis) etc.	20	50%
Appendicectomy	5	12.5%

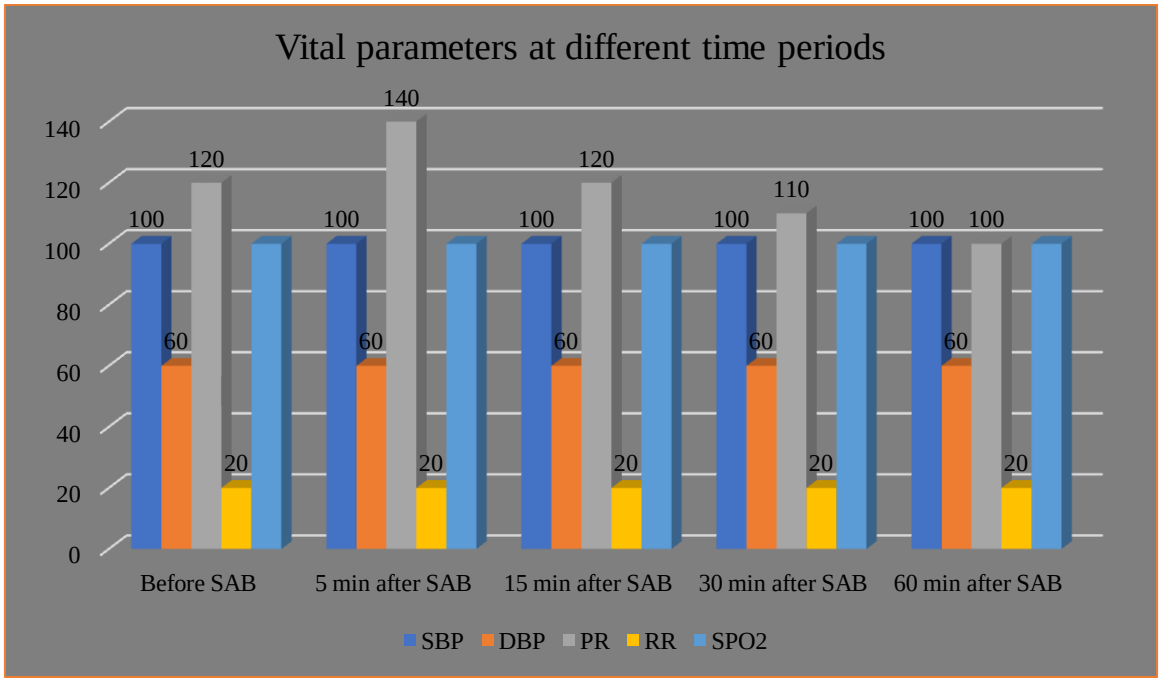

Figure-1: Vital parameters at different periods.

IV. Discussion

This study was done to evaluate the efficacy and safety of spinal anaesthesia in the paediatric population. General anaesthesia may be associated with several life-threatening complications such as difficulty in intubation, failed intubation, hypoxia, delayed reverse, and other reversal hazards such as hypothermia, postoperative apnea, postoperative hypoxia tongue fallback, and post-operative cardiac arrest. [9] In healthy children, most operative procedures like herniotomy, circumcision, and minor, urological procedure are performed as dry case surgeries. [10] Spinal anaesthesia is a good choice for this patient where a child can return early to the family and lots of stress can be avoided. [11] Spinal anaesthesia is a cheaper atter native due to rapid recovery and shorter hospital stay. Spinal anaesthesia provides minimal PONY, early ambulation and rapid return of appetite. [12] Spinal anaesthesia is more effective than general anaesthesia or epidural block in blunting neuroendocrine stress and adverse responses to surgery plasma epinephrine, norepinephrine, lactate and 12–6 levels are reduced. [13] Spinal anaesthesia is a preferred choice for a child who is at risk of developing malignant hyperthermia. [14] In 1998, Kokki et al studied paediatric spinal anaesthesia among 100 children aged 2 to 15 months. [15] This was a comparative study between isobaric and hyperbaric bupivacaine. The success rate of the spinal block was higher in the hyperbaric group. Only one case required GA. In our study hyperbaric bupivacaine was used and the success rate was 98% only 2 cases require GA. In 2009, Jamil et al conducted a study among 66 (aged 6 months to 10 years) paediatric patients undergoing surgery on the subcritical region of the baby at Ayub Teaching hospital Abbottabad, Pakistan. All patients were premedicated with atropine which was similar to our study. [16] Lumbar puncture was successful in the first attempt in 37 (56.1%) patients and the second attempt was required in 29 (43.9%) patients. In our study, Lumber puncture was successful in the first attempt in 35 patients and 5 patients required a second attempt. Overall patient safety, feasibility and reliability are the key features of this technique which will only become better with greater use, experience and research. Spinal anaesthesia produces a reliable and profound block and good muscle relaxation. The failure rate is low in our study. From our study, we can recommend that spinal anaesthesia is ideal, safe and cost-effective for surgery and there is no need for other drugs and equipment for the procedure. Because of this benefit, spinal anaesthesia is a good choice for lower abdominal surgery.

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