

**ORIGINAL ARTICLE****EVALUATION OF EFFECT OF SPINAL AND CAUDAL ANAESTHESIA IN PAEDIATRIC PATIENTS: A COMPARATIVE STUDY**

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**ABSTRACT:**

**Background:** In children, regional anaesthesia was first studied by August Bier in 1899. Since then, spinal anaesthesia was known to be practiced for several years with a series of cases published as early as in 1909-1910. The appearance of neuromuscular blocking agents and the development of volatile anesthetics in the forties shifted the techniques toward general anesthesia. However, spinal pediatric anesthesia did not disappear. Hence; we comparatively evaluated the spinal and caudal block technique in paediatric patients. **Materials & Methods:** The present study was conducted in the paediatrics department of the institution and included all the patients reporting for the treatment of various surgical procedures from 2011 to 2014. Before performing surgical procedures, injection of ketamine 2 mg/kg was given. 120 patients were divided into two groups with 60 patients in each group. After performing procedure, patient were turned supine, level of block was checked by pin prick method up to 15 minutes. Motor block was assessed by Bromage scale. During surgery, sedation is maintained using midazolam at 0.1 mg/kg as necessary and the patient is kept with continuous oxygen administration by a mask close to the face. Postoperatively pain was assessed every 30 minutes using observed pain score. All the results were analyzed by SPSS software and chi-square test was used for assessment of level of significance. **Results:** Mean age of the patients in group A and group B were 7.5 and 7.9 years respectively. Most of the patients in both the groups were males. Non-significant results were obtained while comparing the demographic details of the patients in both the groups. While comparing the various type of surgical procedure in the two study groups, non-significant results were obtained. Non significant results were obtained while comparing the mean duration of sensory and motor block in the two study groups. Non-significant results were obtained while comparing the mean duration in the two study groups. **Conclusion:** In terms of success, both the techniques are equally good.

**Key Words:** Anaesthesia, Caudal, Paediatric, Spinal

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**INTRODUCTION**

In children, regional anaesthesia was first studied by August Bier in 1899. Since then, spinal anaesthesia was known to be practiced for several years with a series of cases published as early as in 1909-1910.<sup>1</sup> In an infant of three months a case of strangulated hernia repair under spinal anaesthesia reported by Bainbridge in 1900.<sup>2</sup> In other case, in 1909-1910 a british surgeon reported a series of 200 cases of lower abdominal surgeries in infants and children under spinal anaesthesia published by Tyrell Gray. The appearance of neuromuscular blocking agents and the development of volatile anesthetics in the forties shifted the techniques toward general anesthesia. However, spinal pediatric anesthesia did not disappear. Some

variables are there such as the intervention site, age, and presence of chronic disease, when regional anaesthesia is given to older children, cooperativeness and parental preferences should be considered.<sup>3, 4</sup> Hence; we comparatively evaluated the spinal and caudal block technique in paediatric patients.

**MATERIALS & METHODS**

The present study was conducted in the paediatrics department of the institution and included all the patients reporting for the treatment of various surgical procedures from 2011 to 2014. The written informed consent was obtained from all parents whose children were participated. In this study the written consent was obtained from all parents whose children were

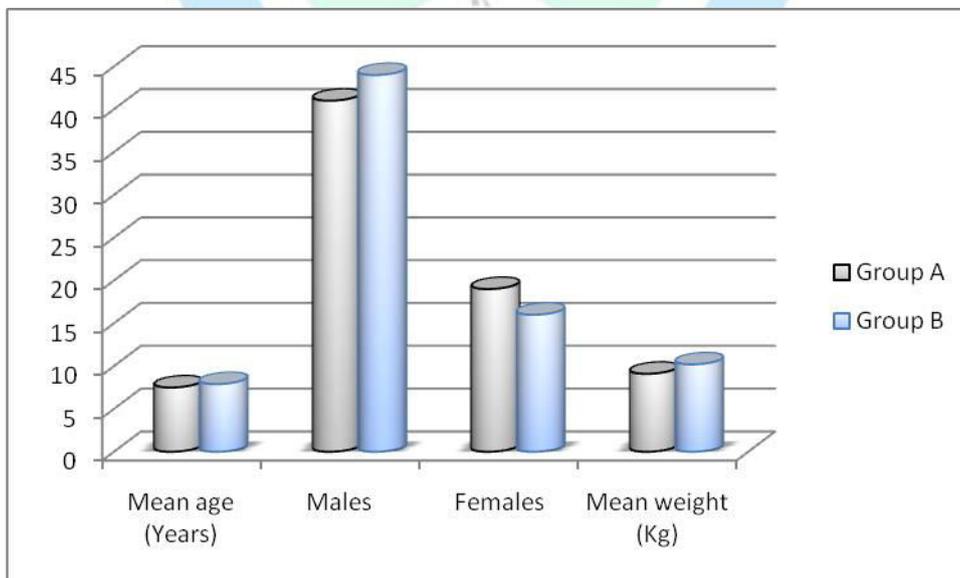
participated. Total no. of patient is 120, Age of children is 3 to 14 year, weight is less than 20 Kg, of both sex, ASA grade 1 and 2, undergoing elective infraumbilical surgery like herniotomy, orchidoplexy, hypospadias repair etc . Exclusion criteria: patient with the history or evidence of infection at back, allergy to drugs, congenital malformation of the back, pre-existing neurological or spinal diseases. All the patients were examined on the previous day of surgery & all the routine investigations were noted. All patients were kept nil by mouth for six hours before surgery. Patient’s guardian or parents were informed about anaesthetic procedure and informed consent was taken. In the operation theatre injection isolyte-p was started and intra-venous line was secured. All children were premedicated intravenously with injection glycopyrrolate 0.04 mg./kg & injection midazolam 0.05 to 0.1 mg./kg. Before performing surgical procedures, injection of ketamine 2 mg/kg was given. 120 patients were divided into two groups with 60 patients in each group. After performing procedure, patient were turned supine, level of block was checked by pin prick method up to 15 minutes. Motor block was assessed by Bromage scale. Heart rate, blood pressure, respiratory rate & oxygen saturation were monitored every 5 minutes during the first 30 minutes and then every 15 minutes during surgery. Decrease in MAP>30% was defined as hypotension & treated with intravenous fluids or inj.epheдрine. A decrease in HR>30% was defined as bradycardia & treated with intravenous inj.Atropine 0.01mg./kg. During surgery, sedation is

maintained using midazolam at 0.1 mg/kg as necessary and the patient is kept with continuous oxygen administration by a mask close to the face. Postoperatively pain was assessed every 30 minutes using observed pain score. All the results were analyzed by SPSS software and chi-square test was used for assessment of level of significance.

**RESULTS**

**Graph 1** shows the demographic details of the patients. Mean age of the patients in group A and group B were 7.5 and 7.9 years respectively. Most of the patients in both the groups were males. **Table 1** highlights the p-value for demographic details of the patients. Non-significant results were obtained while comparing the demographic details of the patients in both the groups. **Graph 2** shows the various surgical procedures done in the patients. **Table 2** shows the p-values for various operative procedures. While comparing the various type of surgical procedure in the two study groups, non-significant results were obtained. **Table 3** shows the mean duration of onset (min) of motor and sensory nerve block in both the study groups. Non significant results were obtained while comparing the mean duration of sensory and motor block in the two study groups. **Table 4** shows the p-value for mean duration of analgesia in the two study groups. Non-significant results were obtained while comparing the mean duration in the two study groups.

**Graph 1:** Demographic details of the patients

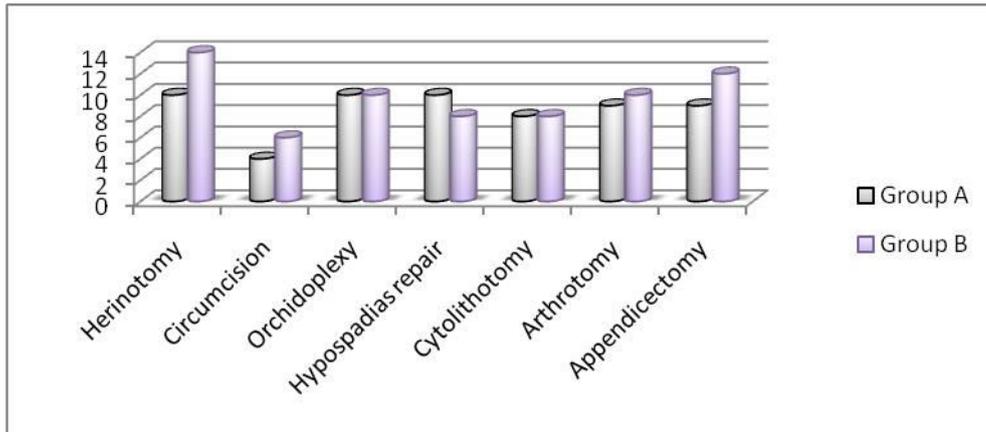


**Table 1:** P-value for demographic details

Parameter	p-value
Mean age (Years)	1.202 (NS)
Sex	0.542(NS)
Mean weight (Kg)	1.302(NS)

NS: Non Significant

**Graph 2:** List of surgical procedure



**Table 2:** p-value for list of surgical procedure

Surgical procedure	p-value
Herinotomy	0.415 (NS)
Circumcision	0.612(NS)
Orchidoplexy	0.812(NS)
Hypospadias repair	0.714(NS)
Cytolithotomy	0.231(NS)
Arthrotomy	1.001(NS)
Appendicectomy	0.977(NS)

NS: Non Significant

**Table 3:** Mean duration of onset (min) of motor and sensory nerve block in both the study groups

Parameter	Group A	Group B	p-value
Sensory	9.2	3.2	0.060 (NS)
Motor	11.2	6.1	0.312 (NS)

NS: Non Significant

**Table 4:** Mean duration of analgesia

Mean duration in minutes	Group A	Group B	p-value
Mean time	121	91	0.04 (S)

S: Significant

**DISCUSSION**

A common paediatric condition is inguinal hernia occurring in approximately 2% of infant males and high as 9-11% in premature infants and slightly reduced incidence in females. Regional anaesthesia can be provided via the epidural (usually caudal) or spinal routes, or by blocking peripheral nerves with local anaesthetic agents.<sup>5</sup> The relevant techniques and anatomy will be discussed, as will side effects and safety considerations, and the pharmacology of the most commonly used local anaesthetics. The role of general anaesthesia, awaken regional anaesthesia and the use of adjuvant in regional anaesthesia will be discussed, with particular focus on future developments in these fields. Inguinal herniotomy, the reparative operation, is most commonly performed under general anaesthesia with regional anaesthesia; however, some experts in caudal anaesthesia perform the procedure with awaken regional anaesthesia.<sup>6-8</sup> Hence; we comparatively

evaluated the spinal and caudal block technique in paediatric patients.

In the present study, we observed that changes in systolic, diastolic and mean blood pressures were minimal. This is because sympathetic vascular tone at rest in children is less than in adults. Heart rate was kept at normal range because regional anesthesia eliminates the Brady cardiac response to mesenteric or spermatic cord manipulation during urogenital surgery or lower abdominal surgery. Respiratory rate and pulse oximetry did not suffer significant changes, which is coincident with other authors. Age, weight and sex are not limiting factors for the administration of the techniques. Age range was 3 to 14 years and weight range was 8 kg to 20 kg. We observed that the younger the patient the more effective the anesthesia is. There were fewer changes in arterial pressure and heart rate. No other types of complications were observed. e complications related to spinal anaesthesia are usually either due to the needle used to perform the procedure (backache, headache,

nerve or vascular injury and infection) or the drugs injected (high or total spinal, drug toxicity). However, little data is available regarding the incidence as compared to adults. Post dural puncture headache (PDPH) is rare in paediatric patients and some authors have even challenged its existence.<sup>9-11</sup> In his study on 200 children using two different sizes spinal needles of 25 G and 29 G Quinke, Kokki et al found that 10 had PDPH with no difference regarding the type of needle used. The failure rate of attempted spinal anaesthesia was 4% and even when the subarachnoid space was reached and the local anaesthetic injected, the overall success rate of the technique was only 91%.<sup>12</sup> Silvani et al compared the duration of postoperative analgesia in children scheduled for hypospadias repair when two different volumes and concentrations of a fixed dose of ropivacaine are used. They analyzed 30 children (ASA I, 1-5 years old) were enrolled in a multicentre, perspective, not randomized, observational study conducted in two children hospitals. After premedication with midazolam, anaesthesia was induced with thiopental and maintained with sevoflurane in oxygen/air. After induction, patients received a caudal blockade either with ropivacaine 0.375% at 0.5 mL/kg or ropivacaine 0.1% at 1.8 mL/kg. The time periods were compared using analysis of variance adjusted for age, weight and duration of surgical procedure as covariates. They observed that all patients were judged to have sufficient intraoperative analgesia, and none of them received additional analgesics intraoperatively. Patients' characteristics were similar, besides the age and weight. From the results, they concluded that in children undergoing hypospadias repair, caudal block with a "high volume, low concentration" regimen produces prolonged analgesia and less motor block, compared to a "low volume, high concentration" regimen.<sup>13</sup> Wang et al evaluated whether the addition of caudal sufentanil to levobupivacaine provided better analgesia for children undergoing orchidopexy. They analyzed sixty-two patients, scheduled for right orchidopexy, received caudal block after induction. Group LS received levobupivacaine 0.25% 1 ml/kg plus sufentanil 0.5µg/kg, and group L received levobupivacaine 0.25% 1 ml/kg only. There were no statistically significant differences between the two groups in age, weight, and duration of surgery. From the results, they concluded that in paediatric orchidopexy, the addition of sufentanil to levobupivacaine for caudal blockade offers clinical benefit over levobupivacaine alone in blocking the spermatic cord traction response.<sup>14</sup>

### CONCLUSION

From the above result, they concluded that in terms of success, both the techniques are equally good. Both the techniques have their own technical skills which should

be kept in mind while delivering anaesthesia to the paediatric patients.

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