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Original Article

A Prospective Comparative Study of Efficacy of Spinal and General Anesthesia for Surgeries in Children

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ABSTRACT

Objectives: Present study was carried out to compare the spinal anaesthesia and general anaesthesia in children undergoing surgeries of the lower parts of the body. Objectives were to assess the patient comfort, adequate surgical condition, hemodynamic change, post op analgesia and post op complication in spinal anaesthesia and general anaesthesia.

Material and Method: 50 ASA grade I & II children of either sex, aged 5-13 yrs undergoing elective surgeries for the lower parts of the body (lower abdominal, perineal and lower limb surgeries) were taken. Patients were distributed randomly in two groups with 25 patients in each group.

Group A: Subarachnoid block was given Group B: General anesthesia was given.

Result: There were no significant differences between the patients with respect to age, sex, duration and type of surgery. In SAB the risk and postoperative respiratory depression is minimal. The stress response to surgery is also limited and recovery is fast. Postoperatively complications like sore throat, laryngeal irritation, cough etc. was also less associated with it.

Conclusion: Overall pediatric spinal anesthesia is a cost effective & safe alternative to general anesthesia and often the anesthesia technique of choice in many lower abdominal and lower limb surgeries in children. Although these results are significant, individualization remains necessary. Surgical technique and duration, patient preferences and expectations, postoperative nursing management, and institutional practice models must all be taken into consideration when determining anesthetic management.

KEYWORDS: General anesthesia, Pediatric anaesthesia, Spinal anaesthesia, Subarachnoid block.

INTRODUCTION

Spinal anaesthesia (SA) in children was successfully used by August Bier in 1898 for surgery of thigh tumor.[1] Several scientists described SA as an excellent alternative to general anesthesia (GA) in children in past.[2-4]

Subsequently, considerable improvement in techniques of GA like introduction of muscle relaxants and safe intravenous induction agents occurred as well as few adverse factors like lack of expertise for SA, fear of adverse effects, lack of patient co-operation, possibly prevented widespread use of SA in children.

In 1984, Chris Abajian of Vermont University reintroduced SA as an alternative to GA in the high-risk former preterm neonates, by limiting the incidence of post-operative apnea and bradycardia.[5] The Vermont spinal registry proved its safety in infants including the ex-premature and advocated its use in all infants undergoing lower abdominal or extremity surgery.[6] Since then, SA has become an established standard of care for neonates & infants.[7-9]

Regional anesthesia may attenuate adverse physiologic stress responses associated with surgery, including alterations in circulatory (tachycardia, hypertension, vasoconstriction), metabolic (increased catabolism), immunologic (impaired immune response), and hemostatic (platelet activation) systems.[10,11] The use of regional anesthesia combined with light general anesthesia may facilitate early tracheal extubation postoperatively in infants and children.[12,13]

After the study by Abajian et al in 1984, spinal anaesthesia in infants was successfully reintroduced into the modern anaesthesia practice.[5] Since then infant

spinal anaesthesia has been used either alone or in combination with epidural anaesthesia for different types of surgical procedures of the lower parts of the body and even as an adjunct to general anaesthesia in infants undergoing cardiac surgeries.

Present study was carried out to compare the spinal anaesthesia and general anaesthesia in children undergoing surgeries of the lower parts of the body. Objectives were to assess the patient comfort, adequate surgical condition, hemodynamic change, post op analgesia and post op complication in spinal anaesthesia and general anaesthesia.

MATERIALS AND METHODS

After taking approval from institutional research review board and ethics committee, present study was conducted in Department of Surgery, S.G.R.R.I.M & H.S. Dehradun, Uttrakhand, INDIA. 50 ASA grade I & II children of either sex, aged 5-13 yrs undergoing elective surgeries for the lower parts of the body (lower abdominal, perineal and lower limb surgeries) were taken. After taking a detailed history, thorough general physical examination, and all concerned investigation were carried out to exclude any systemic disease. Informed and written parental consent was taken prior to surgery.

Cases of patient refusal to participate in the study, had neurological diseases, spinal deformities, infection at local site, coagulopathy, increased intracranial pressure, failed spinal and drug allergy were excluded. Patients were distributed randomly in two groups with 25 patients in each group.

Group A: Subarachnoid block (SAB) was given after IV glycolprrolate (0.005mg/Kg), IV Midazolam (0.02mg/kg), IV ondensetron (0.1mg/Kg) & IV ketamine (1mg/kg). The lumber puncture was done in lateral decubitus position using midline approach at L3-L4 interspace under full aseptic condition using 25 G. spinal needles, after verifying correct placement bupivacaine (0.3 mg/kg) was injected in CSF. Intraoperative monitoring consisted of SPO2, PR, NIBP, RR and assessment of duration of post- operative analgesia was done.

Group B: General anaesthesia was given, premedication with IV glycopyrolate (0.005mg/Kg), IV midazolam (0.02mg/Kg), IV fentanyl (2µg/kg), IV ondensetron (0.1mg/Kg). Induction with ketamine & relaxation with succinylcholine was given to facilitate tracheal intubation with appropriate size of endotracheal tube. Anaesthesia was maintained with 50% N2O and 50% O2 and atracurium (0.5mg kg-1 loading and 0.1 mg/kg as maintenance dose) for further relaxation. At the end of surgery muscle relaxation was reversed.[14]

Statistical tests were performed using SPSS. Demographic data and operation characteristics were evaluated using descriptive statistics. A value of p-value < 0.05 was considered to be statistically significant.

Table1: Comparison of results of present study.

		Group A	Group B	P Value
Mean Age		6.12 ± 2.1	5.95 ± 1.9	>0.05
Duration of Surgery (Mins)		46.35 ± 7.96	45.74 ± 6.13	>0.05
Duration of Post op Analgesia (Mins)		48.97 ± 11.42	31.32 ± 10.13	<0.05
Mean HR	**(intraoperative)**	81 ± 2.1/min	89 ± 1.9/min	<0.05
	(postoperative)	85 ± 2.6/min	95 ± 1.7/min	<0.05
Mean BP	**(intraoperative)**	104 ± 1.9mmhg	111 ± 2.6mmhg	>0.05
(systolic)	**(postoperative)**	116 ± 2.3mmhg	121 ± 3.2mmhg	>0.05

Table 2: Side Effects.

Side Effects	Group A	Group B
Nausea/Vomiting	2	4
Shivering	1	2
Hypotension	1	-
Upper limb Movement	3	1

RESULTS

Both groups were well matched in demographic profile and the mean duration of surgery. (P>0.05) (Table 1).

Mean heart rate values were higher in group B intra operatively and postoperatively (P<0.05). Intraoperative blood pressures values were comparable in the two groups but were higher in group B postoperatively. (Table 1)

In SAB, the risk and postoperative respiratory depression is minimal. The stress response to surgery is also limited and recovery is fast. Postoperatively complications like sore throat, laryngeal irritation, cough etc. was also less associated with it. (Table-2)

Duration of post-operative analgesia after spinal anesthesia was found to be significant more than group B (general anesthesia).

DISCUSSION

Present study was carried out to compare the feasibility and safety of spinal anaesthesia and general anaesthesia in children undergoing surgeries of the lower parts of the body.

Patients were hemodynamicaly stable during surgery and in the postoperative period. Mean heart rate values were

higher in group B intra operatively and postoperatively ($P<0.05$). Intraoperative blood pressures values were comparable in the two groups but were higher in group B postoperatively.

In SAB, the risk and postoperative respiratory depression is minimal. The stress response to surgery is also limited and recovery is fast. This could be due to less general anaesthetic drug including parental opioid were used during SAB.

The breathing was normal in all the patients as the pulse oximeter (spo_2) remained normal. Ashish mathur et al[14], Blaise and Roy[15] also noted no episode of hypotension/arrhythmia or vomiting intra-operatively in their patients. Kachko et al. noted bradycardia (H.R. <100/min) without de saturating (spo2<90%) in 1.8% their patients as the main side effects. They studied 505 new born and infants undergoing surgery under spinal anaesthesia. They achieved spinal anaesthesia at first attempt in 69.9% of their patients.[16] Our results are comparable to their results in achieving spinal anaesthesia.

Innovations in anesthetic equipment and medications continue to refine anesthetic management. Researchers in past showed that the addition of intrathecal fentanyl to small-dose bupivacaine or lidocaine improves spinal anesthesia without prolonging recovery, whereas a propofol/nitrous oxide general anesthetic provides rapid recovery with small risk of postoperative nausea and vomiting.[17-19]

Anesthetic technique may influence resource utilization and institutional costs in the immediate postoperative period. Christopher J. Jankowski et al. reported that a significantly larger percentage of patients undergoing general anesthesia required PACU admission (65%) when compared with spinal (0%) techniques. The larger PACU admission rates resulted in an increased utilization of nursing resources and associated costs for general anesthesia.[20]

CONCLUSION

In conclusion, we compared the surgical operative conditions, postoperative recovery, analgesic requirements, patient satisfaction, and side effects of GA & SA anesthetic techniques for children undergoing surgeries of the lower parts of the body. From present study it can be concluded that overall pediatric spinal anesthesia is a cost effective & safe alternative to general anesthesia and often the anesthesia technique of choice in many lower abdominal and lower limb surgeries in children.

Although these results are significant, individualization remains necessary. Surgical technique and duration, patient preferences and expectations, postoperative nursing management, and institutional practice models must all be taken into consideration when determining anesthetic management.

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