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ORIGINAL ARTICLE

OBSERVATIONAL STUDY ON SUB ARACHNOID BLOCK IN PRE SUBDUED CHILDREN IS A CHEAP, EFFECTIVE, SAFE ALTERNATIVE TO GENERAL ANAESTHESIA

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ABSTRACT: Technically, carrying out Spinal Anaesthesia in adults, may not pose much problems, because of patient co-operation, but same is not always so in case of toddlers and children, because of inherent fear of Hospital atmosphere, detachment from parents, immaturity and other. This study aims at performing Spinal Anaesthesia, in children, if they are pre-medicated, and pre-subdued, might pave way for the comfort of both patient and Anesthesiologists. So, pre-medicated, pre-subdued Spinal Technique may be cheaper, safer alternative to General Anaesthesia. In our Observational study, results are satisfactory, with no occurrence of described complications, and study needs to be done in large number of cases.

KEYWORDS: sub arachnoid block; pre-medicated; pre-subdued.

INTRODUCTION: Intrathecal anaesthesia in children was studied in early 20th century. Regional anaesthesia,[1]in children was first studied by AUGUST BIER in 1899. This was practiced for many years with series of cases published as early as in 1909-1910. In 1900 Bain Bridge[2] reported a case of strangulated hernia repair under Spinal Anaesthesia in an infant of 3 months. Tyrel Grey,[3]a British surgeon published a series of 200 cases of lower abdominal surgeries in children under spinal anaesthesia in 1909-1910.

With the introduction of muscle relaxants Spinal Anaesthesia fell into disuse for many years. In 1983 ASA RA breakfast panel, Abajian et al start "frenzy" of modern pediatric spinal anaesthesia when they reported 71 cases in 81 infants. The textbook of pediatrics Bailey and Belton demonstrated that 10% of all anesthetics procedures practiced in children at Vancouver General Hospital were spinal techniques including pulmonary lobectomies and pneumonectomies.

In 1990s again Spinal anaesthesia started in many centers due to improving knowledge on pharmacology, safety information and availability of specialized equipment and monitoring in children. In coming years Regional Anaesthesia would be the choice of anaesthesia for all risky and lower abdominal surgeries.[4]

Pediatric Spinal anaesthesia is a safe alternative to GA in children and reliable in providing anesthesia[5]. But even in skilled hands it is not free of complications and requires strict attention to detail, precise and gentle manipulations. Regional Anaesthesia[6] in children is extremely useful in austere situations particularly when limited sources are available (eg. lack of post-operative analgesia, inadequate post-operative care, and limited resources).

To provide safe spinal anesthesia in children medical staff must have enough knowledge in recognizing the myriad physiological and pharmacological differences between pediatric and adult patients.

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The anesthesiologist who is performing pediatric Regional Anaesthesia should not only be experienced in the technique but also should be comfortable with pediatric patient care because almost all pediatric spinal anaesthesia done either in IV sedation or under General Anaesthesia.

MATERIALS & METHODS: An open Non Comparative study[7] was performed on 40 children aged 3-12 years undergoing lower abdominal and lower limb surgeries. A plain solution of bupivacaine 5mg/ml at a mean dose of 0.3 mg/kg body weight (range 0.2-0.5mg/kg)[8] was administered via L4-5 & L5-S1 interspace with sitting position, lateral position[9]. Consent obtained from parents of the children.

Counseling done for children older than 6 years. Secured intra venous access (key to success in regional technique) and premedication given with i) iv Midazolam 0.01-0.02mg/Kg ii) IV Pentazocine 0.5 mg/Kg iii) iv Fentanyl 1- 2mcg/Kg iv) iv Ketamine 0.5-1 mg/Kg v) Inhalational anaesthesia for 5 minutes (Sevoflurane).Intra operative monitoring done with Pulse Oximetry, ECG, NIBP. Child's back prepared taking aseptic precautions. Skin infiltrated with 0.2 – 0.5 ml 2 % plain xylocaine at L4-5 interspace.

PROCEDURE: The basic principle is to avoid trauma to spinal cord, by using needles of 25-26G.By keeping the child in sitting or lateral position, the spinal needle is introduced and the drug administered into Intrathecal space at a dose of 0.2mg- 0.5 mg/kg. The block assessed with pin prick for sensory dermatomal levels after 5 minutes.

Inclusion Criteria:

1. Children of ASA Class I & II.
2. Children undergoing Elective Surgeries for lower abdominal,[10]UroGenital Surgeries lower Limb Surgeries.
3. Burns, Ulcers, Grafts of Lower Limbs are included.

Exclusion Criteria:

1. Refusal from patient or parent.
2. Spinal anatomical deformities.
3. Skin infection at injection site.
4. Coagulation abnormalities.
5. Severe dehydration & hypovolemia.
6. Children belonging to ASA class III, IV& V.

Sl. No.	TYPE OF SURGERY	NUMBER
1	UDT	6
2	CIRCUMCISSION	12
3	HERNIA (OR)CONGENITAL HYDROCELE	12
4	APPENDICECTOMY	4
5	GRAFTING	2
6	ULCER DEBRIDEMENT	2
7	HYPOSPADIASIS	2

CHART SHOWING TYPE OF SURGERY AND NUMBER

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Sl. No.	AGE GROUP	MALE	FEMALE	TOTAL
1	3 to 5	9	1	10
2	5 to 10	23	1	24
3	10 to 11	5	1	6

CHART SHOWING AGE & SEX DISTRIBUTION

Sl. No.	Parameter	Neonate	1 Year	Adults
1	SPINAL CORD ENDS AT	L 3	L1	L1
2	DURAL SAC ENDS AT	S3	S2	S2
3	INTERCRISTAL LINE CORRESPONDS TO	L5-S1	L4-5	L3-4
4	CSF VOLUME	NA	4ML/KG	2ML/KG
5	Intracranial vs. Spinal CSF %	NA	50	25

Parameters showing variations in children and Adults[11]

DISCUSSION: Local Anaesthetics binds to Alfa-1-acid glycoprotein (AAG protein) found in plasma. Neonates have very low levels of AAG 20-40 % of normal adults. Normal levels after 1 year. Low levels of AAG leads to higher serum unbound Local Anesthetic and this free drug is responsible for toxicity.[12] Infants have decreased clearance and longer elimination half-life. All these contribute to increased risk of toxicity in pediatric patients. Myelination is not complete until 12 years of age. Incomplete myelination allows better penetration of local anaesthetic into nerve fibers.

Decreased dose of diluted drug can provide complete block in pediatric patients. Also loose fascial attachments around nerves facilitate spread. As Local Anaesthetic spreads easily in children, duration of block may be shortened. As age increase the local anaesthetic latency of onset and the duration of action increases. Children have inherent fear of needles. So spinal is done under General Anaesthesia, or deep sedation to ensure immobile child but assessment of block and detection of signs of toxicity are difficult under General Anaesthesia.[7]

So we preferred 0.01 to 0.02mg/Kg Midazolam and 0.5mg/kg Pentazocine for all patients under study before spinal anaesthesia and local infiltration of 2 % Xylocaine 0.2-0.5 ml at the site of lumbar puncture at L4-5 or L5-S1 before lumbar puncture in sitting position.

Physiological Difference:

1. Due to immature sympathetic system: impact of sympathectomy is minimal fall of BP, HR are not seen, preloading of IV fluids is not necessary.
2. Relatively small intravascular volume in lower limbs.
3. Splanchnic system limiting venous pooling
4. Vaso-dilating peripheral blood vessels.

RESULTS: Spinal anaesthesia produces reliable profound uniformly distributed sensory block with rapid onset of good muscle relaxation, with complete control of cardiovascular, stress response.

It is ideal for day care surgeries in terms of safety and cost effectiveness. The child is returned to the family soon after surgery. There is no need of recovery of the patient from General Anaesthesia and intra/post-op complications like laryngo-bronchospasm cough, vomiting, ET tube Obstruction, post-operative atelectasis are avoided with spinal anaesthesia. Even in case of hyper-reactive airways spinal anaesthesia is the choice as no General Anaesthesia drugs are given only Bupivacaine is given according to weight.

The duration of sensory and degree of motor block recorded are satisfactory. Surgical anesthesia was achieved in 39 patients out of 40. One child received GA (due to prolonged surgery). Highest level of sensory block was T4, lowest level was T10. Mean time of regression of sensory block was 80 minutes. Range from 30 minutes to 150 minutes. Complete surgical block was achieved in 39 patients.

ADVERSE EFFECTS:

- HYPOTENSION.
- BRADYCARDIA.
- TRANSIENT NEUROLOGICAL SYMPTOMS.
- POST DURAL PUNCTURE HEADACHE.[13]

None of the above complications are seen.

CONCLUSION: Spinal Anaesthesia is economically cheaper, requires short preparation time using less drugs and equipment with less complications. Pre-Medicated, Pre-subdued, Sub Arachnoid Block is a preferred technique when compared to General Anaesthesia in skilled hands, especially in austere conditions.

REFERENCES:

1. Busoni P, Messer A: Spinal Anaestheia in infants: Could L-S1 approach be safer? ANAESTHESIOLOGY 1991; 75: 168-9.
2. Melman E, Penuelas JA, Marrufo J: Regional Anaesthesia in children. ANESTH ANALG.1975; 54:387-90.
3. Gray H: A Study of Spinal Anaesthesia in children and Infants: From a series of 200 Cases.LANCET 1909; 2: 913-7.
4. Craven PD, Badawi M, and Henderson-smart DJ, O' Brien M: Regional (Spinal, Epidural, Caudal) versus General in preterm infants undergoing inguinal herniorrhaphy in early infancy. Cochrane database of Systematic reviews 2005.
5. Blaise GA. Roy WL: Spinal Anaestheia for minor Pediatric Surgery- CANADIAN ANAESTHETISTS
6. Frumiento C, Abajian JC, Vane DW: Spinal Anesthesia for Preterm Infants undergoing InguinalHernia Repair. Arch. Surg 2000; 445-51.
7. Polaner D, Suresh S, Cote CJ; Pediatric Regional Anesthesia, A practice of Anesthesia for Infants and Children, 3 edition. Edited by Cote C, Todres I D, Ryan JF, Goudsouzian NG. Philadelphia, W B Saunders company, 2000, PP 636-75.

8. Kokki H, Hwndolin H: Hyperbaric Bupivacaine for Spinal Anaesthesia in 7-18 yrs. old children: comparison of Bupivacaine 5 mg ml in 0.9 % and 8 % Glucose solutions. Br. J. Anaesth. 2000; 84: 59-62.
9. Gleason CA, Martin RJ, ANDERSON JV, CARLO WA, SANNITI KJ, FANAROFF AA: Optimal Position for a Spinal tap in preterm infants. Pediatrics 1983; 71: 31-5.
10. Burke D. Kennedy S, Bannister J. Spinal anesthesia with 0.5% bupivacaine for elective lower limb surgery. Reg. Anesth. Pain Med 1999; 24; 519- 23.
11. Gray H: ANATOMY OF THE HUMAN BODY: Gray's Anatomy, 30th Edition. Baltimore, MD, Williams & Wilkins, 1985.
12. Aberg G. Toxicological and local anesthetic effects of optimally active isomers of two local anesthetic compounds. Acta Pharmacol Toxicol 1972; 31; 273-86.
13. Miser AW, Miser JS: Postdural Puncture Headache in Pediatric Oncology patients, CLINICAL PEDATRI. (PHILA) 1998;37: 247-51.

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