

ORIGINAL RESEARCH

REGIONAL ANESTHESIA

Factors resulting in underutilization of pediatric spinal anesthesia in South Punjab (Pakistan)

Haq Dad Durrani, DA, FCPS, MSc¹, Sairah Sadaf, FCPS² ✉, Syed Aushtar Abbas Naqvi, FCPS¹ ✉
Amjad Siddique, DA, FCPS² ✉, Manzoor Hussain Bajwa, DA, FCPS³ ✉

Author affiliations:

- 1- Department of Anesthesiology, Pain & Intensive Care, D. G. Khan Medical College, Dera Ghazi Khan, Pakistan.
- 2- Department of Anesthesiology & Intensive Care, Sheikh Zayed Medical College, Rahim Yar Khan, Pakistan.
- 3- Department of Anesthesiology & Intensive Care, M. Islam Medical and Dental College, Gujranwala, Pakistan.

Correspondence: Prof. Haq Dad Durrani, Department of Anesthesiology, Pain & Intensive Care, D. G. Khan Medical College, Dera Ghazi Khan, Pakistan; Phone: +92 3087598502; E-mail: drhaqdad@szmc.edu.pk

Abstract

Background & objectives: Spinal anesthesia in children a useful alternative to general anesthesia, is not usually practiced in most of the hospitals of South Punjab. We aimed to evaluate the utilization of spinal anesthesia in children in South Punjab (Pakistan) and to discover the elements preventing its use in children.

Methodology: A questionnaire was delivered to all 47 FCPS qualified anesthesiologists working in South Punjab vide e-mail and whatsapp messages to them. Out of 47 anesthesiologists, 38 (80.85%) responded. Questionnaire consisted of 3 components. All participants were asked to fill the first component regarding demographic data, but only those who did not administer spinal in children, needed to fill second and third components. In the second component, structured questions with scale 1 to 5 (strongly disagree to strongly agree). In the third component, the participant had open choice to write three most important factors (most important, second most and third most) prohibiting the practice of spinal anesthesia in children.

Results: All of the 47 senior anesthesiologists working in South Punjab were included in this survey. The response rate was 80.85%. Demographic data showed 33/38 (87%) males and 05/38 (13%) females, mean age 44.34 ± 11.06 yrs, mean of total experience in anesthesia 17.03 ± 9.12 yrs and mean experience after postgraduation 8.01 ± 6.85 yrs. The number of respondents administering spinal anesthesia in children was just 3 (7.88%) and 35 (92%) never used spinal in children. Lack of expertise/training/guidance (4.69 ± 0.83) is the most common cause prohibiting the use of pediatric spinal anesthesia followed by risk of high/total spinal (4.14 ± 1.31), lack of cooperation of child (3.83 ± 1.34), risk of spinal cord injury (3.71 ± 1.51), difficulty in assessment of block (3.34 ± 1.64). Less common factors avoiding pediatric spinal include objection by family, objection by surgeon and lack of proper

The number of participants considering lack of expertise/training/guidance most important factors for avoiding spinal anesthesia in children was 9 (25.71%), followed by uncooperative children 8 (22.86%), risk of spinal cord damage 5 (14.28%), risk of high/total spinal 3 (8.57%) and objection by family 3 (8.57%). Other factors quoted were objection by the surgeon, risk of postdural puncture headache, risk of neurological complications, being short duration, not recommended and not acceptable by society.

Conclusion: Pediatric spinal anesthesia is practiced by only three consultants (7.88%) in South Punjab out of a total of 47. There is a need to enhance the expertise level of the anesthesiologists during postgraduate training and to remove the fears / phobias attached with this particular practice.

Key words: Pediatric; Anesthesia, Spinal; Barriers; South Punjab

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1. Introduction

Bainbridge was the first to publish a report of 12 operations on infants and young children under spinal anesthesia.¹ The technique remained dormant over several decades followed by its resurgence in preterm infants in an attempt to reduce apnea and respiratory insufficiency. Moreover, the Possibility of negative long term effects on exposure to general anesthetics has enhanced interest in pediatric spinal anesthesia. There is a large number of publications reflecting great success of pediatric spinal anesthesia particularly for inguinal herniorrhaphy.²

In many situations general anesthesia in children becomes a tricky option. Respiratory tract infections produce bronchial hyperactivity resulting in constriction of smooth muscles in the respiratory tract, which may persist for 6 weeks even after clinical symptoms have disappeared.³ On an average six episodes of upper respiratory tract infections occur in children under the age of five.⁴ Peri-operative, stimulation of potentially irritable airways may result in laryngospasm, bronchospasm, desaturation and breath holding. The probability of adverse respiratory events is highest if general anesthesia with endotracheal intubation is administered.^{5,6,7}

The prevalence of inguinal hernia is higher in premature children. The risks of incarceration, testicular torsion and recurrence of hernia requires early repair of inguinal hernia.^{8,9} There is higher incidence of central apnea, reduced oxygen saturation and bradycardia in prematurely born infants during normal sleep. There is exacerbation of these adverse events after general anesthesia, but not after spinal anesthesia.¹⁰ Gotum et al. recommended that spinal anesthesia alone or combined with sedation as an alternative to general anesthesia in pediatric patients for lower abdomen and lower extremity operations.¹¹

Furthermore, The U.S. Food and Drug Administration (FDA) Safety Communication has warned about the possibility of effect on development of brains of children if they undergo repeated or lengthy use of general anesthetics under 3 yrs of age or third trimester of pregnant women following several experimental studies raising concerns about direct and/or indirect neurotoxic effects of anesthesia. It is also advised to discuss with parents and caregivers about possible

complication on brain development and delay of surgery if not expected to affect the health of child.¹²

Pediatric spinal anesthesia, a useful alternative to general anesthesia has been used at our hospital for more than 20 yrs, without any significant problem, but its utilization in South Punjab is scarce¹³. The literature about factors inhibiting utilization of spinal anesthesia in children is scarce.

We aimed to evaluate the utilization of spinal anesthesia in children in South Punjab (Pakistan) and to discover the elements preventing its wide-spread use.

2. Methodology

This cross sectional study was conducted after clearance from the Institutional Ethical Committee vide their letter

No. 53/PHY/DGKMC, dated 9 March 2020.

A questionnaire was designed in consultation with consultant anesthesiologists. We carried out a pilot study among eleven expected participants. Reliability of the questionnaire was analyzed by IBM SPSS Statistics 26, the Cronbach's alpha was 0.619. Although usually Cronbach's alpha ≥ 0.7 is considered to be acceptable. But for a pilot/exploratory study, its value ≥ 0.6 was considered acceptable.^{14,15}

We invited all anesthesiologists with a terminal qualification of FCPS/MD/MS (termed level-III by Pakistan Medical & Dental Council) working in South Punjab. Name of the participants were kept anonymous. The questionnaires were delivered to anesthesiologists via e-mail and whatsapp. The questionnaire consisted of 3 components. The first component regarding demographic data was to be filled by all of the participants. It required age, gender, total experience in anesthesia, experience after post-graduation, the institute they were associated with, percentage of spinal anesthesia in adults requiring anesthesia and whether they administered spinal in children. The participants, who did not used spinal in children, were asked to fill second and third components. The second component comprised of eight structured questions with numerical scale 1 to 5. (1 denoted 'strongly disagree' and 5 denoted 'strongly agree').

In the third component, the participant had an option to write three most important factors prohibiting them

Table 1: Demographic Data [Mean ± SD (Range)]

Variable	Results
Mean age in years	44.34 ± 11.06, (29-67)
Number of male participants	33 (86.84)
Number of female participants	05 (13.16)
Mean of Total experience in anesthesia (yrs)	17.03 ± 9.12 (5-40)
Mean of experience in anesthesia after postgraduation (yrs)	8.01 ± 6.85 (10-23)
Mean of administration of spinal anesthesia in adults (%)	59.06 ± 18.68 (20-90)
Participants administering spinal anesthesia in children	3 (7.88)

from administration of pediatric spinal whether included in structured questions or not.

Responses to survey questions were analyzed in IBM SPSS 26 using descriptive statistics and represented as mean ± standard deviation for quantitative data. Qualitative variables (gender and response of open ended questions) were expressed as percentages and frequencies.

Results: Thirty eight (80.85%) out of 47 anesthesiologists responded to the questionnaire. Demographic information is given in Table 1.

Our quantitative data reflects that lack of expertise/training/guidance is the most common cause prohibiting anesthesiologist for administering spinal anesthesia in children followed by risk of high /total spinal, lack of cooperation of child, risk of spinal cord injury, difficulty in assessment of block. Less common factors avoiding pediatric, spinal include objection by family, objection by surgeons and lack of proper recommendations (Figure 1).

In response to open ended questions, the largest group of participants considered lack of expertise (25.71%) to be the main reason for low use of pediatric spinal anesthesia by the anesthetists. Lack of cooperation by children 8 (22.86%), risk of spinal cord damage 5 (14.28%) and risk of high/total spinal 3 (8.57%), objection by family 3 (8.57%) and difficulty in assessment of level of block 2 (5.71%) were considered other most important factors. Objection by the surgeon, risk of postdural puncture headache, neurological complications, meningitis, and not recommended in children were the other reasons mentioned by 1 (2.86%) anesthesiologist (Table 2).

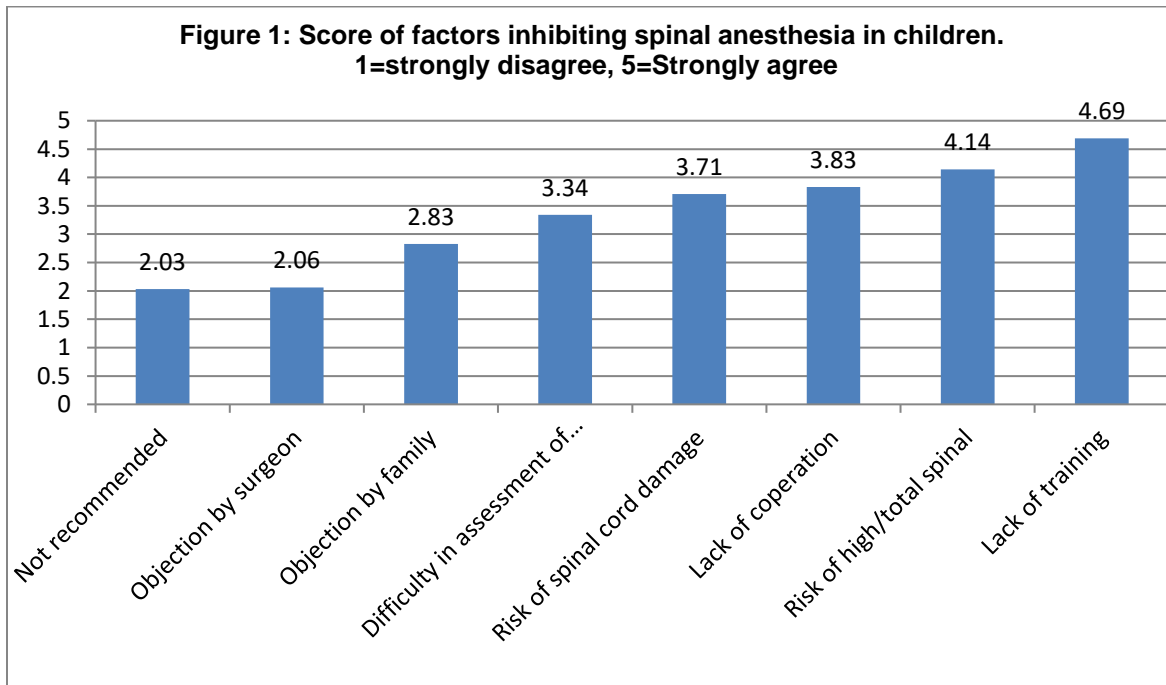


Table 2: Three most common reasons (open ended questions) for not administering spinal anesthesia in children. Data presented as n (%)

Reasoning	Most important reason	Second most important reason	Third most important reason
Lack of expertise/ training/guidance	9 (25.71)	6 (17.14)	5 (14.28)
Risk of high/total spinal	3 (8.57)	12 (34.28)	5 (14.28)
Lack of co operation of child	8 (22.86)	6 (17.14)	2 (5.71)
Risk of spinal cord damage	5 (14.28)	1 (2.86)	7 (20)
Difficulty in assessing block level	2 (5.71)	4 (11.43)	4 (11.43)
Family objection	3 (8.57)	0	3 (8.57)
Surgeon's objection	1 (2.86)	4 (11.43)	1 (2.86)
Meningitis	1 (2.86)	1 (2.86)	1 (2.86)
Consider not recommended	1 (2.86)		1 (2.86)
PDPH	1 (2.86)		
Neurological complications	1/35 (2.86)		
Socially not acceptable		1 (2.86)	4 (11.43)
Local anesthetic toxicity			1 (2.86)
Short duration			1 (2.86)

3. Discussion

Selection of anesthetic technique in children is influenced by several factors including the anesthesiologist's expertise, training, guidance, available facilities and working environment. The literature regarding the prevalence of utilization of pediatric spinal and the elements responsible for its under-utilization is hard to find. However, various researchers have cited some reasons for rare use of this technique.

We selected all the highly qualified anesthesiologists working in South Punjab. Furthermore, our respondents have had a wide experience in anesthesia (17.03 ± 9.12 yrs, varying from 5 to 40 years).

In our study, only three participants (7.88%) practiced spinal anesthesia in children, while thirty five (92.12%) did never attempt this procedure, although they administered spinal in more than 50 % of adult patients at their institutions. J.C. Sander conducted a survey about pediatric regional anesthesia. The respondents practiced caudal, epidural and peripheral nerve blocks in pediatric. None among them claimed subarachnoid block.¹⁶ Benjamin j Walker et al. analyzed that subarachnoid block constituted 2.36% (2,034/86328) of regional anesthesia in children.¹⁷

Spinal administration is reported as 6.2% among pediatric regional anesthetic techniques at 261 centers in 33 European countries.¹⁸

We tried to identify the factors resulting in under-utilization of this technique. In our survey, the highest score of 4.69 ± 0.832 in quantitative data reflects the lack of expertise/training/guidance as the most important factor. In qualitative data the largest group of anesthesiologists expressed the same observation. This factor was considered the most important by 9 (25.71%), second most important by 6 (17.14%) and the third most important by 5 (14.28%) participants, to be the reason for under-utilization of the technique. Administration of spinal by a surgeon to a 4 yrs old child resulted in cardiac arrest. Another report cited the death of a child following spinal anesthesia administered by an anesthetist without proper knowledge and skill.¹³

Second highest score in our quantitative data 4.14 ± 1.309 was given to high/total spinal as a prohibiting factor. In our qualitative data, only 3 (8.57%) considered it to be the most important but the largest group 12 (34.28%) considered it to be as the second most important reason. Despite the fact that no such survey is published, however, Osazuwa et al. and Gupta et al., cited lack of expertise and risk of high

spinal as possible causes of avoiding the technique.^{19,20}

Lack of cooperation of child has the third highest score in quantitative questionnaire in our study. In qualitative data, it ranked the most important factor as hurdle in the technique. KM Ebert et al. referred spinal anesthesia in children is not popular due to lack of cooperation of children during operative procedure.²¹

Risk of spinal cord damage and neurological complications in children following spinal anesthesia led to its prohibition in a hospital.¹³

Difficulty in assessment of block is another reason with score 3.34 ± 1.644 . In qualitative analysis, it was ranked at a lower end. Some other authors also mentioned it as a difficulty in evaluation of block, inadequate block, supplemental sedation and need to convert to general anesthesia, a cause of avoiding spinal anesthesia in children.^{21,22}

A few participants pointed out short duration of action as compared to adults, reluctance by family and surgeon, transient neurological symptoms, back pain, meningitis, and post dural puncture headache as possible reasons for not choosing spinal anesthesia in children supported by various publications.^{22,23}

4. Limitations

We only selected anesthesiologists with the highest qualifications, working either in government, semi government or private hospitals of South Punjab. Large scale studies involving anesthesiologists of all grades and all regions of the country are required to address this issue at a national level.

5. Conclusions

The practice of pediatric spinal anesthesia is very limited even by the anesthesiologists with the highest qualifications in South Punjab. Lack of adequate training and proper guidance needs to be looked into at postgraduate training and the practice encouraged at national level.

6. Conflict of interest

None declared by the authors

7. Authors' contribution

HDD – Concept, design and conduct of study

SS – Manuscript writing, editing

SAAN – Data collection, statistical analysis

AS – Literature search, manuscript writing

MHB - Manuscript writing, editing

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