

Effect of Spinal and General Anaesthesia Over APGAR Score in Neonates Born After Elective Cesarean Section

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ABSTRACT

OBJECTIVE: To compare the effects of general anaesthesia and spinal anaesthesia on APGAR SCORES in neonates born to full term elective cesarean sections.

DESIGN: Randomized prospective study.

PLACE AND DURATION OF STUDY: The study was carried out at Abbasi Shaheed Hospital from March 2009 to July 2009.

MATERIAL AND METHODS: The study was performed on 60 healthy full term patients lying in American Society of Anaesthesiologist-1 category presenting for elective lower segment cesarean section. Thirty patients were given general anaesthesia and other 30 patients received spinal anaesthesia. The Apgar scores were recorded at 1 minute and 5 minutes interval after each delivery.

RESULTS: Patients undergoing general anaesthesia, who had short time interval between induction of anaesthesia and delivery, gave birth to neonates having Apgar Score ≥ 7 at 5 minutes interval and there was less difference in the effects of general and spinal anaesthesia on the Apgar Score of such neonates.

CONCLUSION: There was no significant difference between the effects of general anaesthesia and spinal anaesthesia on Apgar score of neonates at 5 minutes interval after birth, born after full term elective cesarean section.

KEY WORD: Caesarean Section. Neonate. General Anaesthesia. Spinal Anaesthesia. Apgar score.

INTRODUCTION

Obstetric anaesthesia is a demanding but gratifying subspecialty of anaesthesiology and it requires special skills because two lives are involved. Although most patients undergoing cesarean section are young and healthy, they nonetheless represent a high risk group of patient.

Spinal Anaesthesia was introduced by Bier in 1899, Tuffier did remarkably to make it popular and the technique achieved a widespread acceptance.¹ By 1907 it was being used widely in almost all branches of surgery and obstetrics as well.¹

The choice of anaesthesia for cesarean section depends upon indication for operation, its urgency, patients and obstetrician preferences and anaesthesiologist. Either of the general and spinal anaesthesia is not ideal for cesarean section because each has advantages and risk to both mother and foetus.^{2,3} However the aim of anaesthetist is to choose the method which is safest and most comfortable for the mother, least depressant to the newborn and which provides optimal working conditions for the obstetrician.⁴

The outcome of anaesthesia either spinal or general depends upon the condition of the mother and more importantly effects on newborn. APGAR score is the

best parameter to assess the immediate condition of the baby.^{1,5} This is the reason to select this topic.

MATERIAL AND METHODS

The study was carried out at Abbasi Shaheed Hospital from March 2009 to July 2009. This study was performed on 60 healthy full term patients (as per criteria of American Society of Anesthesiologists) presenting for elective lower segment cesarean section. Thirty patients were given general anaesthesia and other 30 patients received Spinal anaesthesia, this is a restrictive randomization of blocking type so that to achieve the balance between two groups. The Apgar scores were recorded at 1 minute and 5 minutes interval after each delivery.

Total 60 patients were included and a written consent was taken from each patient.

Method for General Anaesthesia :Pre medication done with inj. Cimetidine 200mg i/v, Inj. Metoclopramide 10mg i/v 1 – 2 hours prior to induction. Patients was pre oxygenated for 3 – 5 minutes, induction was done with, Inj. Thiopentone 4mg / kg body weight i/v, Inj. Succinyl choline 1.5mg / kg i/v.After endotracheal intubation, 50% oxygen with nitrous oxide and 0.5% halothane inhalation was given each time. General anaesthesia was maintained with non depolarizing muscle

relaxant Atracurium 0.5mg/kg of body weight i/v. After delivery i/v syntocinon 10 units was given stat and 20 units added to the infusion. I/v. Nalbuphine 8 – 10mg was given for analgesia to every patient after delivery and Halothane was discontinued. To reverse the effect of non depolarizing muscle relaxant Inj. Neostigmin 0.05mg/kg of body weight with Inj. Atropine 0.02mg/kg of body weight, was given i/v.

Spinal Anaesthesia

Patient was placed in sitting position and space between 3rd and 4th lumbar spine was identified and marked. After taking all aseptic measure lumbar puncture was done with 25 gauge size spinal needle and hyperbaric Bupivacaine 0.75%, 2ml (15mg) was administered in one minute. Immediately after injection of Bupivacain patient was placed in supine position with wedge under right hip for left uterine displacement. Monitoring was done for the pulse, N.I.B.P., oxygen saturation, ECG and urinary output. Following was recorded during every cesarean section under general or spinal anaesthesia. Time of induction, time of incision to skin, time of incision of the uterus, time of delivery of baby.

Recording of Apgar score

In this study Apgar score of all 60 neonates were recorded by neonatologist. Apgar scores were recorded at 1 minute and 5 minutes after delivery. Birth weight of every baby was recorded. Apgar score of each baby was compared with the standard Apgar score chart as shown below:

Apgar score (**table I**) of the two groups was compared by Statistical analysis performed with the use of power calculation.

RESULTS

Out of 30 patients who received general anaesthesia, 25 patients gave birth to neonates having Apgar score ≤ 6 at 1 minute after birth and Apgar score of other 5 neonates were ≥ 7 . Twenty two neonates with low Apgar score at 1 minute were improved after resuscitation at 5 minutes interval and showed Apgar score ≥ 7 . Three others with low Apgar score at 1 minute did not show improvement and their Apgar score stayed between 5 and 6. On the whole 29 neonates were bearing good Apgar score ≥ 7 at 5 minutes interval and only 1 male baby of 2.6 kgs was not improved at 5 minutes interval and his Apgar score was 6 (**Table II**). On the other hand out of 30 patients who received spinal anaesthesia only 10 patients give birth to neonates with Apgar score ≤ 6 at 1 minute, who improved later on.

At 5 minutes interval Apgar score of all 30 neonates, in spinal anaesthesia group, were ≥ 7 .

Time interval between anesthesia and delivery of neonates was equal ranges from 5 - 10 minutes.

TABLE I: APGAR SCORE

APGAR Score	0	1	2
Heart rate	Absent	<100	>100
Respiratory effort	Absent	Irregular	Good
Reflex irritability	No response	Grimace	Cough/sneeze
Appearance (color)	Blue or pale	Body pink with blue extremities	Completely pink
Muscle tone	Flaccid	Good tone	Spontaneous flexion

TABLE II: APGAR SCORES AT 1MIN AND 5 MIN INTERVALS IN GA AND SA GROUPS

APGAR Score	At 1 min		At 5 min	
	GA-group (n=30)	SA-group (n=30)	GA-group (n=30)	SA-group (n=30)
≥ 7	5 (16.66%)	20 (66.66%)	29 (96.66%)	30 (100%)
≤ 6	25 (83.33%)	10 (33.33%)	01 (3.33%)	0 (0%)

DISCUSSION

Delivery of baby by cesarean section has become increasingly common. However the choice of anaesthetic technique remains controversial. As it said earlier that no technique is ideal for cesarean sections, and both general and spinal anaesthesia have certain advantages and disadvantages.^{1,2}

Comparisons of the condition of neonates delivered by elective cesarean section under general and spinal anaesthesia have demonstrated better clinical outcomes with regional anesthetic techniques.^{2,3,4}

Lalitha Krishnan et al studied two groups of patients, one received general anesthesia and other spinal anaesthesia and found that no significant difference was seen in the mean 1 – minute Apgar scores in the two groups, however more neonates of the general anaesthesia group appeared depressed soon after birth, needing free flow of oxygen and bag and mask ventilation.⁵

Scott. W. Roberets et al observed that 'although it is widely believed that regional anaesthesia was safer than anesthesia for the newborn, our results on

normal term pregnancies suggested that no anaesthetic method was necessarily hazardous or safer than another and that each method had its own liabilities. Inhalational agents necessary for general anaesthesia could depress the newborn, as our 1 minute Apgar scores reflected the same effect. However similar effects were seen with spinal anaesthesia, probably because of the occasionally severe foetal acidemia.^{6,7} Foetal acidemia was identified as "PH value of 7.19 or less because this value is approximately two standard deviation below the mean for normal pregnancies."⁸

A study done by Scott W. Roberts and others and they concluded that there is statistically significant risk of fetal acidemia of varying severity with the use of regional anaesthesia in women delivered by cesarean without labor. Umbilical artery blood PH values less than 7.10 were observed in 4% of fetuses, among whom 1% had PH values less than 6.99. On the other hand no infant had PH values less than 7.10 when general anaesthesia was used. They also concluded that the prevalence of low PH values was significantly increased in those infants exposed to any of regional anesthetic techniques compared to general anaesthesia.^{8,9,10}

However some clinical studies suggested that "there is little to choose between general anaesthesia and spinal anaesthesia for obstetric with regard to their effect on fetal acid base balance."^{11,12}

There are different opinions about the ideal time at which the fetus should be delivered after induction of anaesthesia. Barter was the first to emphasize that parturient women should be prepped and draped before induction of general anaesthesia.¹³ Many workers have recommended that delivery is best completed 6 – 8 minutes after induction of general anaesthesia as nitrous oxide could cause neonatal depression by diffusion through the placenta.^{14,15}

Datta et al observed that "in the absence of hypotension there is no change in Apgar scores or acid base status with prolonged induction to delivery interval in spinal anaesthesia."

Morgan described that "long skin incision-to-delivery time more than 8 minutes and uterine-incision-to-delivery time more than 180 seconds have been associated with foetal hypoxia and acidosis regardless of the type of anaesthesia."

General anaesthesia is one of the major causes of maternal death in Pakistan. Despite the advances in anaesthetic techniques, monitoring facilities and availability of different drugs, young women are still dying of anaesthesia related complication.¹⁵

In another study observed that Apgar scores of neonates whose mothers received general anaesthesia were lower than neonates whose mothers received spinal anaesthesia.¹⁶

CONCLUSION

There is no significant difference between the affects of general anaesthesia and spinal anaesthesia on Apgar score of neonates at 5 minutes interval, born after full term elective cesarean section of healthy patients. Present anaesthetic techniques, however limit the dose of intravenous agents such that fetal depression is usually not clinically significant with general anaesthesia. Therefore it is recommended that spinal anaesthesia is safe for cesarean section of healthy patients.

REFERENCES

1. Brown DL. Spinal, epidural, and caudal *anesthesia*. In: Miller RD, editor. *Anaesthesia*. 4th ed. New York: Churchill Livingstone; 1995. pp. 1505-33.
2. Wu CL. Analysis on doula parturition method in clinical practice field. *Henan J Prev Med* 2006-05.
3. Kattwinkel J, editor. *Textbook of Neonatal resuscitation*. 4th ed. USA: American Association and American Academy of Pediatrics; 2000.
4. Wiswell TE. Delivery room management of the apparently vigorous meconium stained neonate: Result of multicenter, international collaboration trial. *Pediatrics* 2000;105:1.
5. Drowning JW, Houlton PC, Baeclay A. Extra dural anaesthesia for cesarean section: a comparison with general anaesthesia. *Br J Anaesth* 1997;51:390-4.
6. Dutta S, Ostheimer GW, Weiss JB. Neonatal effect of prolonged induction for cesarean section. *Obstet Gynecol* 1981;58:331-5.
7. Krishnan L, Karan NG, Karanand NB. Anesthesia for Cesarean section and immediate neonatal outcome. *Indian J Pediatr* 1995;62:219-23.
8. Roberets SW, Leveno KJ, Sidawi JE, Lucas MJ, Kelly MA. Fetal acidemia associated with regional anaesthesia for elective cesarean delivery. *Obstet Gynecol* 1995; 85:79-83.
9. Morgan GE Jr., Mikhail MS, editors. *Clinical Anaesthesiology*: 2nd ed. Stamford: Appleton & Lange; 1996.
10. Sultan ST. *Anaesthesia and Safe Obstetrics*. *Spectrum* 2003;24(11, 12):42.
11. Wimmer JE. Neonatal resuscitation. *Pediatr Rev* 1994;15:225.
12. Wang YL. Effects of different stage of labour to anesthesia level in cesarean section. *Hebei Med* 2009-01.
13. American Academy of Pediatrics, American Heart Association. *Textbook of neonatal resuscitation*. 4th ed. Elk Grove Village, American Academy of Pediatrics, 2000.

14. Ehrenkranz RA, Wright LL, editors. Highlights from the NICHD Neonatal Research Network. *Semin Perinatol* 2003;23(4):335-48.
15. Niermeyer S, Keenan W. Resuscitation of the newborn infant. In: Klaus MH, Fanaroff AA, editors. *Care of high-risk neonate*. 5th ed. Philadelphia: W.B. Saunders; 2001. pp.45-61.
16. Sultana A. Effect of Type of Anaesthesia on neonatal outcome. *Annals* 2004;9(2):552-6.



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