

## Comparison of the Effects of Spinal Anaesthesia Vs General Anaesthesia on Apgar Score in Neonates Born after Elective Caesarean Section

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### ABSTRACT:

#### BACKGROUND:

Delivery of baby by caesarean section has become increasingly common, Caesarean section can be performed under general or regional anaesthesia like spinal or epidural technique, and both have advantages and disadvantages. It is important to clarify what type of anaesthesia is safest for the mother and baby.

#### OBJECTIVE:

To compare the effect of spinal anaesthesia versus general anaesthesia on Apgar score of neonates born by elective caesarean section in Baghdad teaching hospital.

#### MATERIAL AND METHODS:

The study was carried out in Baghdad teaching hospital from February 2011 to July 2011 .this study was performed on 60 women presenting for Elective lower segment caesarean section .thirty mothers were given general anaesthesia and other 30 mothers received spinal anaesthesia. The Apgar score was recorded at 1 minute and 5 minute interval after each delivery.

#### RESULTS:

Out of 30 mothers, who received general anaesthesia, 25 patients (83.3%) give birth to neonates having Apgar score  $\leq 6$  at one minute after birth and the remaining 5 neonates (16.7%) had Apgar score of  $\geq 7$ .

On the other hand out of 30 mothers who received spinal anaesthesia only 10 mothers give birth to neonate having Apgar score  $\leq 6$  at one minute after birth, who improved at 5 minutes interval, and their Apgar score were  $\geq 7$ .

It had been found that those neonates who were born under G.A were ten folds more likely to have Apgar score less than or equal to 6 at first minute compared to those with spinal anaesthesia, the odds ratio=10 and 95% confidence interval of the odds ratio (2.94-34) and  $p=0.00024$  which is highly significant, G.A had greater risk on infant at the first minute.

#### CONCLUSION:

There is a significant difference between the effects of general anaesthesia and spinal anaesthesia on Apgar score of neonate one minute after delivery of full term neonate by elective caesarean section, but there is no significant difference between the effect of general anaesthesia and spinal anaesthesia on Apgar score 5minutes after birth.

**KEY WORDS:** general anaesthesia , spinal anaesthesia, apgar score, elective caesarean section

### 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 caesarean section are young and healthy, they represent a high risk group of patients. Spinal anaesthesia for caesarean section was

introduced by Bier in 1898<sup>(1)</sup>, Braun was also the first to add epinephrine to prolong the action of local anaesthesia<sup>(1)</sup>.

The choice of anaesthesia for caesarean section depends upon indication for operation, its urgency ,patient and obstetricians preferences and skill of anaesthetist<sup>(1)</sup> Either of general anaesthesia and spinal anaesthesia is not ideal for caesarean section because each has advantage and risk to both mother and foetus<sup>(2,3)</sup>. However the aim of anaesthetist is to choose the method which

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is safest and most comfortable for the mother, least depressant to the newborn and which provides optimal working conditions for obstetrician<sup>(4)</sup>. Outcome of anaesthesia either spinal or general depends upon the condition of the mother and more importantly effects on newborn. Apgar score is best parameter to assess the immediate condition of the baby<sup>(2,5)</sup>; it is performed one and five minutes after delivery.

Apgar score:

It's the first test done to the newborn birth in the delivery or birthing room. The test is simple and repeatable method to quickly and summarily assess the health of newborn physical condition immediately after delivery and to determine any immediate need for extra medical or emergency care. The Apgar score was developed in 1952 by anesthesiologist named Virginia Apgar<sup>(6)</sup>

The Apgar test is usually done to the baby twice: once at one minute after birth, and again at 5 minutes after birth. Rarely, if there are concerns about the baby condition and the first two scores are low, less than 7, the scoring is also performed at 10, 15 and 20 minutes after delivery<sup>(7)</sup>

Five factors are used to evaluate the baby's condition and each factor is scored on a scale of 0 to 2, with 2 being the best score for each: Activity and muscle tone, Pulse, Grimace response, Appearance and Respiration.

Scores obtainable are between 0- 10, with 10 is highest possible score. There are many factors that affect Apgar score including false positive and false negative score<sup>(8)</sup>

### PATIENTS AND METHODS:

This study was carried out in Baghdad teaching hospital from February 2011 to July 2011, and was performed on 60 healthy full term mothers presenting for elective lower segment caesarean section, thirty mothers were given general anaesthesia and other 30 mothers received Spinal anaesthesia, the Apgar scores were recorded at 1 minute and 5 minute interval after each delivery. Total 60 mothers were included and a written consent was taken from each patient.

Method for General anaesthesia: history was taken from all patients in the suite which include age, parity, duration of pregnancy and any complicating maternal health history, anaesthesia related obstetric history, blood pressure measurement, and airway assessment. An 18-gauge intravenous catheter is employed. All women managed with intravenous fluid (usually

lactated ringer), blood was prepared for all patients, and patient was placed in supine position with wedge under right hip for left uterine displacement. Monitoring was for pulse, N.I.B.P., oxygen saturation and all patients were considered to have empty stomach and to be at risk of pulmonary aspiration. Patients were pre oxygenated for 3-5 minutes, induction was done with Inj. thiopentone 4mg/kg body weight iv, inj. Succinyl choline 1mg/kg iv. After endotracheal intubation. 100% oxygen and 0.5% halothane inhalation was given each time. General anaesthesia was maintained with non-depolarizing muscle (atracurium). Patients were selected from age range 18 to 37 years, with full term live single pregnancy. Their informed written consent and anaesthesia fitness report was also taken for inclusion.

Exclusion criteria: the following patients were excluded: Premature pregnancy <37 weeks of gestation, Liver, heart or kidney failure associated with pregnancy, Uncontrolled metabolic disorder (diabetes Mellitus, hypertension, thyrotoxicosis), And Multiple foetus pregnancy.

The study population was full term hospitalized pregnant women registered for caesarean section.

Spinal anaesthesia:

Like in group one, history was taken from patients specially about back surgery, bleeding tendency, valvular heart disease, pre-existing neurological deficits, blood pressure, pulse rate, chest examination was done and back examination for any deformity or back surgery at site of injection, two 18 gauge intravenous catheters are employed, 500-1000ml of crystalloid solution was preloaded then patient was placed in sitting position and space between 3<sup>rd</sup> and 4<sup>th</sup> lumbar spine was identified and marked. After taking all aseptic measure lumbar puncture was done with 22 gauge size spinal needle and hyperbaric Bupivacaine 0.5%, 2.5ml (12.5mg) was administered. Immediately after injection of Bupivacaine, patient was placed in supine position with wedge under right hip for left uterine displacement. Monitoring was for pulse, N.I.B.P., oxygen saturation. The following was recorded during every caesarean section under general or spinal anaesthesia: time of induction, time of incision to skin, time of incision to uterus, time of delivering the baby. We consider that every foetus should deliver with

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less than 10 minutes after induction of GA.

Recording of Apgar score: In this study, Apgar score of all 60 neonates were recorded at 1 minute and 5 minutes after delivery. Birth weight of each baby was recorded, Apgar score of each baby was compared with standard Apgar score chart.

Statistical analysis: By using SPSS (statistical package for social sciences) software for window V.18.US, data of all cases were entered and analyzed; descriptive analytic statistics were performed using appropriate statistical tests. Age and weight were expressed as (Mean  $\pm$  SD). Student (t) test was used to compare these

continuous variables and the mean of both groups. All data were presented as tables, graphs or paragraphs. In all statistical procedures and tests *P* value set at  $\leq 0.05$  to be considered as significant.

### RESULTS:

For all studied 60 mothers, the mean age of the mothers was (29.03 $\pm$ 4.8), and the mean birth weight of neonate was (3.1 $\pm$ 0.16). There was no significant difference in age of the mothers nor had the birth weight of neonates been found in between two groups. (*P. value* >0.05), table (1)

**Table 1: Descriptive statistics of studied group.**

Variables		anaesthesia		All cases	P .value
		GA group	Spinal group		
mother age	Mean $\pm$ SD(year)	29.03 $\pm$ 4.8	28.33 $\pm$ 4.8	28.7 $\pm$ 4.75	0.59
	Ranger (year)	19-37	18-37	18-37	
Neonates' Birth weight	Mean $\pm$ SD(kg)	3.1 $\pm$ 0.16	30.7 $\pm$ 0.18	3.06 $\pm$ 0.17	0.57
	Ranges (kg)	2.8- 3.5	2.8- 3.5	2.8- 3.5	

Out of 30 patients who received general anaesthesia, 25 patients (83.3%) give birth to neonate having apgar score  $\leq 6$  at one minute after birth and the remaining 5 neonates (16.7%) had apgar score of  $\geq 7$ . At 5 minutes, twenty five neonates with low Apgar score at one minute were improved after resuscitation and showed Apgar score of  $\geq 7$ .

On the other hand out of 30 patients who received spinal anaesthesia, only 10 patients give birth to neonate having Apgar score  $\leq 6$  at one minute after birth, who improved at 5 minute interval,

and their apgar score were  $\geq 7$ . The Apgar score at 5 minutes of all 30 neonates, in spinal anaesthesia group, was  $\geq 7$ .

It had been found that those infants who were born under GA were ten folds more likely to have Apgar score less than or equal to 6 at one minute compared to those with spinal anaesthesia, the odds ratio=10 and 95% confidence interval of the odds ratio (2.94-34) and *p*=0.00024 which is highly significant, G.A had greater risk on infant at the one minute, table (2)

**Table 2: Apgar score at one minute and type of anaesthesia.**

Anaesthesia		Apgar score at 1min			Odd ratio	P. value
		$\leq 6$	$\geq 7$	Total		
GA	Count	25	5	30	10	0.00024
	% within anaesthesia	83.3%	16.7%	100%		
Spinal	Count	10	20	30		
	% within anaesthesia	33.3%	66.7%	100%		
Total	Count	35	25	60		
	% within anaesthesia	58.3%	41.7%	100%		

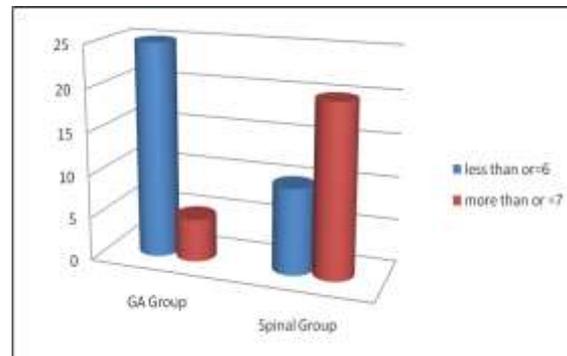


Figure 1 Apgar score and anaesthesia type distribution.

**DISCUSSION:**

The Apgar score is a practical method of systemically assessing newborn infants immediately after birth to help identify those requiring resuscitation and to predict survival in neonatal period. The 1 min. Apgar score may signal the need for immediate resuscitation, and the 5, 10, 15 and 20min.score may indicate the probability of successfully resuscitating an infant. A low score may be due to a number of factors, including drugs given to the mother during labour, caesarean section under general anaesthesia and immaturity<sup>(8)</sup>.

Delivery of baby by caesarean section has become increasingly common, and both general and spinal anaesthesia have certain advantages and disadvantages, but regional anaesthesia has become the preferred technique because general anaesthesia associated with higher maternal mortality and foetal depression<sup>(1)</sup>. Death associated with general anaesthesia are generally related to airway problem, such as inability to intubate , inability to ventilate or aspiration pneumonitis , large population studies in Great Britain and in the United State have shown that regional anaesthesia for caesarean section is associated with less maternal morbidity and mortality than general anaesthesia<sup>(1)</sup>, whereas death associated with regional anaesthesia are generally related to excessively high neural blockade or local anaesthetic toxicity<sup>(1)</sup>.however no technique is ideal for caesarean sections and both general and spinal anaesthesia have certain advantages and disadvantages<sup>(2)</sup> therefore opinion remain divided whether regional block offers any real advantage over general anaesthesia to both

mother and baby during elective section delivery.

Apgars<sup>(9)</sup> was amongst the first to report that babies delivered by Caesarean section under spinal block were, in general, more vigorous at birth than those whose mothers had cyclopropane. Several workers report a marginal improvement in one-minute Apgar scores in infants delivered by Caesarean section under epidural block<sup>(10,11,12)</sup>,but others have found no difference<sup>(13,14)</sup>

A Study done by Aftab Imtiaz and others at Abbasi Shaheed Hospital from March 2009 to July 2009, conclude that 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 caesarean 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 and recommended that spinal anaesthesia is safe for caesarean section of healthy patients<sup>(15)</sup> The result of this study was corresponding to our result i.e. there is significant difference only at one minute after delivery

Other study was done by Therese K. Abboud, MD,*et al*,2005, Los Angeles, California. The result of this study was that the Neonates delivered with general anaesthesia had scored significantly lower on some of the test items than neonates delivered by spinal anaesthesia at one minute after delivery<sup>(16)</sup>.

Lalitha Krishnan et al studied two groups of

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patients, one received general anaesthesia 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.<sup>(12)</sup>

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 woman should be prepped and draped before induction of general anaesthesia.<sup>(17)</sup> 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.<sup>(18, 19)</sup>

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

Morgan describe 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. In another study observed that Apgar scores of neonates whose mothers received general anaesthesia were lower than neonates whose mothers received spinal anaesthesia.<sup>(20)</sup>

So widely believed that spinal anaesthesia is safest anaesthesia for newborn and mother, the reasons behind this is less neonatal exposure to depressant drugs, a decrease risk of maternal pulmonary aspiration, an awake mother at birth time, the option of using spinal opioid for postoperative pain relief and it is easy to perform, rapid with more intense block<sup>(1)</sup>.

### CONCLUSION:

There is significant difference between the effects of general anaesthesia and spinal anaesthesia on Apgar score of neonates at one minute after delivery of full term neonate by elective caesarean section, but there is no significant difference between the effect of general and spinal anaesthesia on Apgar score of neonates at 5minute interval.

### RECOMMENDATIONS:

From our study it is recommended that spinal anaesthesia is safe for caesarean section of healthy patient and more safe for newborn delivery than general anaesthesia at one minute

assessment of Apgar score & more comfortable for the mother. It is preferable to do caesarean section under spinal anaesthesia, to avoid intravenous agents which cause foetal depression at one minute after delivery.

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