Original Article

Effect of General Anesthesia Compared to Regional Anesthesia on the Apgar Score of Neonates

Omar S. Almomani*

Abstract

Background: cesarean section (CS) is one of the common operations performed in obstetric practice worldwide; it can be conducted as elective or emergency operation.

Objective: to assess the effect of different types of anesthesia used during conducting elective cesarean sections (CS) on the health of neonates by using the Apgar score.

Method: a prospective study conducted in Royal medical Services hospitals in Jordan between Jan. 2011 and May 2012.All pregnant women planned for elective CS were included in this study. Women of eventful pregnancy or intra uterine fetal growth retardation or malformation were excluded from the study. 161 healthy pregnant women underwent elective CS were included in this study. The patients were divided into 3 groups; the 1st one received general anaesthesia (GA) (group A) and consists of 104 patients, group B consists of patients who received spinal anesthesia (42 patients) and group C consists of patients who received epidural anesthesia (15 patients).

Results: at one minute 62.5% of patients in group A had normal Apgar score while in group B and C about 80% had normal scores. At five minutes 87.5% of patients in group A had normal Apgar score while in group B and C about 93% had normal scores. There was no statically difference between the three groups in regard to Apgar score at 10 minutes.

Conclusion: General anesthesia adversely influences the short term outcome of infants born to mothers by elective cesarean section. Regional anesthesia is safe and well tolerated for the mother and the neonate and should be considered when there is a choice during cesarean section.

Key words: Apgar score, Cesarean section, General Anesthesia, Regional anesthesia.

Cesarean section (CS) is one of the common operations performed in obstetric practice worldwide; it can be conducted as elective or emergency operation. Although each methods of anesthesia has its own advantages and disadvantages many factors play a role in determining the choice of anesthesia offered for CS; in general GA is preferred for emergency CS since it provides rapid onset of action and more stabilization of patient's circulation and vital signs, on the other hand regional anesthesia is preferred for elective operations because of its lower cost and relatively lower risk of drugs complications to the mother and the fetus. In Turkey, only 44.5% of patients were submitted to regional anesthesia1 compared to 80% in the USA2. However other cultural and personal factors may also play a role in determining the decision of anesthesia; In Jordan most women prefer not to be aware of what's going on during CS operation, anxiety of the patient also force them to prefer GA for regional anesthesia when deciding CS operation, few patients also prefer GA as they think that regional anesthesia my cause spinal cord injury that may result in paralysis despite the detailed explanation of the anesthesia technique used in regional anesthesia. This all made GA accounts for about two thirds of the anesthesia types offered for patients undergoing elective CS. Newborns products of CS can be assessed clinically using the Apgar score which was devised in 1952 by Dr. Virginia Apgar and used it to evaluate the health of newborn and assess the effects of obstetricanesthesia on newborns at birth. It consists of 5 items to be evaluated at 1, 5 and 10 minutes after birth; those items are heart rate, breathing, muscle tone, reflex irritability, and color[3,4]. Apgar

*Consultant anesthetist, Head of department of Anesthesia, Prince Ali Bin Al-Hussein Hospital Royal Medical Services-Jordan.
Email:omardr@yahoo.com

Scores 3 or below are considered critically low while 4 to 6 are fairly low and 7 to 10 generally normal. Other methods used to assess the health of the newborns include · Umbilical cord blood gas analysis, evaluation of newborn neurobehaviour, electronic fetal monitoring, biophysical profile score, fetal pulse oximetry and fetal Doppler[4].

Objectives:
To assess the effect of different types of anesthesia used during elective cesarean sections on the health of neonates by using the Apgar score.

Method:
This a prospective study conducted in Royal Medical Services hospitals in Jordan between Jan. 2011 and May 2012. All pregnant women planned for elective CS were included in thisstudy. Women of eventful pregnancy or intra uterine fetal growth retardation or malformation were excluded from the study. 161 healthy pregnant women underwent elective CS were included in this study. Thepatients were divided into 3 groups; the 1st one who received GA (group A) and consisted of 104 patients, group B patients consisted of patients who received spinal anesthesia (42 patients) and group C patients consisted of patients who received epidural anesthesia (15 patients).

Results:
The mean age for all ladies was 31.4 years, the average gestational age was 38.8 weeks and the average birth weight was 2.6 kg. Table 1 summarizes the mean age, gestational age and birth weight for the three groups.Table 2,3 and 4 represent the Apgar scores for Groups A,B and C patients respectively at 1,5 and 10 minutes.

Table 1:summarizes the mean age, gestational age and birth weight for the three groups.

	Group A	Group B	Group C
Age (yrs)	31.2	31.8	31.7
Gestational age (wks)	39.0	38.5	38.2
Birth weight (kg)	2.5	2.8	2.9

Table 2: Apgar scores for Group A

Apgar score	At 1 minute		At 5 minutes		At 10 minutes	
	Number	Percentage	Number	Percentage	Number	Percentage
0-3	17	16.4%	5	4.8%	0	0.0%
4-6	22	21.1%	8	7.7%	2	1.9%
7-10	65	62.5%	91	87.5%	102	98.1%

Table 3: Apgar scores for Group B

Apgar score	At 1 minute		At 5 minutes		At 10 minutes	
	Number	Percentage	Number	Percentage	Number	Percentage
0-3	3	7.1%	1	2.4%	0	0.0%
4-6	6	14.3%	2	4.8%	1	2.4%
7-10	31	79.6%	39	92.8%	41	97.6%

Table 4: Apgar scores for Group C

Apgar score	At 1 minute		At 5 minutes		At 10 minutes	
	Number	Percentage	Number	Percentage	Number	Percentage
0-3	1	6.7%	0	0.0%	0	0.0%
4-6	2	13.3%	1	6.7%	0	0.0%
7-10	12	80.0%	14	93.3%%	15	100%

Normal Apgar score is assumed when the score is 7 or more; at one minute 62.5% of patients in group A had normal Apgar score while in group B and C about 80% had normal scores. At five minutes 87.5% of patients in group A had normal Apgar score while in group B and C about 93% had normal scores. On the other hand there was no statically difference between the three groups in regard to Apgar score at 10 minutes.

Discussion:

Apgar score is still considered one of the best methods used to assess the health of the newborn since it depends basically on the clinical examination of the newborn. In this study the patients were divided into 3 groups; group A are those who received GA which was introduced as follow: 100%

Oxygen was introduced using the face mask for three minutes as pre-oxygenation then intravenous induction with thiopental (4 mg/kg) and succinylcholine (1.5 mg/kg), and tracheal intubation was performed before starting the operation (rapid sequence induction (RSI)). Anesthesia was maintained with 50% nitrous oxide, 50% oxygen, and small amounts of inhalational anesthetic (e.g. 0.5% halothane) and proper dose of nondepolarizing muscle relaxant. In group B Spinal anesthesia was performed at the level of L3-L4 interspace using proper dose of 0.5% of Bupivacaine. In group C Epidural anesthesia was administered through an epidural catheter placed at the L3-L4 interspace using proper dose of 0.5% of Bupivacaine.

All pregnant ladies with medical diseases like heart diseases, infections, vaginal bleeding, premature labour were excluded from the study because they may affect the health of the fetus and thus affect the Apgar score at birth, in addition to that none of them received sedation or analgesics before the operation. Also any fetal abnormalities like congenital malformations, intrauterine growth retardation and expected low birth weight that are proved by ultrasonography during antenatal care were excluded from the study for the same reason.

Regional anesthesia is more widely used than GA for CS[1,2] in many parts of the world particularly western countries, for example in Italy only 33.8% of CS operations was performed under GA. [5]Although there was a wide range of flexibility regarding the choice of anesthesia in this study most of the cases of elective CS (64.6%) was performed using GA because women preferred not to be aware of what's going on during CS operation since this may aggravate their anxiety and besides some patients think that regional anesthesia my harm the spinal cord and result in paralysis.

Many studies were conducted to evaluate the effect of regional and general anesthesia on the Apgar score of the newborns using different methods of studies, some of those studies revealed no significant differences on the outcome of Apgar score with the use of different type of anesthesia while performing CS[6], while other studies showed that infants who were products of CS using regional anesthesia were clinically in better condition than those where GA was used[7].B.Y. Ong et al. also studied the effect of anesthesia on the health of the newborns using a large sample size; their study showed that GA, whether for elective or emergency cesarean section, was an independent risk factor for low Apgar score but in elective cesarean group significantly better Apgar scores was noticed after regional anesthesia usage[8].However no study demonstrated the superiority of GA to regional anesthesia regarding the effect on Apgar score of newborns products of CS.

After elimination of all maternal and fetal factors that may affect the Apgar score of the neonates this study showed a significant effect of the GA on the Apgar score at one minute; the average Apgar score for those neonates was 6.6 which is considered below normal and 16.4% of neonates had critically low Apgar score, when compared to groups B and C the average Apgar score was 7.9 and 8.4 respectively which is considered within the normal range. At five minutes also the average Apgar score was lower in group A than groups B and C but with a lesser extent than that at 1 minute while at 10 minute the average Apgar score was almost the same in the three groups. This proves that GA adversely affected the outcome of the Apgar score of neonates at one and five minutes. The explanation for this is that at 1 minute the neonate is still under the effect of inhalation anesthetic agents but the time this effect vanishes due to exhalation of these agents by the neonates. There was no statistical difference between groups B and C regardingthe Apgar score at any time as

shown in figure 1.This was consistent with other studies that found that general anesthesia for cesarean section is more depressant for neonates than regional anesthesia[4,9].

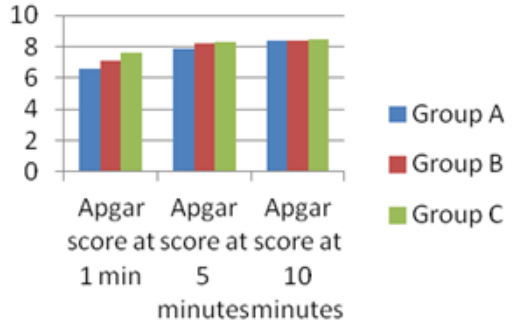

Figure 1. The average Apgar score for groups A, B and C at 1, 5 and 10 minutes after birth.

Many studies also compared the impact of general anesthesia with regional anesthesia on neonates using other parameters; Kolatat et al. studied this issue by comparing the results of Umbilical-Vessel Acid-Base and Blood-Gas values, although no significant difference was found between general and regional anesthesia in regard to umbilical blood gas value a better Apgar score was noted in regional anesthesia group[10].

This study demonstrated clearly the adverse effect of general anesthesia on the Apgar of yields infants at one minute and to a lesser extent at 5 minutes when compared to regional with no difference seen with the Apgar score at 10 minutes. Thus regional Anesthesia sounds to be safer technique for cesarean section due to its lower short term impact on yields infants. In addition to that this study showed that was no statistical difference in regard to neonatal Apgar score in pregnant ladies who received spinal or epidural anesthesia. A more long term study may be needed to elaborate the long term impact of maternal anesthesia on the health of infants. It worth to mention that there was no complication to the mothers while introducing regional anesthesia through spinal or epidural techniques.

Conclusion:

General anesthesia adversely influences the short term outcome of infants born to mothers by elective cesarean section. Regional anesthesia is safe and well tolerated for the mother and the neonate and should be considered when there is a choice during cesarean section.

References

1.Tekin I, Laçin S, Arýca I et al. Factors influencing patient preferences of anesthesia type for caesarean section. Türkiye Klinikleri J Anest Reanim 2005; 3: 1-6.

2. Hawkins JL, Gibbs CP, Orleans M et al. Obstetric anesthesia work force survey, 1981 versus 1992. Anesthesiology 1997; 87: 135-143.

3. Apgar, Virginia. A proposal for a new method of evaluation of the newborn infant.Curr. Res. Anesth. Analg.1953;32 (4): 260–267.

4. Judith Littleford.Effects on the fetus and newborn of maternal analgesia and anesthesia: a review. CAN J ANESTH 2004; 51 (6): 586–609.

5. GoriF., PasqualucciA., CorradettiF.. Maternal and neonatal outcome after cesarean section: The impact of anesthesia. 2007; 20, (1): 53-57.

6. Fox GS, Smith JB, Namba Y et al. Anesthesia for cesarean section: further studies. Am J Obstet Gynecol 1979;133:15-9.

7. Crawford JS, Davies P. Status of neonates delivered by elective caesarean section. Br J Anaesth 1982;54:1015-22.

8. OngB. Y., CohenM M, PalahniukR J. Anesthesia for Cesarean Section-Effects on Neonates. Anesth Analg 1989;68:270-5.

9. AbboudT K., NagappalaS, MurakawaK et al. Comparison of the Effects of General and Regional Anesthesia for Cesarean Section on Neonatal Neurologic and Adaptive Capacity Scores. Anesth. Analg.1985;64:996-1000.

10. Kolatat T, Somboonnanonda A, Lertakyamanee J,et al. Effects of general and regional anesthesia on the neonate (a prospective, randomized trial). J Med Assoc Thai. 1999;82(1):40-5.