A comparison of the effect of spinal and general anesthesia on Apgar score in neonates delivered with elective cesarean section in Tarhuna teaching hospital

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Abstract:

Background: Due to the extreme risk of failed intubation and aspiration with general anesthesia, anesthesia recommendations prescribe regional anesthesia for most caesarean sections. However, based on insufficient evidence, general anesthesia is regarded to be safe for the fetus and is still used for caesarean sections. The newborns may be clinically evaluated using the Apgar score test to assess the health of the physical condition of the newborn immediately after delivery accurately and summarily and to evaluate any significant need for extensive medical or emergency treatment.

Aim of the work: The purpose of the study was to determine the effects of general and spinal anesthesia on the neonate Apgar score in mothers undergoing caesarean section. Patients and Methods: Registered Apgar scores for 40 newborns underwent caesarean section divided into two classes {neonatal mothers in group A (N: 20) underwent caesarean section under general anesthesia} and{neonatal mothers in group B (N: 20) underwent spinal anesthesia}. The Apgar score of 7 for newborns was found to be appropriate.

Results: Mean± Standard Deviation values of Apgar score of neonates at 01 minute was significantly high in Group B, 8.05 ± 0.99 as compared to Group A 6.75 ± 2.12 (p= 0.020). Apgar at 05 minutes was also significantly high in group B compare to group A [9.70±0. 65vs. 8.75 ± 1.44 (p= 0.013)]. **Conclusion:** Apgar score of neonate whose mother underwent spinal anesthesia was better than neonate whose mother underwent the general anesthesia at the 1st minute and 5th minutes interval.

Keywords: General anesthesia, Spinal anesthesia, Apgar score, Neonates, Cesarean section

مقارنة تأثير التخدير الشوكي والعام على درجة (Apgar) لحديثي الولادة بالعمليات القيصرية الاختيارية في مستشفى ترهونة التعليمي وفاء سعيد¹، هيثم عبود²، فرج صقر³ وفاء سعيد¹، هيثم عبود²، فرج صقر³ <u>abuarguob@gmail.com</u>

الملخص:

نظراً للمخاطر الشديدة لفشل التنبيب بالتخدير العام، فإن توصيات التخدير تصف التخدير الشوكي لمعظم العمليات القيصرية. ومع ذلك، بناءً على الأدلة غير الكافية، يعتبر التخدير العام آمناً للجنين ولإيزال يستخدم في العمليات القيصرية. يمكن تقييم الحالة الصحية والجسدية للأطفال حديثي الولادة سريرياً باستخدام درجة (Apgar) بعد الولادة مباشرةً.

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كان الغرض من هذه الدراسة هو تحديد آثار التخدير الشوكي والتخدير العام على درجة (Apgar) لحديثي الولادة في الأمهات اللواتي خضعن لعمليات قيصرية. نتائج (Apgar) المسجلة لـ 40 مولودً بالعملية القيصرية مقسمة إلى مجموعتين، الأمهات لحديثي الولادة في المجموعة أ (20) خضعن لعملية قيصرية تحت التخدير العام، والأمهات لحديثي الولادة في المجموعة ب (20) خضعن للتخدير الشوكي. حيث أن الدرجة 7 هي الدرجة المثلى لاختبار (Apgar) عند حديثي الولادة. النتائج: المتوسط الحسابي ± قيم الانحراف المعياري لدرجة (Apgar) لحديثي الولادة عند الدقيقة (10) كانت عالية بشكل ملحوظ في المجموعة ب (900 ± 8.05) مقارنة بالمجموعة أ (± 6.75) بعد الدقيقة (10) كانت عالية بشكل ملحوظ في المجموعة ب (909 ± 8.05) مقارنة بالمجموعة أ (± 6.75) بالمجموعة أ (1.4 ± 1.45). الاستتاج: كانت نتيجة (Apgar) لحديثي الولادة بالمجموعة أ (1.4 ± 1.45). الاستتاج: كانت نتيجة (Apgar) لحديثي الولادة الذين خضعت أمهاتهم للتخدير المجموعة أ (4.5 ± 1.45). الاستتاج: كانت نتيجة (Apgar) لحديثي الولادة الذين خضعت أمهاتهم للتخدير

الكلمات المفتاحية: التخدير العام، التخدير الشوكي، درجة (Apgar)، حديثي الولادة، العملية القيصرية.

Introduction:

Cesarean section is considered among the most ordinarily performed abdominal operations in women worldwide(Barber *et al.*, 2011).Widely, a progressive increase in cesarean delivery rates have been observed in the last years(Wilmink *et al.*, 2010).It is mentioned that cesarean sections account for 52% of births in Turkey , 43.9% in Mexico, 38.5% in Italy, 32.3% in the USA,26.6% in Canada,23.4% in England,17.1% in Norway,16.5% in Finland, and 14.3% of births in Holland (Boyle and Reddy., 2012 ;Demirci *et al.*, 2017).

The most important cause of fetal distress in any anesthetic technique is the reduction in the volume of O_2 available to the fetus as a result of the reduction of uteroplacental blood passing. Maternal, placental, and fetal factors play functions in cognate reduction. The effect of anesthetic medicaments is direct or through the changes in the mother(Petropoulos *et al.*, 2003). Newborns delivered by cesarean section can be assessed clinically using the Apgar score (Table -1) which was designed in 1952 by Dr.Virginia Apgar to assess the health of newborn and the effects of obstetric anesthesia on newborns at birth(Berchicci *et al.*, 2015). The test is simple and repeatable method to quickly and summarily assess the health of newborn physical condition directly after delivery and to determine any immediate need for added necessary care (Iliodromiti *et al.*, 2014;Nelson *et al.*, 2015).

Anesthesiologists prepared anesthesia for cesarean sections are responsible for the care of both the mater and baby. There are multiple factors involved when select the type of anesthesia for cesarean section, including the experience of the anesthesiologist, the mother's preference to a degree, presence of maternal co morbidities, and the urgency of the procedure (Yeoh *et al.*, 2010).

Spinal and general anesthesia both have advantages and disadvantages when applied in cesarean sections. Advantages of spinal anesthesia are that the patient is conscious, there is no hazard of aspiration, and it does not depress neonatal respiration. The most serious disadvantages of spinal anesthesia are the ability for fetal acidosis and hypoxia as well as maternal postdural puncture. General anesthesia is superior to spinal anesthesia in terms of giving more fast induction, better cardiovascular stability and respiration control, and the low liability of hypotensive attacks.Nonetheless, aspiration

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of gastric contents and intubation difficulties are more common when using general anesthesia in pregnant women (Lee, *et al.*, 2018; Reynolds, 2010).

Objective of study

The study was aim to determine the effects of general and spinal anesthesia on Apgar score of the neonates in mothers undergoing caesarean section.

APGAR SCORING SYSTEM					
	Point0	Point1	Point2	Point totaled	
Activity (muscle	Absent	Arms and legs flexed	Activity movement	Severely	
pules	Absent	Below 100 bpm	Over100 bpm	Moderatly depressed 4-6	
Grimace (reflex irritability)	flaccid	Some flexion of extremities	Active motion (sneeze,cough, pull away)	Excellent condition 7-10	
Apparance (skin color)	Blue, pale	Body pink, extremities blue	Completly pink		
Respiration	Absent	Slow irregular	Vigrous cry		

Table 1: Apgar Scoring System.

Patients and Methods

This study was carried in Tarhuna Teaching Hospital over a period of one year from February 2019 to February 2020.A total 40 pregnant women (36-40 weeks gestational age) planned for elective cesarean section were divided into two groups according to type of anesthesia given, group (A): 20 cases received general anesthesia, whereas group (B): 20 cases received spinal anesthesia.

The inclusion criteria were full term singleton uncomplicated pregnancy with elective cesarean section. Mothers with complicated pregnancy (gestational diabetes, pre-eclampsia, placenta previa, etc.), disease (diabetes, hypertension, known chronic disease as TB, chronic renal failure etc.) or congenital malformation known antenatally in the newborn were excluded.

In the General anesthesia group (A):-

General anesthesia protocol included pre-induction oxygenation with 4 or 5 vitalcapacity breaths of pure oxygen using an oro-facial mask, followed by the induction regimen of 5 mg/kg intravenous thiopental, then endotracheal intubation and administration of 1mg/kg succinylcholine chloride. Finally, 0.5 mg/kg of atracuriumbesylate was administered after the cord had been clamped. Controlled mechanical ventilation was started using a mixture of 50% oxygen and 50% nitrous oxide(Talebi *et al*, 2009),with a 0.5 minimum alveolar concentration of sevoflurane. Moderate maternal hyperventilation was maintained at a tidal volume of 10 mL/kg and a respiratory rate sufficient to achieve an end tidal carbon dioxide pressure between 30and 32-mm Hg. Mothers were rested in the left 15° lateral tilt position until delivery.



In the spinal anesthesia group (B):-

Spinal anesthesia was performed in a flexed, sitting position using a 25-gauge Sprotte needle or a 27- gauge Whitacre needle placed in the L2–L3 or L3–L4 intervertebral space through which a 2 mL of hyperbaric 0.5% bupivacaine mixed with 0.2 mg of morphine sulfate was injected. The dose was reduced to 1.75 mL of hyperbaric 0.5% bupivacaine and 0.25 mL of morphine sulfate in patients with a height less than 1.55m (Subramanyam *et al.*, 2015).

Data collection and recording procedure:-

Data was collected after delivery of the infant. Apgar score was done as per the protocol mentioned by the neonatal Advanced Life Support endorsed by the American Pediatric Association. At delivery, for evaluation of infant, Apgar scores were assigned at 1 and 5 minutes and was substantiated on proforma. It was predicated on the appearance (color), pulse rate, grimace (reflexes), muscle tone (activity), and respiratory effort of infant each carrying a score from 0 to 2 (Table 1). Apgar score scaling predicated on neonatal advanced life supportis endorsed by the American Pediatric Association (APA) (Casey *et al.*, 2001).

To check the status of infants, Apgar scores between 7 and 10 was considered as an proper general condition and scores smaller than 7 represented a critical condition and immediate need for resuscitation.

Statistical Analysis

Recorded data of Apgar score at 01 and 05 minutes were collected. The data collected was analyzed through statistical package SPSS software version 26.The Mean and standard deviation of the quantitative variables of Apgar score were determined. Independent samples' t-test was used to compare mean difference between groups for Apgar score. P value < 0.05 was taken as statistically significant.

Results

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In this study 40 patients who were on operation theatre list for caesarean section were divided into two groups. Group (A) (n=20) received general anesthesia and group (B) (n=20) received spinal anesthesia.

Regarding to the results of the research, the average Apgar score at 01 minute, in the group (A) was (6.75 ± 2.12) while in group (B) the average Apgar score was (8.05 ± 0.99) (table 2). There was statistically difference in both groups regarding Apgar score at 01 minute . Apgar score as illustrated in the (table4) in regard to (P-valu=0.020).

Table	2:Mean+SD) comparison	of Apgar	score at 01	minute between	groups.
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Apgar scores at 01 minute				
Group	Ν	Mean	Std. Deviation	
A-(Generalanesthesia)	20	6.7500	2.12442	
B-(Spinal anesthesia)	20	8.0500	.99868	

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The average Apgar score at 05 minutes, in the group (A) was (8.75 ± 1.44) while in group (B) the average Apgar score was (9.70 ± 0.65) (table 3). There was statistically difference in both groups regarding Apgar score at 05 minutes. Apgar score as illustrated in the (table4) in regard to (P- valu=0.013).

Apgar scoresat 05 minutes				
Group	Ν	Mean	Std. Deviation	
A-(Generalanesthesia)	20	8.7500	1.44641	
B-(Spinal anesthesia)	20	9.7000	.65695	

 Table 3: Mean±SD comparison of Apgar score at 05 minute between groups.

There were significant mean difference on the mean 01 and 05 minutes Apgar score (P<0.05).Mean±SD values of Apgar score of neonates at 01 minute was significantly high in those women who received spinal anesthesia Group (B), 8.05 ± 0.99 as compared to those who received general anesthesia Group (A) 6.75 ± 2.12 (p= 0.020). Apgar at 05 minutes was also significantly high in group (B) compare to group (A) [9.70±0. 65vs. 8.75 ± 1.44 (p= 0.013)].

Elevation Apgar score at 01 and 05 minutes intervals in infants of women who received spinal anesthesia Group (B) than those women who received general anesthesia Group (A) (table 4).

 Table 4: Mean±SD comparison of Apgar between groups.

Variables	Group A (General anesthesia)	Group B (Spinal anesthesia)	P-Values
Apgar scores at 01 minute	6.75±2.12	8.05±0.99	0.020
Apgar scores at 05 minutes	8.75±1.44	9.70±0.65	0.013

Discussion:

Apgar score may be a practical method of systemically assessing newborn infants immediately after birth to assist identify those requiring resuscitation and to predict survival in time of life. The 01 minute Apgar score may signal the need for immediate resuscitation, and thus the 05 minutes score may indicate the probability of successfully resuscitating an infant (Klieyman etal., 2007).

The results of this study revealed significantly higher at 01 and 05 minutes intervals in neonates of women who received spinal anesthesia Group (B) than those women who received general anesthesia Group (A).

To check the status of infants, Apgar scores between 7 and 10 were considered as a proper general condition, and scores smaller than 7 represented a critical condition and



immediate need for resuscitation. This result is in agreement with (Mohammed *et al.*, 2020) evaluate the effect of anesthesia on neonates who delivered under general anesthesia has relatively low Apgar score when compared to those who delivered under spinal anesthesia.

The results in comparison to other studies were almost the same in study was done by (Enas and Zinah, 2018).there were significant differences between the effects of (general and spinal) anesthesia on Apgar score of neonate whose mother underwent spinal anesthesia was better than neonate whose mother underwent the general anesthesia at the 1st minute and 5th minutes interval.

A retrospective study by(Mekonnen and Desta, 2016)agreed with these findings in this study revealed that the mean at the 1st minute and 5th minutes Apgar score is much better in babies delivered under spinal Anesthesia when compared to general Anesthesia.

Whereas studies done by(Sahana,2014)observed Apgar score in neonates whose mothers received general anesthesia were lower than, neonates whose mothers received spinal anesthesia. Satisfactory Apgar scores were significantly higher in spinal anesthesia group. neonatal outcome is favorable in spinal anesthesia and can be preferred over general anesthesia. It can be further evaluated by a large studies on Apgar scores in neonates following both elective and emergency cesarean sections.

On the other hand, the study by (Korkmas, 2004) found no differences in the 1st minute and 5th minutes Apgar scores, when comparing epidural spinal anesthesia versus general anesthesia.

In another study, the neonatal resuscitation and intensive care admission is higher in babies delivered under general anesthesia as compared to spinal anesthesia but there was no significant mean difference (p>0.071). This study finding is in line with a study conducted in Turkey in which neonatal intensive care admission was 5th minutesvs6th minutes for spinal and general anesthesia respectively (Odd *et al.*, 2008).

Conclusion

The Apgar score of neonate whose mother underwent spinal anesthesia was better than neonate whose mother underwent the general anesthesia at the 1^{st} minute and 5^{th} minutes interval.

In general, spinal anesthesia is associated with minimal neonatal outcomes even in emergency caesarean section. Can be used general anesthesia when the spinal anesthesia is contraindicated.

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