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EFFECT OF ANAESTHESIA UPON NEONATAL WELL BEING, IN TERM OF APGAR SCORING ANDUMBLICAL ARTERY BLOOD PH, AFTER ELECTIVE CAESAREAN SECTION, A COMPARISON BETWEEN GENERAL AND SPINAL ANAESTHESIA

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ABSTRACT:

Objectives: To compare the effect of General anaesthesia (G.A) versus Spinal anaesthesia (S.A) upon neonatal well being in terms of Apgar scoring and Umblical artery blood pH after lower segment caesarean section (LSCS).

Study Design: This was a randomized, prospective, interventional, quasi- experimental study.

Place & duration of study: This study was conducted at the department of Anaesthesiology, Surgical.I.C.U., and pain management clinic, Civil Hospital Karachi and Dow University Hospital, Dow University of Health Sciences, for the period of two years i.e. from May 2009 to June 2011.

Patients & Methods: 200 pts, aged between 18 – 45yrs, ASA-I & II, with singleton pregnancy, undergoing Elective LSCS were randomly divided in to 2 groups, General anesthesia (G.A.) group & Spinal anaesthesia (S.A.) group, each group having 100 patients, randomization was done by envelope draw method. This study was based on 2 proformas, Intra-operative proforma& Baby's proforma. Apgar scoring at 1 min & 5 min after birth was done.Umblical artery blood sample was taken for estimation of its pH. Results of the 2 groups were analysed by "Chi.Square test" with P value less than 0.05 was considered statistically significant.

Results: In our study we have found that S.A. group is a associated with better Apgar Score at 1min. as compare to the G.A. group, as 68 babies out of 100 had Apgar Score of 7 or >7 after 1min. in the S.A. group as compared to only 16 babies out of 100 had Apgar Score of 7 or >7 in the G.A. group. Whereas the Apgar Score after 5min. were approximately the same in the both groups ,so poor Apgar score (6 or < 6)after 1minute in the GA group is statistically significant (84% VS 32%) P<0.001 whereas after 5minutes it is statistically insignificant (3% VS 0%) P=0.246 Umblical artery blood pH in the GA group is 7.298 +0.07 and that of SA group it is 7.248 + 0.06 with P<0.01 which is statistically significant.

Conclusion: This study concludes that SA is associated with better neo-natal outcome as compared to GA, as the Apgar Score of the SA group was better than the GA group after 1min, and the Apgar Score were approximately same after 5 min. in the both G.A. and S.A. group. But the Umblical artery blood pH in the SA group is more acidemic as compare to the GA group.

Key words: G.A, SA, & LSCS. Apgar Score.Umblical artery blood pH.

INTRODUCTION

Obstetric anesthesia may affect uterine blood flow by changing uterine vascular resistance

TABLE-1

Comparison between GA and SA group, apgar score at 1 minute ,5minutes and its P value

APGAR SCORE	GA (ç=100)	SA(ç=100)	P-Value
Apgar at 1 Minute e"76 or <6	16 (16%)84(84%)*	68(68%)32(32%)	X^2=55.5P<0.001
Apgar at 5 Minutese"76 or <6	97(97%)3(3%)	100(100%)0(0%)	X^2=3.05P=0.246

*Statistically Significant

TABLE-2

Umblical artery blood pH, A comparison of the GA and the SA group.

Group	GA	SA	P-Value
h(Number of the patients) Umblical Artery blood pH	1007.298±0.07	1007.248±0.06	P<0.01*

*Statistically Significant

or by changing perfusion pressure. Either directly through changes in vascular tone or indirectly by altering uterine contractions or uterine muscle tone [1].

Anesthetic methods used during cesarean section have advantages and disadvantages to both mothers and neonates. And may result in short and long-term neonatal effects. The anesthesiologist must choose the safest and most comfortable method for the mother. And the least depressant technique for the newborn [2].

Obstetric anesthesia has become a very demanding & challenging sub-speciality because it requires special skills on the part of an anesthesiologist, as 2 lives are involved, its blessing that though most of the patients are young & healthy, they nevertheless represent a high risk group because of the enormous physiological & anatomical changes taking place in the obstetric patients. The reasons that make these patient a high risk group are, increased gastric emptying time, increased gastric volume, use of opioid to relieve labour pain, gastric fluid has pH<2.5 & Volume more than .4ml/Kg, aspiration of gastric content can lead to fatal pulmonary damage [3]. Incidence of aspiration of gastric content is 1:500 for obstetric patients & 1:2000 for overall pts [4]. Incidence of failed endotracheal / difficult intubations is also fairly high in obstetric patients [5]. Because of the immense development in the field of obstetric/gynae&anaesthesiology more pts today end up in elective / emergency LSCS as compared to their number 20 years ago. This has made even more important now, for the anesthesiologist to have indepth knowledge to decide as to which type of anesthesia will be given to which patients. Obviously each technique of anesthesia (whether G.A. or S.A) has its own advantages and disadvantages. The advantages of G.A. are considered to be its rapid and reliable onset, effective control over airways and ventilation and haemodynamic stability, it is less hypotensive than S.A [6], whereas the disadvantages of G.A are, increased risk of regurgitation and pulmonary aspiration leading to Mendelson's syndrome, Difficult intubation, failed intubation leading to maternal and fetal hypoxia, awareness of mother during G.A., allergic reaction to anaesthetic drugs, malignant hyperpyrexia, etc. It has been shown that G/A is associated with lower APGAR score at 1 minute as compare to the SA, But the APGAR score after five minutes appears to be the same in the both groups.

Spinal anesthesia was introduced by Bier in 1895, it was made popular by Tuffier, it was not until 1907 that it was widely used in almost all branches of surgery and obstetric [7]. Like G.A., Spinal anesthesia also has its own advantages and disadvantages. Mother and fetus are less / not exposed to the depressant drugs, with better Apgar score. Risk of pulmonary aspiration is decreased, no problem of difficult / failed intubation and better maternal and neonatal binding and awake mother are amongst its advantages, whereas its disadvantages are intraoperative hypotension which in turn can lead to fetal acidemia, [8], its time consuming, can cause post spinal headache, urinary retention etc.

It is said that present anesthesia technique however limits the dose of I/V agents, such that fetal depression is usually not clinically significant with G.A. Long skin incision to delivery time >10min. and uterine incision to delivery time >3min. are associated with fetal hypoxia and acidosis, regardless of the type of aneasthesia [9].

Apgar soring is a numerical expression of the condition of the neonates on scale from 0 – 10, if done properly it is simple, useful guide to neonatal well being and resuscitation. The score is usually recorded at 1min. and 5min. after birth. 1min. score correlates well with fetal acidosis and survival, whearas 5min. score many be predictive of neurological outcome. Apgar Score have clinical importance not only during nursery stay but also later in child health. This system of assessing neonatal outcome was first described by Virginia Apgar M.D. an obstetrical Aneasthetist in the year 1953.

PATIENTS AND METHOD

After the approval of the hospital's ethical committee & obtaining informed, written consent of the patients. This study was conducted in the department of anesthesiology, Pain management clinic of Civil Hospital Karachi, Dow University Hospital,Dow University of Health Sciences for the period of two years. This randomized, interventional, observational, prospective study was conducted on 200 patients, who were randomly divided into 2 groups, having 100 patients each randomization was done by envelope draw method. All patient were between 18-45 years of age, of ASA I or II physical status and singleton full term uncomplicated pregnancy, cephalic presentation, fetus having normal growth parameters on ultrasound with adequate volume of liquor, Skin

incision to delivery time of <10min. & Uterine incision to delivery time of within three minutes where included in this study. Patient not consenting for the study, below 18 or greater than 45 years and the history of taking any drugs in the pre-operative period, and the history of pregnancy induce hypertension, heart, lungs or any other systemic disease, massively obese patient, patient associated with bleeding disorders (abnormal PT, APTT Levels) and twin or multiple fetuses, presentation other then cephalic, congenital fetal malformation, small for dates babies or fetal distress, skin incision to delivery time of >10min. & uterine incision to delivery time greater than 3 minute and all those patients who had a fall in MAP(mean arterial pressure) >20% from the base line were excluded from the study. The results of the 2 groups were statistically analyzed using "Chi-Square test" with P value <0.05 considered statistically significant.This study was based on two proformas. Intra-operative proforma and Baby's proforma.

METHOD FOR G.A. GROUP: After the application of all available monitors, I/V cannula size 18G was inserted and injection Ringer's Lactated (R/L) was started, aspiration prophylaxis was done and standardized GA technique was used and patients were mechanically ventilated.

Method for S.A. Group: After the application of the available monitors, I/V cannula size 18G was passed and injection Ringer's Lactated (R/L) was started. As with the patient of the G.A. Group, aspiration prophylaxis was done and standardized SA technique was used.

Intra-operative proforma included patient's profile (i.e. her name, husbands name, age, bed No., ward and date of surgery) and technique of anesthesia used for that particular patient (whether belonging to G.A. group or S.A. group).

Baby's proforma, assessed neonatal outcome after 1min. and 5min. using Apgar Scoring system. Baby's heart rate, respiration, skin colour, muscle tone and reflex irritability were assessed and umblical artery blood samples were taken for examination of it pH.

RESULTS:

In our study we have found that in the G.A. group only 16 babies had Apgar Score of 7or >7 after 1min. & 84 babies had Apgar Sore of 6 or <6 after 1min., whereas at 5min. 97 babies had Apgar Score of 7 or >7 and only 3 babies had Apgar Score of 6 or <6, as compared to this in S.A. group 68 babies had Apgar Score of 7 or >7 & 32 babies had Apgar Score of 6 or <6 at 1min. interval, whereas at 5min. Apgar Score of 7 or >7 was seen in all 100 babies included in the study and non had Apgar Score of 6 or <6. As can be seen in the tables below.Results of the two groups were statistically analyzed by using the "chi-square test ". Poor Apgar score (6 or < 6) after 1 minute in the GA group is statistically significant (84% VS 32%) P<0.001, whereas after 5minutes it is statistically insignificant (3% VS 0%) P=0.246.Neonates delivered following SA were more acidemic (pH=7.249) as compare to those delivered by GA (pH=7-296) despite measures taken to minimize maternal hypotension.

DISCUSSION:

In our study we have found that in the G.A. group only 16 babies had Apgar Score of 7or >7 after 1min. & 84 babies had Apgar Sore of 6 or <6 after 1min., whereas at 5min. 97 babies had Apgar Score of 7 or >7 and only 3 babies had Apgar Score of 6 or <6, as compared to this in S.A. group 68 babies had Apgar Score of 7 or >7 & 32 babies had Apgar Score of 6 or <6 at 1min. interval, whereas at 5min. Apgar Score of 7 or >7 was seen in all 100 babies included in the study and non had Apgar Score of 6 or <6. So it can be seen that S.A. is associated with a significant better Apgar Score after 1min. which is 68% of babies having Apgar Score of 7 or >7 at 1min. as compared to only 16% in the G.A. group, this study further elaborates that the Apgar Score of 7 or >7 after 5min. in both group are approximately the same, as it is 100% in the S.A. group & 97% in the G.A., & no babies had Apgar Score of 6 or <6 after 5min. in the S.A. group & only 3 babies had Apgar Score of 6 or <6 after 5min. in the G.A. group. Poor Apgar Score (6 or < 6)after 1minute in the GA group is statistically significant (84% VS 32%) P<0.001 whereas after 5minutes it is statistically insignificant (3% VS 0%) P=0.246. Further we have found that Umblical artery blood pH in the GA group was 7.296 and in the SA group it was 7.249 which is staistically significant.

Scott W.Roberts et al(10) observed that although it is widely believed that SA is safer than GA for the newborn. Our results in normal pregnency suggest that no available anaesthetic technique is necessarily hazerdous or safer than another and that each method has its own merits and demerits,for example inhalational agents necessary for GA can depress the newborn and 1minute Apgar score presumably reflects this effect , however similar effects were seen with SA , probably because of the occasional fetal acidemia associated with maternal hypotension of SA. Fetal acidemia was defined as pH value of 7.19 or less because this value is approx 2 STD deviation below the mean for normal pregnancy,they have further concluded that there is a statistically significant risk of fetal acidemia of varying severity with SA in women delivered by LSCS as shown by Umblical artery blood pH <7.10 .Comparing two techniques they stated that inhalational agents necessary for GA can depress the newborn and our 1minute Apgar score presumably reflects this effect, how ever similar effects were seen with the SA group because of occasionally severe fetal acidemia, they also concluded that the prevelance of low pH value was significantlly increased in those infants,Whose mother were exposed to SA as compared to GA. It was further observed that major adverse fetal effects of SA and its sympathetic blockade is uteroplacentalhypoperfusion.

Similar study was conducted by Afolabi BB et al, in lagos (11) and they have found that Apgar Score at 1min. & 5min. were significantly lowered for the G.A. group than the S.A. group & the need for respiratory assistance was greater for the G.A. group, this study further recommended that the current practice of S.A. for Caesarean section in the Lagos University Teaching Hospital is a good one.

Further study conducted by Kolatat T, et al (12) in Siriraj Hospital Bangkok, Tailand, have also compared the effect of the G.A. with the S.A. upon the Apgar Score of the neonate at 1 & 5min. they have found that the Apgar Score of the neonate whose mother received G.A. was lower than neonates whose mother received S.A.

A study done by Mueller et al have demonstrated that SA may decrease uteroplecental blood flow and cause a significant deterioration in fetal acid-base status , The most usefullUmblical cord blood parameter is Umblical artery pH.[8]

A study was conducted by Dick W.F. in University Hospital Mainz Germany [13] he has found that under normal maternal and fetal conditions, G.A. and S.A. are almost identically useful with respect to neonatal well being after caesarean section, subtle or inconsistent neurobehavioral residua may be present for a short period of time after G.A., under condition of a compromised fetus, the neonates may however benefit from S.A. more than from G.A.

A study was conducted by Krishnan L, et al in Kasturba Hospital Manipal [14], they have found that the babies delivered after G.A. appeared relatively depressed requiring more freeflow of O_2 and bag and mask ventilation, though 1min. Apgar Score showed no significant difference in the either group ,they have found that induction delivery interval were longer in the S.A. group, but it was not associated with more morbidity, and uterine incision delivery interval were very small in both groups and they suggested that S.A. should be used more frequently considering its more post natal advantages.

Hodgson C.A., Wanchob TD, [15] conducted a study in Liverpool U.K. they have studied the condition of 74 neonates delivered by elective LSCS under G.A. and compared with that of 63 neonates delivered by S.A., they have found that when the uterine incision-delivery interval was <3min. neonates in the S.A. group exhibited a higher Apgar Score at 1min. ($P<0.002$) and a higher mean umbilical venous pH ($P<0.05$) than the equivalent G.A. group, they concluded that LSCS under S.A. is associated with better Apgar Score as compared to G.A.

Ratcliffe FM, Evans J.M. [16] have found that the percentage of neonates with a 1min. Apgar Score of 7 or >7 was 93% in S.A. & 75% in the G.A. group this difference was statically significant ($P<0.05$).They have further found out that neonates delivered by SA were more acidemic,than those delieverd by GA.

Not all studies are in favour of S.A. for elective LSCS, as a study conducted by Petropoulos G, in University of Athens Medical School, Greece [17]., concludes that type of Anesthesia does not influence short term outcomes in infants born via elective Cesarean section.

Another study conducted by Zhu CX, et al.[18] also concludes and suggests that mode of anesthesia does not influence significantly the outcome of newborn infants delivered by elective cesarean section.

CONCLUSION:

This study has concluded that S.A. group is associated with better neonatal outcome as compared to G.A. group which is reflected with better Apgar Scoring after 1min. whereas the Apgar Score after 5min. for both G.A. and S.A. were approximately the same and SA is associated with some degree of fetal academia as compared to GA

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REFERENCES

1. Hawkins JL. Arens JF. Bucklin BA et al. Practice Guidelines for Obstetrical Anesthesia. Anesthesiology. 1999: 90:600-11.
2. Miller RD: Obstetrical Anesthesia, Anesthesia (Fifth Edition)1998: Churchill Livingstone, Volume 2:61:2031-76.
3. A.R. Atkenhead,Obstetrical Anesthesia,A.R. AtkenheadG. Smith Text book of Anesthesiology 2nd Edition London 1990:548-49.
4. G. Edward Morgan; Jr. Maged. S. Mikhail Obstetrical Anesthesia. Clinical Anesthesiology 4th Edition Stamford Lange; 2006:902.
5. G. Edward Morgan; Jr. Maged. S. Mikhail. Obstetrical Anesthesia, Clinical Anesthesiology 4th Edition Stamford; 2006:902.
6. G. Edward Morgan; Jr. Maged. S. Mikhail.Obstetrical Anesthesia, Clinical Anesthesiology 4th Edition Stamford; 2006:901.
7. A.R. Atkenhead, G. Smith Obstetrical Anesthesia, Text book of Anesthesiology 2nd Edition London 1990:541.
8. Mueller. M.D, Bruhwiler. H, Schupfer. GK, Luscher .KP. Higher rate of fetal academia after regional Anesthesia for elective LSCS delivery. Obs-Gyn. 1997 July; 90(1):131-4.
9. G. Edward Morgan; Jr. Maged. S. Mikhail. Obstetrical Anesthesia, Clinical Anesthesiology 4th Edition Stamford Lange; 2006:901.
10. Scott W.Roberts,MD;KennethJ.leveno,MD,JElainSidawi , MD,Fetalacidemia associated with regional anaesthesia for elective LSCS delivery , OBS-GYN 1995 jan;85:79-83.
11. Afolabi BB, Kaka AA, Abudu OO Spinal and General Anesthesia for Emergency C Section, Effect on neonatal APGAR score and Maternal Haemtocrit., Niger Postgrad Med J. 2003 Mar;10(1):51-5.
12. Kolatat T, Somboonnanonda A, Lertakyamanee J, Chinachot T, Tritrakarn T, MuangkasemJ.Effects of General and Regional Anesthesia on the neonates a prospective and randomized trial.Journal Med Assoc Thai. 1999 January;82(1):40-5.
13. Dick WF., Anesthesia for C. section (Epidural and General) effect on the neonates. Eur J ObstetGynecolReprod Biol. 1995 May;59 Suppl:S61-7.
14. Krishnan L, Gunasekaran N, Bhaskaranand N. Neonatal effects of Anesthesia for C. Section. Indian J Pediatr.1995 Mar-Apr;62(2):219-23.
15. Hodgson CA, Wauchob TD.A comparison of spinal and General Anesthesia for Elective C. Section.Int J ObstetAnesth. 1994 Jan;3(1):25-30.
16. Ratcliffe FM, Evans JM.Neonatal well being after Elective C. Section with General, Spinal and Epidural Anesthesia.Eur J Anaesthesiol. 1993 May;10(3):175-81.
17. Petropoulos G, Siristatidis C, Salamalekis E, CreatsasG.Spinal and Epidural versus General Anesthesia for Elective C. Section at terms, Effects on Acid-Base status of the mother and new born. J Metern Fetal Neonatal Med. 2003 Apr;13(4):260-6.
18. Zhu CX, Chen H, Huang HF.(Comparison of the Effects of General and Epidural for C. Section on Fetuses).Zhonghua Fu Chan KeZaZhi. 2005 Apr;40(4):253-5.