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A Comparison Between Epidural And General Anesthesia for Cesarean Sections

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ABSTRACT... redh_ent06@hotmail.com The choice of anesthetic technique for cesarean sections, a common problem faced by anesthetists remains controversial. **Objective:** To compare the effects of epidural anesthesia with general anesthesia. To evaluate which mode is better especially keeping in mind the Apgar score of the newborn. Which was taken as the index of immediate neonatal outcome. **Design:** A prospective cohort study. **Setting:** Combined Military Hospital Peshawar. **Period:** Six months. **Material & Methods:** A total of hundred patients aged between 26-35 years were selected who were under going elective cesarean section. **Results:** The gestational ages of the newborn were between 36 and 40 wks. The patients were divided into two groups of fifty each receiving the two modes of anesthesia. A random sampling of the patients was done. Apgar scores of the newborn babies were taken at 01 and 05 minute intervals. Computer based SPSS 8.0 was used to analyze the results and it was found that none of the babies was severely depressed, (Apgar score less than 4 at 01-minute interval in both the groups). 2% of the cases were moderately depressed, (Apgar score 4-6 at 01-minute interval in the epidural group as compared to 10% of the cases born under general anesthesia). In the epidural group 4% of the cases had 01 minute Apgar score of less than 8 compared to 36% in the general anesthesia group. As regards the 05 minute Apgar score 6% of the patients had Apgar score less than 10 in the epidural group compared to 11% in the general anesthesia group. This showed that epidural anesthesia has an advantage over general anesthesia especially as regards 01 minute Apgar score as well as being safe for the mother. So this mode of anesthesia should be preferred.

Key Words: Epidural, General anesthesia, Cesarean section, Apgar score

INTRODUCTION

Nearly twenty years ago, there was some concern expressed about the rising cesarean rates both in the United States of America and the United Kingdom, which was up to 20% in most of the advanced centers of the world. Myers and Gleicher were amongst the first to report the results of an initiative to reduce the number of cesarean sections¹. Similar successes were reported in some of the other centers of the world but even then the

rate of cesarean sections in most of the advanced centers is as much as 10%. All these cases that under go a cesarean section receive some form of anesthesia.

The Obstetric anesthetist requires special training, and skills to provide safe anesthesia in emergency situations for patients who are often ill prepared for anesthesia and in the conditions, which may be sub-optimal. The anesthetic techniques and agents chosen should provide

good anesthesia and analgesia with minimal effects on the maternal and fetal well being. The presence of certain medical conditions in either mother or fetus or the existence of obstetric complications may make anesthetic decisions more difficult.

Anesthetic practice for Cesarean section has changed over the recent years with an increase in regional anesthesia. Epidural anesthesia has been found to give less serious maternal complications than general anesthesia. Advantages of epidural anesthesia include less neonatal exposure to potentially depressant drugs, a decreased risk of maternal pulmonary aspiration, an awake mother at the birth of her child² and the option of using epidural opioids for postoperative pain control. In contrast to regional anesthesia, general anesthesia offers a very rapid and reliable onset, control over the airway and ventilation and potentially less hypotension. The major adverse fetal effect of regional anesthesia and its sympathetic blockade is uteroplacental hypoperfusion which leads to an acute fall in intervillous blood flow with a potential for fetal acidaemia^{2,3}.

In 1952 Dr. Apgar an obstetric anesthesiologist proposed the Apgar score as a means of evaluating the physical condition of infants shortly after birth. This scoring system, which encouraged delivery room personnel to pay close attention to the newborn, was rapidly adopted in delivery rooms throughout the United States and the rest of the world. Each of five easily identifiable characteristics - heart rate, respiratory effort, muscle tone, reflex irritability, and color is assessed and assigned with a value of 0 - 2⁴.

The scores are taken at one minute and five minutes after delivery and is therefore a rapid method to evaluate the physical condition of the newborn infants. Of the two scores, the five - minute score is regarded as the better predictor of survival in infancy in the long term⁴. Whereas the one - minute score definitely has the value for assessing the effects of different drugs given to the mother during the cesarean section. This simple method is even more appealing because it is non-invasive. Some authors believe that umbilical artery pH monitoring is more accurate method of assessing the fetal well

being^{5,6,7}, but Casey and his colleagues reported the results of a retrospective analysis of 151,891 neonates born between 1988 and 1998. They found that infants with Apgar scores of 3 or less at five minutes of age had the highest risk of neonatal death, which proves the usefulness of Apgar score system.

Our study was designed to find out a safer mode of anesthesia for elective cesarean section especially keeping in mind the fetal well being.

METHODS AND MATERIALS

A prospective cohort comparative study was carried out in Combined Military Hospital Peshawar Cantt. from March 2001 to September 2001 in order to evaluate the effects of general anesthesia as compared to epidural anesthesia on the Apgar score of the newborn in elective cesarean section.

A total number of 100 cases were taken. A random systematic sampling was done. The first case was taken by toss method with respect to the type of anesthesia she would receive. After that every patient coming at odd number that met the inclusion criteria was selected and was put in each group by turn. Patients were divided into two groups of 50 each. The type of anesthesia both Epidural and General were standardized according to the following standards.

EPIDURAL ANESTHESIA

Safety

Epidural anesthesia was performed in an area, which was fully equipped for treating complications ranging from mild hypotension to cardiopulmonary resuscitation. Verification of the drug administered in the epidural space was done.

Informed Consent

Risks were discussed with the patients including pain during lumbar puncture, backache, hypotension, meningitis, nerve injury, hematoma formation, and headache associated with inadvertent dural tap. The patients were also informed that the catheter might be left in place for postoperative pain relief.

Preoperative Evaluation

The routine physical examination was done along with laboratory investigations and a specific evaluation of the lumbar spine.

Equipment

A standard epidural tuohy needle of 16G was used along with bupivacaine 0.5% to decrease the risk of systemic toxicity⁸.

Procedure for Epidural Anesthesia: Approach

The patient was positioned and draped in a sterile manner, and L4-5 interspace was identified. A skin wheal was raised after giving a small dose of local anesthetic and a dermal puncture was made with an 18-gauge needle.

IDENTIFICATION OF THE EPIDURAL SPACE

The epidural space is entered after the tip of the needle passes through the ligamentum flavum, indenting the dura and creating negative pressure in the epidural space, which up to that time is only a potential space.

Identification of the epidural space was done by "loss of resistance technique" which is the most common way to identify the epidural space. A test dose of 5 ml was injected and an epidural catheter was inserted and secured. After 03 minutes the remaining drug was injected in increments of 05 ml until the desired level was achieved.

GENERAL ANESTHESIA

Physical examination

A thorough physical examination was done in all the patients receiving general anesthesia.

Laboratory Investigations

The same investigations were carried out, which were carried out for the patients receiving regional anesthesia

INCLUSION CRITERIA

Following inclusion criteria was followed

Maternal Factors

- Elective cesarean section
- Uncomplicated pregnancy
- Healthy mother grade ASA I
- Mothers age between 26-35 years
- Gestational age of 36-40 weeks

Fetus Factors

- Fetus having normal growth parameters on ultrasound.
- Standardized operating conditions.
- Incision to delivery time of less than 90 seconds.
- Adequacy of liquor.

EXCLUSION CRITERIA

The following exclusion criteria will be standardized.

Maternal Factors

- History of any drug intake by the mother preoperatively.
- Mother having PIH.
- History of spinal deformity or operation.

Fetus Factors

- Congenital malformations.
- Incision to delivery time of more than 90 sec.
- Small for dates.
- Fetal distress.

RESULTS

A total number of 100 cases were taken during the study and they were divided into two equal groups of 50 each. The cases studied were of uncomplicated pregnancies delivered by elective cesarean section. Computer based SPSS 8.0 was used to analyze the results. Statistical analysis was done by using the student's t-test. The mean maternal age came to 29.56 years.

Table-I. Mean Age of mother		
Type of anaesthesia	No. of Pts	Mean age in year
Epidural	50	29.78±2.46
GA	50	29.34±2.97
Total	100	29.56±2.72

The mean age of the patients receiving epidural

anesthesia was 29.78 years and those receiving general anesthesia was 29.34 years as shown in table I. This was not significantly apart in the two groups. No considerable maternal complications were noted which could be associated to surgery or anesthesia.

Apgar Score out of 10 at 01 Minute	No. of pts	Mean age in weeks
4	1	40
5	1	40
6	4	37.5±1.9
7	14	37.8±1.3
8	56	37.8±1.3
9	24	38.1±1.5
Total	100	37.9±1.4

All the cesarean deliveries were live births. None of the cases had a meconium stained liquor. Six of the cases were rejected in the study and six more included just

because the patients refused to receive the type of anesthesia, assigned to them according to the sampling method. Out of these six patients, four refused epidural anesthesia and two of them refused general anesthesia.

Apgar Score out of 10 at 05 Minutes	No. of pts	Mean age in weeks
6	1	40
7	1	40
8	4	37.5±1.91
9	8	37.25±1.48
10	86	37.56±1.36
Total	100	37.93±1.41

Only one of the newborn exposed to general anesthesia had 01 minute Apgar score of less than 5 compared to none in the epidural group. Two of the newborns exposed to general anesthesia had 01 minute Apgar score of 6 compared to one case in the epidural group.

	Type of anaesthesia	No of pts	Mean	P value
Apgar Score out of 10 at 01 Minute	Epidural	50	8.36±0.63	<0.005
	G A	50	7.54±0.93	
Apgar Score out of 10 at 05 Minutes	Epidural	50	9.92±0.34	<0.05
	GA	50	9.62±0.85	

Comparison of the Apgar scores of the patients in the two groups shows that there is not much difference between the two groups as regards the Apgar score at 05 minutes interval. Whereas there was a significant difference between the two groups as far as the Apgar scores at 01 minutes interval were concerned. Comparing the results at 01 minutes interval showed that those patients who received epidural anesthesia the Apgar scores below 8 were only 4% as compared to 36% of the patients who

received general anesthesia. This difference was much less in 05 minutes Apgar scores. On comparison those patients who received epidural anesthesia 6% had Apgar scores of less than 10 but all had Apgar score of more than 8, which shows a good condition of the baby. Whereas in the group who received general anesthesia 11% of the newborns had 05 minutes Apgar score of less than 10.

However in these patients also only a very few that is only 02 cases had Apgar score of less than 8. This again showed good condition of the newborn at 05 minutes after birth in patients who received general anesthesia. This result indicates that though there was not much of a long term effect on the newborn babies who were born under general anesthesia but there was a significant effect of the type of anesthesia in the short term. This effect was most probably due to the effects of drugs of general anesthesia on the newborn before delivery.

DISCUSSION

The choice of anesthesia for cesarean section is determined by multiple factors, including the indications for operation, its urgency, patient and obstetrician preferences, and the skills of the anesthetist. Anesthetic practice for cesarean section has changed during the last few decades.

There is a worldwide shift in obstetric anesthetic practice in favour of regional anesthesia^{2,9}. Consequently in almost all-obstetrical centers of Europe, epidural anesthesia is a standard method. A comparison of the advantages and disadvantages of general and epidural anesthesia can be summarized under the following aspects.

MOTHER

Risk of Aspiration

Anatomical and physiologic changes during pregnancy increase the risk of aspiration of parturient women. Pulmonary aspiration is a cause of maternal death due to anesthesia. Four hundred and twenty eight maternal deaths were reported in a three-year period in England and Wales¹⁰.

There were approximately 500,000 live births each year and more than 100,000 legal abortions. Forty deaths were either associated with anesthesia (30 cases) or anesthesia was considered to be the main reason for death (10 cases). Aspirations in 14 cases and difficulty with endotracheal intubation in sixteen cases were the most reported causes of death. Four deaths happened after the patients received epidural anesthesia. All the four deaths could have been avoided if the basic

principals of anesthesia were not violated and supervision had been adequate. Two out of the four of these patients aspirated stomach contents. In one of such cases inadequate analgesia was supplemented with diazepam and papaveretum and in other case intravenous ergometrine induced vomiting and aspiration. One patient received general anesthesia for cesarean section after epidural anesthesia in labour and died due to inadequate supervision. In one case total spinal anesthesia occurred after epidural anesthesia while the anesthetist was five miles away from the hospital. So epidural anesthesia caused death only in the last case and that to only because the basic principals of supervision were violated¹⁰.

The most important point in this study is that epidural anesthesia neither caused vomiting nor aspiration directly while after general anesthesia these complications caused death in 14 out of 40 cases. So in this respect epidural anesthesia has some advantage in comparison with general anesthesia.

REGULATION OF CIRCULATION

Both methods of anesthesia have adverse effects on the circulation. General anesthesia very often leads to marked increase in blood pressure and heart rate due to high plasma concentrations of circulating catecholamines¹¹.

Epidural anesthesia can cause a marked decrease of blood pressure due to sympathetic nerve blockade. Both techniques can cause a decrease in placental blood flow. General anesthesia because of maternal vasoconstriction caused by increased maternal plasma nor-adrenaline concentrations and epidural anesthesia because of lowered maternal blood pressure¹².

The influence on the circulation of both techniques may be un-important in normal pregnancy. Whereas in the high risk patients such as in the patients with mitral stenosis it is necessary to avoid tachycardia and increase in after-load as well as hypotension. If general anesthesia is the method of choice in such cases, "light" anesthesia must be avoided and normal deep anesthesia should be performed. Deep anesthesia of the mother may result in

significant depression of the neonate. If, on the other hand epidural anesthesia is performed, a fall of the blood pressure must be avoided.

First the total amount of local anesthetic agent should be given in divided doses of 5-10 milliliters in the lateral position until satisfactory blockade extending from T₆ to S₅ has been achieved. Secondly any fall in the blood pressure must be detected early by good supervision and treated with an anti-hypotensive agent without causing uterine vasoconstriction⁹. However in other cases of fetal risk such as severe preeclampsia, epidural anesthesia may be beneficial as placental blood flow may be improved.

Postoperative Analgesia

Postoperative pain may or may not be severe after cesarean section. However if severe, periodic top up doses can be administered to relieve the pain and it also helps in early ambulation of the patient.

Neonate

It is true that modern light general anesthesia with a short acting induction agents, high oxygen concentration and low concentrations of volatile agents generally result in a good neonatal condition. After epidural anesthesia however neonates are in a better condition in the first minutes of life^{9,13}.

They have better Apgar scores and breathing becomes regular after a shorter time. The time to sustained respiration was significantly longer when infants were delivered after general anesthesia. While one study suggests induction to delivery time was significant another study fails to prove it^{14,15}.

The time between the incision of the uterus and delivery seems to have a positive correlation with fetal acidosis in general anesthesia but not in epidural anesthesia. Crawford and Davis found that in general anesthesia the infants delivered after a uterine incision to delivery time of more than 90 seconds were significantly acidotic¹⁶. In epidural anesthesia there was no correlation between the pH values and the uterine incision to delivery time. The best explanation for these findings seems to be that

during light general anesthesia the handling of the uterus can evoke a local vasoconstrictor response, which may be prevented by epidural anesthesia. Epidural anesthesia may then be better in cases where there is a risk of fetal acidosis, which may be increased by a prolonged uterine incision to delivery time¹⁷.

Our results are in conformity with other workers around the world the results of some of which are as follows.

In a study conducted by Kolatat and colleagues¹⁸ the results showed that " Apgar scores of the infants whose mothers received general anesthesia were lower than infants whose mothers received Regional anesthesia." Our study shows similar trends.

In the study conducted by Evans and colleagues¹⁹. The results showed that

- a. No babies in the epidural group were severely depressed (Apgar less than 4 at 05 min) compared with 6.2% in the General anesthesia group. Whereas in our study no infant was severely depressed (Apgar less than 4) in both the groups.
- b. In the above mentioned study comparing the 1 minute Apgar score 4.3% of the babies in the epidural group were moderately depressed (Apgar 4-6) compared to 15.4% of the babies born under general anesthesia. Whereas in our study 2% of the babies were moderately depressed (Apgar 4-6) in the epidural group compared to 10% of the babies moderately depressed in the general anesthesia group, which shows almost a similar trend.

CONCLUSION

Epidural anesthesia is safer as regards the neonatal outcome in the cesarean section especially taking into consideration 01 minute Apgar score which is most probably due to the effects of the general anesthetic drugs crossing the placenta and affecting the neonate, which becomes considerably depressed.

Epidural anesthesia is also safer for the mother with lesser side effects especially the risk of aspiration, which accounts for a considerable number of deaths in cesarean section under general anesthesia. So this mode of anesthesia should be given preference in cesarean sections because of its advantages over general anesthesia until there is a specific contraindication.

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