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Reducing Postoperative Pain Using Obstetric Anesthesia a Patients Perspective

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Abstract
The postoperative pain management by using obstetric anesthesia is considered as one the major problems that is being faced by both the anesthesiologists and the obstetricians. The inappropriate postoperative analgesia after delivery could delays the ambulation with the succeeding increase in the risk of thromboembolism, and could be harmful to mother-baby relationship. The standard goals for postoperative pain are opioids, either it is administered neuraxially or systemically. This research study intend to discuss the effectiveness of obstetric anesthesia used for reducing the postoperative pain, and for this chosen topic, a qualitative research design is appropriate. The potential advantages that have been associated with the critical care patient are usually a result of the reduced systemic effects and superior analgesia. The reduction in systemic effects is usually associated with the epidural opioids analgesia which signifies different economic and medical benefits, as compared to the conventional analgesic techniques.

1. Introduction

The postoperative pain management by using the postoperative pain management by using obstetric anesthesia is considered as one the major problems that is being faced by both the anesthesiologist and the obstetrician. It is generally associated withthe abdominal wall dissection and incision of the abdominal muscles. The inappropriate postoperative analgesia after delivery could delay the ambulation with the succeeding increase in the risk of thromboembolism, and could be harmful to mother-baby relationship [3]. The standard goals for postoperative pain are opioids either it is administered as neuraxial or systemic but it is mainly linked with a number of side effects, for example, vomiting, nausea, pruritus, respiratory depression, and constipation.

Postoperative pain could also have a negative impact on breastfeeding as well as on the neonatal-maternal interactions. It has been found that there are very costly consequences associated with the ineffectively managed chronic and acute post-operative pain mostly in case of caesarian delivery [9]. The passable control for the management of postoperative pain often for caesarian section is very significant in obstetrics due to the reason that it reduces the stress to the neuro-hormonal response, eases the commencement of breastfeeding, and contributes to the quick mobilization of parturient. At present, the most widely used practice for the relief of obstetric pain is known as patient-controlled epidural analgesia (PCEA).

The effective management of pain is not essentially to make the parturient completely insensible to the feeling that caesarian section has been performed. Instead, it enables a satisfactory level of comfort and also promotes sense and physical recovery of the well-being. However, an effective postoperative analgesia could be given with the systemic administration of non-opioid or opioids analgesics along with spinal and epidural techniques [4]. The list of maternally administered opioids which are commonly well-suited with breast-feeding includes fentanyl, butorphano, and morphine as they are accepted by the 'American Academy of Pediatrics Committee on Drugs'.

2. Background of the Study

The difference of obstetric anesthesia from any other kind of anesthesia is that it involves two patients i.e.

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mother and baby. Therefore, it is necessary to take into consideration the safety of and suitability to both mother and baby while choosing anesthesia. Additional factor that is considered broadly is that the labor is unpredictable. It could be wide-ranging from easy and quick to exhausting and painful. One of the important points that must be remembered is that everyone experience pain differently with respect to their tendencies for managing pain.

2.1. Commonly Used Obstetrical Anesthetics

The modalities of anesthesia are usually based on its effect and suitability to mother and baby. There are several different types of anesthesia which are administered at the time of childbirth. They might be administered separately or in conjunction with one other. A number of widely used anesthesia include:

Local Anesthesia. The most commonly used regional anesthesia for childbirth is perineal infiltration with local anesthetics. It is also used in cases where neuraxial anesthesia is insufficient during the expulsive. 2% lidocaine is used as 100 to 200 mg diluted to 1% giving a volume of 10- 20 cc [3]. It only provides cutaneous anesthesia in the perineal region, without muscular relaxation. For example local infiltration- this course of local injections could make it more comfortable for delivery and for placement of sutures, in case it is required.

Sedation. Tranquilizers and Narcotics could be administered intravenously or as an injection. They could help in reducing pain of the labor but will not completely eliminate the pain. This could be also used to ease anxiety that often accompanies the process of delivery.

Regional Anesthesia. Pudendal block, it could be administered as injections of local anesthesia to make vaginal area insensible for the preparation of delivery [9].

Epidural. An epidural is type of local anesthesia that could be delivered by a tiny tube known as catheter placed in a small section of the back, which is just exterior to the spinal canal. The main benefit of the epidural is that it allows majority of the women to completely participate in the birth experience for example continue to have sensation of touch, feel and pressure, while reducing most of the pain, if not then to some extent all of the labor and delivery pains [4]. However, in majority of the cases, the anesthesia provider will start placing epidural when the cervical dilations are about four to five centimeters. Whereas, under such circumstances, it might be desirable to administer epidural earlier.

Spinal. This anesthetic is quite similar to an epidural, but due to its administration into spinal canal with a needle, it is having a much faster effect. There will be a feeling of numbness and will require assistance during the process of delivery. On the contrary, spinal anesthesia is often used when there is a need of forceps as indicated, or for the delivery by cesarean section.

The usage of spinal and epidural are not recommended if the patient is:

•Having a bleeding tendency or usage of blood thinners.
•In shock or hemorrhage
•Having an infection in the blood or in the back
•Having an unusual spinal abnormality or anatomic condition

General Anesthesia. The principle of this technique is to interrupt the pain pathway at the cervical and uterine levels by blocking the para-cervical plexus or pudendal nerve. It allows the blockage of pain in the manipulation of the cervix and uterus and in uterine contractions. It does not produce maternal hypotension, is of low toxicity, and produces motor blockade or urinary retention or defecation. It does not produce sacral anesthesia which requires a second type of analgesia during labor. The administration of general anesthesia is by having patient breathing anesthetic gases and administering anesthetic drugs intravenously [3]. A general anesthetic might be necessary in case of arising complications during the process of delivery. One of the benefits of general anesthesia is that it could be administered rapidly, so it is used as the best choice when there is a need for timely completion. Moreover, general anesthesia makes the uterus relax, in case it is found to be important by obstetrical provider. The most commonly used agents are bupivacaine, fentanyl, and sufentanyl which are described as follows:

Bupivacaine. It presents great affinity to maternal proteins which determines a smaller transfer of the anesthetic to the fetus [9]. The morbidity and mortality are associated with accidental intravascular injection, which determines cardio-toxicity and generates arrhythmias, myocardial depression, and important neurotoxicity (seizures).

Fentanyl. It is an opioid with high liposolubility in comparison to morphine. Its administration via analgesia enhances the analgesia of local anesthetics. Thereby, it allows reduction of the concentration used. This results in a decrease in motor blockade

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and a margin of safety to wider toxic reactions. The possible risk of depression respiratory rate is similar to that of other opioids used via the epidural. Intrathecal produces deep and rapid analgesia, without motor blockade with doses close to 20% of doses epidurals and a duration of approximately 75 minutes.

Sufentanyl. It has greater liposolubility and analgesic potency than fentanyl which makes it opioid of high effectiveness. It is mainly used intrathecally where it induces analgesia for longer duration, whereas in some cases it also allows the relief of pain throughout the process of child birth. Currently, the use of anesthesia is scarce because it causes a loss of maternal effort during the expulsion which increases the incidence of use of forceps. It also increases the incidence of aspiration, delays breastfeeding, and leads to increased neonatal depression [4]. It is used in obstetrics mainly for emergency cesarean section, since it means a quick induction, predictable, and controllable effect of the drugs administered and absence of sympathetic block.

2.2. Use of Obstetric Anesthesia

In terms of the use of obstetric anesthesia during the period of child birth, the majority of the women fall into these three categories:

•Those who are quite convinced that they will require pain relief.

•Those who are not sure of their options of pain relief, and how they would affect their delivery and labor.

•Those who would choose to give birth deprived of any pain relief.

The category is not usually important, the thing that is important is to know how to relieve pain, and anesthesia could be used in delivery and labor for this purpose [6]. Despite, falling in later category, remember the old wise saying, it is the privilege of a woman to change her mind, as none of the two women could experience childbirth in entirely the same way. Therefore, it is necessary to keep all the opinions open. Moreover, every woman should be ready for the possibility of taking an obstetric anesthesia. The information prepared by the American Association of Nurse Anesthetists will be useful to attempt answers of a number of questions regarding the use of anesthesia in delivery and labor, and will also provide the general overview of different types of obstetric anesthesia that are currently available [9]. Besides reading the necessary instructions, there is a need to have a meeting with the physician or the Certified Registered Nurse Anesthetist (CRNA) and the Certified Nurse Midwife (CNM) for discussing the best options of anesthesia and pain relief for both the baby and mother.

3. Research Question

Research questions are important to provide a clear direction to the researchers about what needs to be researched. For the proposed research of analyzing the effectiveness of obstetric anesthesia used for reducing the postoperative pain, the following research questions are suitable.

•What is the effect of various modalities of anesthesia on both mother and baby?

•Does obstetric anesthesia have any effect on the health and safety of both mother and baby?

•Does epidural in analgesic dose help in reducing labor pain?

•Can opioids in normal delivery be useful for labor without pain?

4. Aims and Objectives

Aim of the proposed research is to assess the effectiveness of obstetric anesthesia used for reducing the postoperative pain. Within this aim, the importance of anesthesia based services and effects and suitability of anesthesia for both mother and baby will also be identified. In the light of this research aim, following objectives seem relevant.

•To reduce the postoperative pain by using obstetric anesthesia

•To improve the quality and assessment of postoperative pain management by using anesthesia based pain services

•To identify the effect of anesthetic drugs on fetus

•To compare various modalities of anesthesia and its effect and suitability for both mother and baby

•To compare epidural (bupivacain or rubivacain) in analgesic dose versus opioids (fentanyl, sufentanil) in normal delivery for labor without pain

5. Literature Review

Anesthesia is known as the obstetric emergency that imposes an extra risk to the mother, and might have extremely harmful effects on the fetus [4]. Maternal risks could be reduced significantly by the use of regional anesthesia, whenever it is possible, and general anesthesia could be restored only when it is required essentially. This is particularly relevant in most of the developing countries where the rate of death under anesthesia might be increased significantly as compare to the West [3]. However,

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Cesarean section has been done due to the umbilical cord prolapse or maternal hemorrhage that is usually mandated by general anesthesia, and due to the non-reassuring status of fetus that often permits the placement of a local anesthesia. It has been found that the close communication with the obstetricians could assist in determining whether the mother, fetus or both of them are in frequent jeopardy and require general anesthesia (GA).

There are different situations when both general anesthesia and neuraxial blocks might be contraindicated. Although various techniques for regional anesthesia for example Transversus Abdominis plane (TAP) might be useful, by providing not merely anesthesia, but also reduction in post-operative pain [9]. The technique for loss of resistance for TAP blocks has been known to be a reliable and simple technique that might be carried out without the need of ultrasound guidance. Moreover, the 'cushion effect' understanding is significantly improved by the success rate of this particular technique.

5.1. Pain Management in Mother and Fetus

The response of the obstetric anesthesia on the parturient occurs at different levels, which could compromise the entire economy and therefore has effects on both mother and fetus [6]. They are divided into 3 types of responses:

Segmental Response. It consists of segmental muscle spasm, which increases pain and can alter the mechanical ventilation due to decreased thoracic compliance. Cardiovascular complications cause changes in gastrointestinal disorders such as decreased bowel motility and gastric emptying, which favors ileus, nausea and vomiting, and an increase in HCL production. Further, it produces incoordination in the uterine activity which decreases the urine output and favors the sweating.

Suprasegmental Response. It mainly considers the response of stress and hyperventilation. Stress is secondary to the neuroendocrine cascade with an elevation of stress hormones such as corticosteroids and catecholamines.

Cortical Response. It refers to psychological and neurobehavioral changes.

5.2. Effects of Obstetric Anesthesia on Body Functions

There are various effects of obstetric anesthesia on the health conditions of both mother and baby as defined by discussing its effects on different body systems. However, among patients with cardiovascular diseases, there is an increase in GC by 50 to 100% in the first and second stages of labor, as a result of sympathetic activation and discharge of catecholamines. It can even increase by 30% more with every uterine contraction [16]. However, patients with compromised respiratory system are usually at risk of increasing 15 to 20 fold tidal volume and volume minute. It means that Hb becomes more related to the O2 and thus decreases the transfer of O2 to the fetus.

The alkalosis along with the sympathetic discharge can also produce constriction of umbilical vessels. Hypocapnia that occurs after each uterine contraction causes hypoventilation due to inhibition of the respiratory center with consequent PaO2, which in cases of placental insufficiency and low fetal respiratory reserve, can compromise fetal PaO2 [2]. Moreover, there is also an impact on various reproduction processes as the uterine contractility can increase, decrease or incoordination by the effect of excess catecholamines and cortisol, maternal pain, and emotional stress. Norepinephrine increases uterine activity, but adrenaline and cortisol reduce it.

5.3. Effect of Anesthetic Drugs on Fetus

The effect of anesthetic drugs on fetus could be determined by evaluating the transient reduction of the intravenous drugs flow that occurs in each contraction [8]. It isprovoked by sympathetic discharge and hyperventilation that is induced by maternal pain. Usually, this phenomenon is compensated by the O2 reserve of the fetus and intervillous space, and by redistribution of the fetal germ cell (GC). In the presence of obstetric or maternal complications, this usually decreases in aggravated placental oxygen transfer [8]. However severe pain may be a critical factor in perinatal morbidity and mortality.

5.4. Modalities of Anesthesia and Its Effectiveness

Parenteral Analgesia. Most drugs cross the placental barrier by a diffusion mechanism and are excreted in breast milk. The most commonly used drugs are tranquilizers and the opioids (meperidine and fentanyl) [13]. Later, in analgesic doses, they cause excessive sedation and maternal and fetal respiratory depression, and nausea, vomiting, ileus, hypotension, and decreased airway reflexes. In the fetus, it shows decrease variability of LCF Meperidine (Pethidine or Demerol) as it is one of the most commonly used opioids [3]. It is administered

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by EV in doses of 25 to 50 mg every 1 - 2 hours, its effect starts at 5-10 minutes and life average is about 2-3 hours. The IM dose is 50-100 mg every 4-6 hours and the effect is initiated at 30 to 45 minutes. It crosses the placental barrier by 70% and the maximum fetal uptake occurs approximately 3 hours after administration of the drug to the mother, which is the period of greater risk of neonatal respiratory depression.

The half-life in the newborn is 18 to 23 hours; Fentanyl is a fast and short-acting synthetic opioid. The dose is 50 to 100 µg per route IM and from 25 to 50 µg by EV route. The half-life is 30 to 60 minutes when given via EV and 1 to 2 hours via IM. They have the advantage of being early administrable and fast acting. The disadvantage is that it should be used in the minimum useful doses and the lowest possible frequency. This could be useful to decrease the accumulation of the drug or its metabolites in the fetus, so it is very difficult to achieve good maternal analgesia by this way. Whereas, opioid antagonists (naloxone) should always be used to treat an eventual maternal or neonatal respiratory depression. [5]. Therefore, the indication for opioids would be in patients in early labor, with much pain and at that time regional analgesia cannot be administered.

Inhalational Analgesia. It allows achieving variable levels of maternal analgesia, mainly in the first stage of the labor. It does not produce maternal unconsciousness or inhibits the protective reflexes of the pathway [10]. For upper airway, nitrous oxide auto-inhalation is used at the onset of uterine contraction, the team must deliver a mixture of the anesthetic with oxygen, without the anesthetic exceeding the fifty%. For this type of analgesia, there must be cooperation of the patient [10]. However, there is a risk of hypoxemia during administration, especially when combined with the use of opioids. This technique does not replace the anesthesiologist.

6. Methods

6.1. Research Design

For conducting any research an appropriate research design and methodology is extremely important for the researchers to carry out research effectively. By selecting correct methodology, it becomes easier for the researchers to have valid and reliable results to conclude. However, the selection of research methodologies is mainly dependent upon the nature of the selected research topic. If the topics are merely subjective in nature, the qualitative research approach is appropriate, whereas when the research topic is objective and require a number of facts and figures for reaching a conclusion, then quantitative research approach is preferred.

This research study intended to discuss about the effectiveness of obstetric anesthesia used for reducing the postoperative pain [3]. For this chosen topic, a qualitative research design is appropriate, as the qualitative research approach generally revolves around existing literature related to the topic. A wide variety of secondary sources such as journals, articles, internet publications, books, and other data sources will be used for gathering most relevant data. Out of them, the major focus is over peer-reviewed article and journals, whereas no human subject is involved while carrying out this research.

The reason for choosing the qualitative research design is mainly because of the nature of the research topic. There will be no exaggeration if it is claimed that there is no statistical inferences are required to answer the research questions [14]. Moreover, the collection and analysis of the secondary data is widely available and could easily fulfil the specific purpose of the research study. The selected research design is opposite to the quantitative research method. Whereas, quantitative research design includes a collection of primary information from different participants. For example, interview, surveys and questionnaires have been used for collecting relevant information with regard to their different view and perception. Later, various statistical tools will be used for analyzing the conducted interviews and gathered information.

However, in this study, the chosen research design is qualitative, which is more subjectively entailed during the entire process of the research study. The significance of choosing qualitative research design, as it provides opportunity for compiling different ideas of many authors in the same direction [14]. The research in question will be open-ended and exploratory. Thus, the qualitative research design is the best method for this kind of research study. The research method does not have any requirement for quantitative measurement. Therefore, it is less time consuming and less expensive as compared to the quantitative research design.

6.2. Research Philosophy

The appropriate research philosophy that has been chosen guided the researchers to be very specific regarding their set scope and parameters. There are a number of research philosophies which include positivism, realism, and interpretivism. These

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philosophies differ accordingly with the design and structure of researchers. Whenever propositions are taken to get the relevant data from existing ideas for the proposed research, positivism is used. However, the findings are usually generalized. In contrast, realism is a critical and direct approach for conducting researches.

With reference to Silverman (2016), reality occurs when individuals are capable to select various viewpoints and make efforts to reach the appropriate conclusion [15]. Whereas, interpretivism usually revolves around the views of regulating, ideas, information, and opinions of individuals. However, interpretivism known to oppose the basic concepts of natural sciences and positivism. The proposed research study is qualitative in nature; therefore, interpretivism philosophy has been preferred and will be followed accordingly [15].

6.3. Data Collection and Analysis

The collection of data is considered to be as one of the most important aspects of any research study. Without appropriate collection of data, it is not possible for any researcher to reach its conclusions. There are two main types of data collection methods i.e. primary and secondary. Secondary data is collected by means of exploring many different researches in the similar direction, whereas primary data collection is always carried out by means of direct observations or direct interviews with the respondents.

For this particular research study, secondary data has been collected by using different online articles and peer-reviewed journals. However, online databases such as EBSCO, Emerald, ProQuest, Oxford Online, and many others has been used for locating the most relevant articles. Moreover, all the data that has been collected and analyzed by the scholars is according to their judgments and understanding of the topic. It is significant to take into consideration that the selected qualitative study remains particularly subjective and therefore, analysis and interpretation of the results have been according to the judgments of the researchers. Furthermore, researchers should be sure that all the collection and analysis of data has been bias-free.

7. Results and Discussion

It has been found that the epidural opioids analgesia has become an important therapeutic technique in the acute pain management and has been known to be equal or superior to other parental opioid techniques (intravenous, intramuscular, PCA) with least associated sedation and considerably lesser doses of drugs [4]. The benefits of therapeutic effects of epidural opioids as a consequence of improved analgesia include modification of the metabolic-endocrine stress response, improvement in pulmonary function, decreased morbidity, improvement in time ambulation, and shorter stay at the hospital.

The administration of epidural opioids has been associated with the particular complications and side effects; the most important potential side effect is related to the respiratory depression. However, along with this many other potential medication-related side effects which are associated with the opioid analgesia, are mostly associated with the opioids analgesia administered with many alternative routes [3]. The major problems that have occurred in rare cases, are preventable or controllable with the particular management and selection of patient. The potential advantages that have been associated with the critical care patient are usually as a result of the reduced systemic effects and superior analgesia. The reduction in systemic effects is usually associated with the epidural opioids analgesia which signifies different economic and medical benefits, as compared to the conventional analgesic techniques.

Nag et al., (2015) challenged the traditional idea of ephedrine as the most preferred choice. It is used as the vasopressor to struggle hypotension after administration of spinal anesthesia for the C-section. They have concluded in the quantitative systemic review that for the elective C-section, phenylephrine has been associated with the improved status of fetal acid-base. Therefore, there is no difference in clinical outcome has been found based on the Apgar scores that could be established. In patients usually treated with the ephedrine, the major cause of base excess, oxygen content and, decreased PH in the umbilical cord arterial blood is found to be controversial [12]. Although, it has been indicated in many of the earlier studies that there is a different action of vasopressors on the utero-placental circulation. With reference to the studies of Ngan-Kee et al., it has been shown that the decreased fetal acid-base status was probably because of the ephedrine crossing the placenta that also causes decrease in fetal PH by means of its metabolic effects which is secondary to the stimulation of receptors of fetal β-adrenergic.

Another study by Miller et al., (2015) has provided a new direction to this understanding. They have shown that the neonatal homozygosity of the ADRB2

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for Arg16 from the neonatal academia when treated with ephedrine in the majority of the mothers [4]. The presence of this type of genotype is higher than 30% of the Chinese cohort and with the fact that there is a vast difference in their genotype as compared to the North Americans. It indicates that the clinicians should be aware of inducing studies because one ethnic population greatly differs from another [11]. Rather than the evidence in favor of the phenylephrine as the best choice, there remains a broad ranging variation in the dosing, method, and choice of vasopressors administration. The guidelines from 'National Institute for Health and Care Excellence' in UK state that phenylephrine and ephedrine are equally effective as the vasopressors in the obstetric anesthesia [4].

As stated by 'The American Society of Anesthesiologists Task Force on Obstetric Anesthesia' [7] when both phenylephrine and ephedrine are acceptable, phenylephrine might be preferred due to the reason that it maintains improved status of fetal acid-base in uncomplicated pregnancies usually in the case of normal deliveries [3]. Moreover, much clarity has been given in the Canadian guidelines which state that there is usually general agreement between the experts for recommending the appropriate use of phenylephrine and accepted as the best treatment [11]. Furthermore, Belgian guidelines also recommended phenylephrine as the most preferred vasopressor in the absenteeism of maternal bradycardia. Although there is a lot of literature present as the evidence for claiming superiority of phenylephrine over ephedrine usually in healthy parturient who went through the elective C-section which is based on the fetal acid-base status, there is a lack of evidence for showing its benefits in clinical outcomes.

However, the Meta-analysis of about 142 research studies for comparing ephedrine and phenylephrine failed to confirm superiority of one over another while comparing the Apgar scores [7]. Although, recent meta-analysis and systemic review represent the fetal acidosis as defined as the PH < 7.20 which is usually associated with two-and-four folds increase in the morbidity and mortality, respectively [4]. The combination of ephedrine and phenylephrine infusion has been demonstrated as deterioration in the status of fetal acid-base and control of maternal hemodynamics. Systemic opioids analgesia is a most commonly used adjunct along with the initiation of local analgesia and an independent pain control method has been used early in the beginning stage of labor.

Moreover, the repeated administration of maternal opioids often results in considerable fetal exposure and also upsurges the potential of respiratory depression of neonates. Patient- controlled analgesia along with the synthetic opioids for example alfentanil (Alfenta), fentanyl, and the recent ultra-shorts analogs remifentanil (Ultiva) might be useful for the labor analgesia.

It has been demonstrated in one of the randomized controlled trial that early epidural analgesia such as prior the onset of labor, usually results in better pain management as compared to systemic analgesia opioids during the process of labor induction (on a of 0-to-10 scale, a score of 2 versus 6; P < .001) [3].. However, this finding was apparent in nulliparous women who has been admitted for the induction of labor for than 36 weeks gestation with less than 4cm cervical dilation and intact membranes walls. The rates of cesarean delivery were similar among the group receiving systemic opioid analgesia and the groups receiving early epidural analgesia (32 vs. 33%, respectively). In the early stages of epidural Analgesia, there was a slight difference in the duration of labor which is shorter (median: 528 vs. 569 minutes) [1]. It has been found that there is no difference in the mode of vaginal delivery in the Newborn Apgar scores.

7.1. Strengths and Limitations

This study involves significant insights regarding improvement of assessment and quality of postoperative pain management by using anesthesia based pain services. It also includes understanding regarding the possible relationships among obstetric anesthesia and pain management as well as epidural in analgesic dose vs. opioids in normal delivery for labor without pain. Moreover, this research study will eventually serve to help many researchers doing research on the same topic.

Obstetric anesthesia has been found to cause various changes in the health condition and body systems of both mother and baby. However, the study was limited by means of coverage area and availability of data relevant to the patient perception. Moreover, financial resources restrained this study, since it was not possible to purchase variety of research material and access important data from online data bases.

8. Conclusion

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