Title : Regional Versus General Anaesthesia For Caesarean Section: Changing Perspectives

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Abstract :

Background : Worldwide the number of caesarean sections has increased over the years. Hence, it has become a greater challenge to provide care for the parturient, and the anaesthesiologist has got a greater opportunity to contribute to obstetric services. The anaesthesiologist must safely provide anaesthesia for the mother without compromising the condition of fetus and newborn. During the last several decades, the incidence of anaesthesia-related maternal mortality has declined. The incidence of maternal deaths from other causes also has declined. Anaesthesia remains responsible for approximately 3%-12% of all maternal deaths. While caesarean deliveries were historically performed using general anaesthesia, there is a recent significant move towards regional anaesthesia. Regional anaesthesia (epidural or spinal anaesthesia) is increasingly used for elective and emergency caesarean sections and is considered to be safer for the mother than general anaesthesia. We present some factors that are important to consider when choosing the anesthetic method for caesarean section. **Material and Method :** This article is based on obstetric anaesthesia textbooks, non-systematic searches in Pub Med and own clinical experience. The study included all articles regarding lower segment Caesarean section requiring either regional or general anaesthesia. **Observations:** When regional anaesthesia is correctly administrated the fetus /neonate and mother are not much affected, adverse effects are very rare and it is possible to establish contact between the mother and newborn immediately after delivery. Spinal anaesthesia is most common. Epidural anaesthesia is most often used in emergency situations when caesarean section has to be performed instead of the expected vaginal delivery and the women have already been given an epidural. Prophylactic epidural access may be prepared during delivery in women with a high risk of complications in general anaesthesia. Combined spinal and epidural anaesthesia is also an option. The most common side effect with regional anaesthesia is hypotension.

Recommended preventive measures for hypotension are to preload patients when inducing anaesthesia, to administer small doses of phenylephrine intravenously. There are few contraindications to regional anaesthesia. Although anaesthesia for Caesarean section is predominantly performed using regional techniques of anaesthesia, general anaesthesia will remain essential for subgroups of obstetric patients, especially those who are at high risk of complications. In the present review, issues regarding general and regional anaesthesia in Caesarean section will be discussed. **Conclusion:** Both regional and general anesthesia may be employed for caesarean section. Each is relatively safe and they have their own advantages and disadvantages. Actual decision to adopt one technique over another depends on maternal and foetal status and skill and ability of the anesthesiologist to tackle the situation with the aim of patient and baby safety.

Key words : Caesarean section, Spinal anaesthesia, general anaesthesia, obstetrics

Introduction : Caesarean section (CS) is a surgical procedure commonly performed in rural hospitals in developing countries. Rate of this procedure has also risen to 25% and above in many developed countries specially in high risk patients.[1,2] The increased incidence of CS deliveries reflects advances in fetal salvage and neonatal intensive care, obstetric preference and confidence in the safety of the operation. The choice of anaesthesia for CS depends on the reason for the operation, the degree of urgency, the availability of equipments and drugs, desires of the patient and the experience of the anesthesiologists and the surgeon. The anesthesiologist must choose the method that is believed to be the safest and most comfortable for the mother and least depressant to the newborn and that provides the optimal working conditions for the obstetricians.

Classification of CS :

Depending on the degree of urgency of procedure CS [3] can be classified into:

- Immediate: there is immediate threat to the life of women or fetus.
- Urgent: maternal or fetal compromise that is not immediately life threatening.
- Early: no maternal or fetal compromise, but needs early surgery.
- Elective: delivery timed to suit women and staff.

Emergency CS patients must be transferred to operation theatre as early as possible with continued fetal monitoring until abdominal skin preparation starts. Decision to delivery time should be less than 30 mins in case of fetal distress and each case must be individually assessed and the classification of urgency continuously reviewed.

Types of anaesthesia : Basically two types:

- General anaesthesia: preferred in acute emergencies such as hypovolaemic shock and severe fetal distress and is the method of choice where regional anaesthesia is contraindicated.
- Regional anaesthesia: is almost universally preferred when time is not as much of a factor.

General anaesthesia has the advantage of speed, but introduces the risk of airway complications including aspiration of gastric contents or failed intubation. Regional anaesthesia such as spinal or epidural block, avoid these risks, but takes longer to perform, and may cause undesirable hypotension secondary to peripheral vasodilatation.[4]

Regional anaesthesia for CS : It is more than 16 times safer than general anaesthesia[5,6]

Advantages :

- Both mother and partner can be present at delivery.
- Improved safety for mother with minimal risk of aspiration and lower risk of anaphylaxis.
- The neonate is more alert, prompting early bonding and breast feeding.
- Fewer drugs are administered with less hangover than after general anaesthesia.
- Better post operative analgesia and earlier mobilization.

Techniques of regional anaesthesia for CS : [7,8,9,10] :
Three techniques are available :

- **Epidural:** commonly used for women with epidural analgesia for labour, and for elective CS where slow onset of block is preferred.
- **Spinal :** Most popular technique for elective CS. Also preferred for emergency CS because of its rapid onset by experienced anesthesiologist.
- **Combined spinal – epidural :** becoming a popular technique in some centres. It is preferred in patients where sudden changes in afterload may be dangerous. (i e stenotic-valvular disease)

Preparation :

- careful history
- appropriate examination performed which includes checking ;
- Blood groups and antibody screen
- routine cross matching of blood not required.
- USG reports to establish the position of the placenta : there is risk of a major haemorrhage with a low lying anterior placenta.

Take patient to confidence by :

- explaining the techniques : reassurance & support are important.
- Mentioning the possibility of complications : document all complications discussed.

1) Epidural anaesthesia in CS :

Indications :

- Women who already have epidural analgesia established for labour.
- Severe pre-eclampsia (controversial).
- Specific maternal diseases (eg : cardiac diseases) where rapid changes in systemic vascular resistance might be problematic.

Advantages :

- Easy to top up labour epidural.
- Stable blood pressure.

- Intraoperative manipulation possible.
- Epidural can be used for post operative analgesia.

Disadvantages :

- Slow onset
- Large doses of local anaesthetics.
- Poorer quality of block than spinal anaesthesia.

Local anaesthetic options :

- 1.5 % to 2% lignocaine with 1:200000 adrenaline.
- 0.5% bupivacaine.

Test dose of 3 ml of local anaesthestic with adrenaline 15mcg is given.Heart rate is observed for 60 secs or any evidence of sub arachnoid block in 3-5 min is looked for. If negative, 20 ml of local anaesthetic is administered in fractional increment of no more than 5 ml in 30 secs.Epidural catheter is then inserted if not already present for labour analgesia.

Epidural narcotic options :

- Fentanyl (50 to 100mcg) or sufentanil (10 to 20mcg) may be added to the local anaesthetic to potentiate intraoperative analgesia.
- Morphine (3to 5mg)may be administered through the epidural catheter after delivery.

Anxiety and incomplete or spotty anaesthesia is treated with one or more of the following :

- Midazolam 0.25 to 1 mg IV.
- Fentanyl 1mcg/kg IV.
- Nitrous oxide 40%.
- Ketamine 0.25mg/kg IV.

2) Lignocaine 0.5%, 10 to 20 ml intra-peritoneal. Spinal anaesthesia in CS[7,8] :

Most commonly used technique for elective CS. Onset is rapid with dense block and post operative analgesia is long acting with use of intrathecal opioids.

Advantages :

- Quick test
- Good quality analgesia
- Easy to perform

Disadvantages :

- Single shot
- Limited duration
- Inadequate analgesia is difficult to correct.
- Rapid changes in cardiac output and blood pressure.

Local anaesthetic options :

- Lignocaine 60 to 75mg (1.2 to 1.5 ml of 5% solution)
- Bupivacaine 12 to 15mg (2.4 to 3 ml of 0.5% solution) Intrathecal narcotic options (added to above local anaesthetics)
- Fentanyl 12 to 25 mcg.
- Morphine 0.1 to 0.2mg.

3) Combined spinal- epidural anaesthesia for CS[9]:

Indications :

- Prolonged surgery
- When limiting the speed of onset of block is particularly important. A small intrathecal dose of local anaesthetic can be supplemented through the epidural catheter as required.
- Epidural catheter may be left in situ and used for post operative analgesia.

Advantages[10] :

- Quick onset
- Good quality analgesia
- Intra operative manipulation possible
- Epidural can be used for postoperative analgesia.

Disadvantages :

- Rapid change in blood pressure and cardiac output.
- Technically more difficult with higher failure rate of spinal injection.
- Untested epidural catheter.

Contra-indications for regional anaesthesia [11] :

• Allergy to local anaesthetic	• Patient refusal.
• Coagulopathy.	• Local or systemic sepsis.
• Haemorrhage	• Hypovolaemia
• Major spinal abnormalities	• Active neurological disease

General anaesthesia for CS :[4]

Elective general anaesthesia for CS has declined due to increasing popularity of regional particularly spinal anaesthesia and increased possibility of failed intubation in the obstetric patient. However general anaesthesia is still required in certain circumstances.

Indications :

- Maternal request
- Urgency of surgery-acute severe fetal distress.
- Regional anaesthesia contraindicated.
- Failed regional anaesthesia.
- Additional surgery planned at the same time as CS.

Advantages :

- Rapid induction
- Less associated hypotension and CVS instability.
- Better control of the airway and ventilation.

Disadvantages :

Risk of aspiration	Neonatal depression
Difficult intubation	Blood loss is greater
Awareness	Mother is more sleepy and likely to suffer pain and nausea/vomiting post op.

Anaesthetic requirements for CS are :

- Maintenance of efficient maternal and fetal oxygenation
- Ensuring the absence of awareness
- Avoidance of drug induced neonatal depression
- Control of uterine relaxation
- Provide satisfactory surgical conditions

Important considerations in general anaesthesia for CS:

- Administer a non particulate oral anatacid within 30 min of induction
- Utilize left uterine displacement
- Start IV infusion with large bore cannula
- Preoxygenate with high flow rates (> 6L/min)
- Assistant to apply cricoid pressure (rapid sequence intubation)
- Administer thiopentone (4mg/kg) and scoline (1.5 mg/kg),wait 30 to 60 secs and then intubate trachea.
- Administer nitrous oxide (5L/min) and oxygen (5L/min) plus either halothane 0.5% or isoflurane 0.75%.Muscle relaxant either vecuronium or atracurium may be used.
- Avoid maternal hyperventilation.
- Anaesthesia to be deepened after cord clamping.
- Extubate when patient is awake
- Equipment for the management of difficult intubation should be available at all times and within easy reach.
- Failed intubation drill should be known and practiced.

Local infiltration for CS :

- In patients with a difficult airway in whom central neural blockade is contraindicated, local infiltration with upto 100ml of 0.5% lignocaine with adrenaline can be used. Infiltration of each layer is performed in stages. The procedure is lengthy and uncomfortable, but may be used as a last resort where other techniques are unavailable and unsuccessful.

Postoperative analgesia [12,13,14,15]:

- The mainstay of postoperative analgesia are opiods and NSAIDs. The route that these are given is dependent on the intra operative anaesthetic technique.

- **Regional :** intrathecal preservative free morphine (100mcg)provides long lasting analgesia (12 to 18 hr).The side effects are nausea ,vomiting, pruritus and late respiratory depression. Epidural morphine (3 to 5mg) provides analgesia for 6 to 24 hrs, but pruritus is again common and nausea occurs in 20 to 40 %.
- **General anaesthesia :** bilateral ilioinguinal nerve block at end of surgery. Intravenous aliquots of morphine until comfortable. Parenteral opiods (IM or PCA as available)

- **General anaesthesia or regional :** 100mg diclofenac PR at end of surgery, followed by 75mg diclofenac PO 12 hrly.

Conclusion : To summarize, general anaesthesia should be utilized only for a true emergency when a situation will not allow any other options. Regional anaesthesia (either spinal or epidural) offers an effective means of anaesthesia for CS allowing mother to remain awake and avoid a breathing tube. The regional techniques also offer some advantages for the control of pain after operation. The patient should discuss the options, risks and benefit of the anaesthetic with the anaesthesiologist who is aware of the condition and situation.

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