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Physical and Psychological Aspects of Pain in Obstetrics

Longinus N. Ebirim, Omiepirisa Yvonne Buowari and Subhamay Ghosh

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1. Introduction

Childbirth is said to be a highly joyful experience [1] and a universally celebrated event. Childbirth however fulfilling is a painful experience for the majority of women [2,3] and analgesia is regularly required for relieving pain [4]. In non-human primates, labour is thought to be relatively painless, and of short duration, usually unassisted, although changes in behaviour in the days prior to delivery may suggest some degree of labour pains [5]. Exceptionally, very few women may not feel any pain, others can control their responses to reduce pain [3]. Most women think that pain is going to be a major part of giving birth. Each labour has the personal seal of each woman [6]. For religious, cultural and philosophical reasons many groups have sought to prevent and treat pain. Pain may have adverse effects on the mother and foetus. The psychological effects of severe pain should not be overlooked particularly where it is associated with an adverse fetal maternal outcome [7]. Childbirth is an emotional experience for a woman and her family. The mother needs to bond with the new baby as early as possible and initiate early breast-feeding, which helps to contract the uterus and accelerate the process of uterine involution in the postpartum period [8]. This is affected by pain after delivery whether the delivery is spontaneous vaginal delivery or operative.

Labour as a life event is characterised by tremendous physiological and psychological changes that require major behavioural adjustments in a short period of time [9, 10]. Pain is an individual and multi-factorial experience influenced by culture, previous pain events, beliefs, moods, and ability to cope. The patients' personality affects pain perception and response to pain relieving drugs. Maternal satisfaction has to be taken into consideration when evaluating quality and planning a maternal and child health care service [11]. Labour presents a physical and psychological challenge for women. The latter stages of pregnancy can be a difficult time emotionally. Fear and apprehension are experienced alongside

excitement. These emotions both positive and negative will affect the woman's birth experience.

2. Pain in obstetrics

Maternal comfort is of major importance during and after labour [12]. Pain in obstetrics arises from numerous sources and reasons from labour pain, caesarean section, episiotomy and postpartum. Attention to comfort and analgesia for women during and after labour is important for physical reasons and out of compassion. Pain management in obstetric practice therefore focuses on pain relief in labour, pain control during caesarean section and postpartum pain treatment [13]. Pain related to childbirth may present during pregnancy, during labour when more than 95% of women report pain occasionally during caesarean section if there is a poor quality nerve block or prolonged surgery and after delivery when more than 70% of mothers report acute or chronic pain [14].

2.1. Labour pain

Labour although varies with the individual may be the most painful experience, any women may ever encounter. Concerns about pain in labour are as old as mankind [15]. Pain can make patients feel uncomfortable and become sleepless and agitated. Pain also stimulates the sympathetic nervous system, which causes increase in the heart rate, blood pressure, sweat production, endocrine hyperfunction, and delays the patients prognosis [16, 17]. Pain management makes low priority in many low to middle income countries that are struggling to meet United Nations Millennium Development Goals such as eradication of poverty and hunger, universal primary education and reduction in child and maternal morbidity and mortality [18].

Parturient perception and response to labour pain depends on the intensity of pain, psychological factors, cultural beliefs, previously painful experiences, history of pregnancy, social and marital status [19]. Some other factors influencing labour pain and delivery are the parturient psychological state, mental preparation, family support, medical support, cultural background, primipara versus multipara, size and presentation of the foetus, size and anatomy of the pelvis, use of medications to augment labour (oxytocin) and duration [15]. A long, painful labour may lead to an exhausted, frightened, and hysterical mother incapable of decision-making [20]. The degree of pain experienced during labour is related to the frequency, intensity, and duration of uterine contractions and dilatation of the cervix. In addition, the position of the foetus, descent of the presenting part, stretching of the perineum and pressure on the bladder, bowel, and sensitive pelvic structures also contribute to pain levels [21]. Labour pain is a complex and subjective interaction between multiple physical, psychosocial, environment plus cultural factors and a woman's interpretation of the labour stimuli [22]. Women experience varying degrees of pain in labour and exhibit an equally varying range of responses to it. An individual's reaction to pain of labour may be influenced by the circumstances to her labour, the environment, her cultural background preparations towards her labour and the support available to her [23]. During labour, the

woman is dealing not only with the contractions but also with the myths that the culture has created for her. Labour and birth, although viewed as a normal physiological process, can produce significant pain requiring appropriate pain management [24].

Labour pain is caused by stretching of the cervix during dilation, ischemia of the muscle wall of the uterus with the build-up of lactate and stretching of the vagina and perineum in the second stage of labour. Both the experience and perception of pain are regarded as subjective and this remains difficult for an observer to measure objectively [3,21].

There are three stages of labour namely first, second and third stage of labour. The first stage of labour begins with the onset of regular contracts and ends with complete cervical dilation [25, 26]. The second stage of labour commences from full cervical dilation to the delivery of the baby while the third stage is from the delivery of the baby until the delivery of the placenta. Pain during the first stage of labour occurs mostly during contractions and is caused by uterine contractions and cervical dilatations [27, 28]. Pain is carried by the visceral afferent fibres of T10-11 from the uterus, cervix, and upper vagina from the cervical plexus and enters the spinal cord at the T10-11 levels. The visceral afferent fibres also enter the sympathetic chain at L2 and L3 levels [29,30]. Pain at the end of the first stage signals the beginning of foetal descent. Pain in the second stage of labour is due to stretching of the birth canal, vulva, and perineum and is conveyed by the afferent fibres of the posterior roots of the S2 to S4 nerves. In the second stage of labour, expulsion of the foetus activates somatic afferent pain fibres from the mid and lower vagina, vulva, and perineum. These signals are conveyed via the S2 – S4 spinal nerve roots that form the pudendal nerve. The pudendal nerve projects bilateral through the inferior sciatic foramen, where it is accessible for blockade by local anaesthetist. Neuraxial representation of labour pain is not continuous and the interceding segments represent and mediate the sensory and motor innervations of the lower extremities.

Painful contractions may lead to maternal hyperventilation and respiratory alkalosis, which in turn shift the oxygen haemoglobin dissociation curve to the left, decrease delivery of oxygen to the foetus [31]. The pain of labour is associated with reflex increase in blood pressure, oxygen consumption, and liberation of catecholamines, all of which could adversely affect uterine blood flow. Increased carbon dioxide, peripheral vascular resistance, and increased oxygen consumption in turn accompany this. This could be dangerous for women with pre-existing cardiopulmonary problems [15].

2.2. Cultural aspects, beliefs and myths of labour and labour pain

Cultural and religious beliefs can affect the perception and interpretation of labour pain. In some cultures the woman is expected to scream and cry uncontrollable while in others the woman may not externally express much distress in her labour. Cultural influences on labour pain can take many varied forms. Cultural beliefs and ethnicity are known to influence the perception of pain such factors can play a vital role in how a woman copes with pain in labour [18].

In some cultures, solitary, and unassisted births are valued and seen as a source of pride [5]. Considering the mysterious qualities of conception, it's easy to see why it's the subject of so many myths [32]. Some women believe that labour pain is natural and would not accept pain relief in labour. Some feel that it is best to express their pain and let their feelings go. Others may see labour as an opportunity to demonstrate their strength and stoicism in a particular way. They may for example moan, scream, sway, click their fingers or tap rhythmically, shake their heads, chant, pray or call god. As a girl grows up into a woman, she becomes involved through the stories of other women with the female body that suffers agony and pain during labour.

Some Hispanic women may believe that they should not take any pain medications as the indication may not be good for the baby. Screaming during the labour and delivery is considered to be harmful to the baby as the culture considers pregnancy to be a hot stage of life [33].

In rural parts of India and Bangladesh, a common belief is that women should bear the pain of childbirth in silence to demonstrate their courage and character. The Japanese believe that the greatest experience of a woman's life is to hear her baby's cry and this should be the only sound heard during labour [32]. Several African studies have found that many women would desire to have labour analgesia if given the opportunity. In humid Benin, Africa the Bariba women are also expected to give birth in silence and girls are taught that a woman who fusses or cries during childbirth is lower than an ant. In Nigeria, among the Hausa, there is great social pressure not to show any sign of pain. Labouring quietly and patiently is thought to demonstrate proper modesty. The Fulani girls from Nigeria are taught from an early age how shameful it is to show fear of childbirth [32]. The Bonny people of southern Nigeria believe that a woman shouting and crying during labour will cry in subsequent deliveries therefore she is advised by her mother and elder female relatives when pregnant not to shout or cry during labour. They are taught it shows how strong and capable she is as a woman to endure pain that no amount of shouting or screaming can reduce the pain so why not just bear it in silence. This psychological preparedness is handed down from generations to generation. Many of these beliefs are 'myths' because they are untrue, however there are many beliefs and practices that have been used in non-western cultures for years that are effective [32].

3. Physical and psychological aspects of labour

Psychological factors help to explain the efficacy of psychotherapy. People who have painful conditions or injuries are often additionally affected by emotional distress, depression and anxiety [34]. Fear and anxiety are significant influences on pain experiences which is one reason why mothers are accompanied by another person during childbirth. Psychosocial factors have been implicated in the pain experienced during childbirth, which can have both short and long-term consequences on the mother's health and her relationship with her infant [33]. For several decades, childbirth educators have focused on the alleviation or reduction of pain and suffering. During the childbirth experience a wide array of non-pharmacological pain relief measures as well as pharmacological interventions are presently

available to woman in labour. Relaxation, breathing techniques, positioning, massage, hydrotherapy, music, are some self-help comfort measures women may initiate during labour to achieve an effective coping level for their labour experience. A woman's reactions to labour pain may be influenced by the circumstances of her labour including the environment and the support she receives [35]. During childbirth in addition to or in place of analgesia women manage pain using a range of coping strategies. Antenatal education provides an opportunity prior to birth to help women to prepare for an often painful event [36]. Loneliness, ignorance, unkind or insensitive treatment during labour, along with unresolved past psychological or physical distress increases the chance that the woman will suffer. The physical sensation of pain is magnified and frequently becomes suffering when it coexists with the negative psychological influences [37]. Maternal satisfaction is influenced by outcome of labour, support and interactions with staff, control over pain rather than amelioration. Good communication and team effort are needed to reap the benefits of pain free labour while minimizing the potential effect of epidural analgesia on labour outcome. Many women in labour each day in sub-Saharan Africa particularly in Nigeria, childbirth is experienced not as a joyful event but as sad experience due to midwives attitude towards the labouring woman who shout and yell at labouring women especially if she screams cries or complains of labour pain.

4. Pain relief in labour

Modern views on pain and influence of western concepts of pain are gradually changing the perception and desires for pain relief in labour [5]. Adequate analgesia is important as pain causes an increase in circulating catecholamines which in turn impair uteroplacental perfusion [38]. Analgesia may mask the signs of early preterm labour and therefore tocometry is useful to detect contractions [39]. The choice of analgesic technique depends on the medical status of the patient, progress of labour and resources at the facility [40,41]. There are a number of different forms of pain relief in labour with differing side effects and efficacious labour pain relief is an important aspect of women's health [42]. Pain relief during labour is desirable in order to reduce maternal distress and enhance the progress of labour as most women wish they had some degree of pain relief during labour [43].

In low income countries, pain relief in labour remains essentially rudimentary. Reasons for this are largely theoretical and include racial differences in pain threshold with some women not minding the pains of labour, religious background which makes some women think that labour pains is a divine will [44, 45]. Good antenatal care in may not be available in some countries, it is important that the few who seek for modern care of the parturient be allowed to derive maximum benefit, so as to encourage others to attend hospital for delivery [46].

5. Non-pharmacological methods of labour pain relief

The non-pharmacological methods avoid the use of drugs for pain relief in labour [47]. Transcutaneous electrical nerve stimulation (TENS), hypnosis and acupuncture to relieve labour pains has been shown in many studies [15,19]. The non-pharmacological approach to

pain includes a wide variety of techniques to address not only the physical sensations to pain but also to prevent suffering by enhancing the psychological and spiritual components of care [10]. The non-pharmacological methods of labour pain relief require patient preparation and antenatal education. Psychological and non-pharmacological techniques are based on the premise that the pain of labour can be surpassed by recognising one's thought.

6. Continuous support

Continuous support in labour is associated with shorter labour labours and reduced requirement for analgesia. Traditional cultures have always had the support of experienced women to be with the woman in labour. In some places doulas are available. Continuous labour support provided by a doula, a lay woman trained in labour support, consistently has decreased the use of obstetric interventions. Intermittent labour support does not convey the same benefits as continuous support low income women who otherwise would labour with minimal or no social support receive the greatest benefit from a doula [48]. Continuous support from a partner or caregiver can reduce the frequent use of epidural analgesia and the amount of other analgesia administered to a mother [14].

7. Tens

A low voltage electrical impulse is delivered to the skin via four pads which are placed over the lower back with a boost during uterine contractions. Its mechanism of action is also based on the gate control theory of pain [28].

7.1. Massage

This is commonly used to help reflex tense muscle and soothe and calm the individual. Touching another human being can communicate positive messages such as caring, concern, reassurance or love. Massage is the intentional and systemic manipulation of the soft tissues of the body to enhance health and healing is used during labour to enhance relaxation and reduce pain [44].

Other methods like water immersion and acupuncture are known to reduce labour pain intensity and analgesic use.

8. Pharmacological methods of pain relief in labour

Pain relief in labour is teamwork between the anaesthetist, midwife and obstetrician. In considering analgesia for the woman in labour, it should be borne in mind that whatever the method of pain relief employed it should be safe for both mother and baby [46].

The ideal analgesia for labour should provide rapid onset excellent pain relief in both the first and second stage of labour without risk or side effects to mother or foetus and should also retain the mother's ability to mobilise and be independent during labour [49]. The ideal labour analgesic should also provide effective pain relief, tailored to the changing needs of

the parturient throughout the different phases of labour with minimal motor blockade and adverse material, foetal effects so as to provide the parturient with a highly satisfactory birthing process. There is growing awareness of the importance of empowering the parturient in decision making process in labour and delivery [19]. The ideal properties of labour analgesia should produce good analgesia without loss of consciousness, should not prolong or depress the process of labour, should not produce neonatal depression, should not produce maternal cardiorespiratory depression, should not possess unpleasant maternal side effects, should have high technical success rate, be predictable and constant in its effects, be reversible if necessary, be easy to administer, be under the control of the mother, should not interfere with uterine contractions, should not prolong the period of labour [50, 49].

Pharmacological methods of pain relief in labour include parenteral opioids, inhalational and regional techniques [46,47]. Epidural and parenteral opioids are superior to non-pharmacological techniques for relieving pain in labour. Systemic analgesia has become less common, whereas the use of newer neuraxial techniques with minimal motor blockade have become more popular [24].

8.1. Parenteral analgesics

Nearly all parenteral opioids analgesics and sedatives readily cross the placenta and can depress the foetus and reduce foetal heart rate variability due to depression of the central nervous system [19,46]. Systemic analgesics are still widely used around the world, despite being significantly less efficacious than epidural analgesia. Pentazocine is still used in some developing countries where pethidine, morphine are not readily available. Many parenteral opioids have been used to provide obstetric analgesia but the most popular have been pethidine, morphine and diamorphine [20].

8.2. Pethidine

This is an analgesic and antispasmodic drug is usually given intramuscularly. It is decreased in popularity as nausea; vomiting, drowsiness and lack of control are important side effects. It works when given intramuscularly in about twenty minutes given good pain relief for some and sedation for most patients [3]. Pethidine readily crosses the placenta and ionizes in the relative acids foetal circulation, leading to accumulation. It is a neonatal respiratory depressant. Its onset of time is within ten minutes when given intramuscularly and lasts up to two-three hours.

Pethidine causes analgesia, amnesia, dysphonia and sedation with a series of adverse effects like maternal and neonatal respiratory depression, nausea, sedation and hallucinations. It is metabolised to norpethidine which has pro-convulsant properties therefore it should be used with caution in patients with pre-eclampsia, renal failure or uncontrolled epilepsy.

8.3. Morphine

Primary maternal outcomes include maternal satisfaction with pain relief one or two hours after drug administration and characteristic of the labour process, secondary outcomes

include subsequent use of epidural analgesia, adverse symptoms (example nausea, drowsiness) inability to urinate or participate in labour, caesarean delivery or instrument assisted vagina delivery and maternal qualitative outcomes such as satisfaction with the overall birth experience. Some of the advantages of systemic analgesia are easy availability, simple to administer. Disadvantages of systemic analgesia less efficacious compared to epidural analgesia. Non-steroidal anti-inflammatory drugs have been used in some centres but this may affect the foetus adversely.

9. Inhalational pain relief in labour

Nitrous oxide is relatively insoluble in blood and has these properties. Entonox is premixed 50% nitrous oxide and 50% oxygen under pressure in a cylinder [47] and is administered usually via on an on-demand valve with a face mask or mouth piece [20]. Nitrous oxide has a low blood gas solubility coefficient [0.47] so it equilibrates rapidly with the blood. There is minimal accumulation with intermittent use in labour as it is rapidly washed out of the lungs. Adverse effects of entonox include drowsiness, disorientation and nausea which results in actual loss of consciousness in 0.4% of cases after prolonged use [46].

10. Regional labour pain relief techniques

Regional analgesia for labour encompasses pudendal nerve block, paracervical block, spinal, epidural and combined spinal epidural block. Regional analgesia is the most effective form of analgesia in labour [27,29]. It reduces maternal pain, cardiovascular work and anxiety with minimal effects on the foetus. Regional analgesia is widely available in the developed world and has changed the labour experience for many women making it much more pleasurable and satisfying and requires dedicated staff and monitoring. The pulse, blood pressure, oxygen saturation and consciousness of the patient must be monitored to check for signs of toxicity of the local anaesthetic being used or adverse effects of the methods of the technique. This is why it is not commonly available in developing countries. It is widely accepted that the most reliable method for labour analgesia is neuraxial analgesia via the conventional spinal and epidural technique [19]. There are relatively few contraindications to regional analgesia, the absolute contraindications are maternal refusal, coagulopathy, infection at the injection site, uncontrolled hypovolaemia and raised intracranial pressure due to a space occupying lesion [27]. Regional analgesia is often performed early in labour to optimise positioning and may be easier in the sitting position since the midline may be identified more easily than the lateral position [51].

Bupivacaine has been the most widely used local anaesthetic for regional analgesia in labour [52]. The use of epidural, spinal and combined spinal epidural techniques for obstetric care has increased dramatically because of the quality and safety of the analgesia and anaesthesia produced the ability to titrate the degree and duration of pain relief and the expanding number of situations for which their use is appropriate. In a randomised, non-blinded controlled trial at a university hospital in the United States of America by Wong et al, in 728 nulliparous women, neuraxial analgesia started in early labour did not increase the risks of

caesarean section or instrumental delivery, compared to initial use of systemic analgesia with epidural started later, at 4cm or at least two requests for analgesia [53].

10.1. Single shot spinal

This regional labour analgesia can be provided in low resource settings however care must be taken during ambulation and manpower shortages are significant limitation. Spinal labour analgesia using Whitcare needles and bupivacaine [2.5 mg) with or without narcotic.

Spinal anaesthesia is a simple and reliable technique with rapid onset. Spinal (subarachnoid) anaesthesia provides an awake and comfortable patient with minimal risks for pulmonary aspiration of gastric contents. Despite the lower abdominal incision sensory dermatome level is required to prevent referred pain from traction on the peritoneum and uterus [30].

10.2. Epidural pain relief in labour

The epidural technique may enable a lesser incidence and extent of maternal hypotension because of the ability to administer the dose of local anaesthetic in a fractionated manner and allow compensatory cardiovascular medicines to respond to the more slowly developing sympathetic blockade [30]. The epidural technique is the most common neuraxial technique used for labour analgesia because of relative rapid sensory analgesia with minimal motor blockade; uterine affects a maternal or foetal toxicity. Epidural bupivacaine provides excellent pain relief during labour and delivery and is still the most widely used local anaesthetic in obstetric analgesia. However, it is potential for motor blockade and central nervous system and cardiac toxicity by accidental intravenous injection of high dose is clinically undesirable especially for obstetric patients [54]. Many factors such as gestational age, ruptured membranes, cervical dilatation can influence pain intensity. The degree of motor block during epidural analgesia depends not only on the drug used but also on the cumulative dose of the local anaesthetic. Epidural analgesia provides effective pain relief during labour and delivery and has no significant adverse effects on infant and outcome [55]. Epidural analgesia has been safely and effectively used since the 1960s. The introduction of low dose epidural low anaesthetics to maintain labour as well as the use of patient controlled epidural analgesia intra-partum has reduced the use of local anaesthetic and minimised its side effects [56]. In some studies epidural analgesia increases the duration of the second stage of labour rates of instrument assisted vagina deliveries and the likelihood of maternal fever [57]. Though women who receive epidural analgesia during labour are more likely to require instrumental or caesarean delivery there is little evidence to suggest that the epidural itself is to blame. There is an association between epidural analgesia and labour outcome but this is probably not causative. Epidurals have consistently been shown to provide superior analgesia when compared with non-epidural analgesia for labour pain, although this is not always associated with greater maternal satisfaction. Analgesia can be readily converted to anaesthesia by increasing the local anaesthetic concentration, facilitating instrumental or caesarean delivery. Labour analgesia benefits patients with hypertension and some types of cardiac disease example mitral stenosis because it blunts the haemodynamic effects that accompany uterine contraction are increased preload,

tachycardia, increase systemic vascular resistance, hypertension and hyperventilation [31]. For mobile epidurals affects motor function leading to weakness of the lower limbs, decrease the concentration and adding an opiate provides good pain relief with sparing of motor function and ambulatory epidural service is not yet available in all centres [3].

Epidurals have some potential disadvantages. The dura may be accidentally punctured and causes severe postural headache. This can be cured in most cases with an autologous epidural blood patch, the blood clots in the epidural space and presumably works by sealing the leak of cerebrospinal fluid, thus restoring intracranial pressure. Urinary retention after an epidural is best prevented by careful attention to bladder emptying. Labour epidural analgesia techniques and medications have progressed to provide more predictable and effective labour analgesia. It is now possible for a parturient to experience pain free labour with minimal side effects to both the mother and the foetus while maintaining maternal autonomy.

The use of a patient controlled modality for labour pain control such as patient controlled epidural analgesia has been shown to confer a greater sense of maternal control over the birthing process and has gained maternal acceptance worldwide [19]. Patient controlled epidural analgesia allows patients to self-administer a pre-set amount of local anaesthetic and/or opioid epidurally to meet their own requirements via a patient controlled analgesia device, thus maintaining the neuraxial block within an effective therapeutic range [56].

10.3. Combined spinal epidural labour analgesia

Combined spinal epidural labour analgesia involves injection of an analgesic agent or local anaesthetic drug or both into the intrathecal space immediately before or after epidural catheter placement. A number of variations in this technique have been described. Nevertheless, it is known that despite these variations this technique results in an immediate and significant reduction in pain during labour [11]. This technique offers some benefits including faster onset of analgesia, decreased incidence of motor blockade, more reliable technique, higher level of patient satisfaction and decreased incidence of accidental dura puncture [57]. Combined spinal epidural or labour analgesia allows for use of smaller doses of local spinal anaesthetic because the block can be supplemented at any time.

10.4. Pudendal nerve block

It is possible for a pudendal nerve block to be sited on each side of the birth canal to provide analgesia for the second stage of labour or a straight forward instrumental delivery [28,29]. The pudendal nerve arises from the sacral plexus of S2 to S4 and supplies the perineum, vulva and vagina [28]. Pudendal nerve block is often combined with perineal infiltration of local anaesthetic to provide perinael anaesthesia during the second stage of labour [29].

11. Anaesthesia for caesarean section

Delivery by caesarean section is becoming more frequent and is one of the most common major operative procedures performed worldwide [59]. It is estimated that some 1-2% of

pregnant women undergo anaesthesia during their pregnancy for surgery unrelated to delivery [60,61,62]. The most common surgical procedures include appendectomy, cholecystectomy, ovarian torsion and trauma [60]. Less commonly cardiac and neurological procedures are undertaken during pregnancy [60]. Consideration of possible foetal effects of the maternal disease process is important [62]. Obstetric anaesthesia can be very challenging as the risks are largely related to changes in anatomy and physiology associated with the birthing process or surgical intervention and pharmacological changes that characterise the three trimesters of pregnancy these changes. Anaesthetists who care for pregnant patients undergoing non-obstetric surgery must provide safe anaesthesia for both the mother and foetus. Anaesthetic techniques and drugs administered are modified accordingly foetal well-being is related to avoidance of foetal asphyxia, teratogenic drugs and preterm labour [38]. Left lateral tilt is done to prevent aortacaval compression meticulous pre-oxygenation to prevent hypoxia [38].

The aim in the non-obstetric surgery in pregnancy is to optimise and maintain uteroplacental blood flow and oxygen delivery, avoid unwanted drug effects on the foetus, avoid stimulating the myometrium(oxytocic effects), avoid awareness under anaesthesia under general anaesthesia and use of regional anaesthesia if possible [60]. Caesarean section is often said to be the unique situation where the anaesthetist has to deal with two patients under the same anaesthetic. Protection of the mother is paramount but other goals of anaesthetic management include maintenance of uterine blood flow and foetal oxygenation, avoidance of teratogenic changes and prevention of preterm labour [62].

12. Regional anaesthesia for caesarean section

Though general anaesthesia was previously the favoured technique for caesarean section, there has been a move in favour of regional technique in recent years [59]. Regional anaesthesia is preferred in obstetrics because it is safer than general anaesthesia especially for emergency for emergency caesarean section [63]. Regional anaesthesia is promoted in obstetric practice for reasons of safety. Most women also wish to be awake for caesarean section and anaesthetist try to comply with this whenever possible [63]. Absolute contraindications to regional analgesia and anaesthesia are maternal refusal because the woman's wishes should be respected at all times, allergy, sepsis, increased intracranial pressure, clotting abnormalities and lack of appropriate trained staff and or equipment [64].

12.1. Spinal anaesthesia

Single-shot spinal anaesthesia has become the most popular anaesthetic technique for caesarean section [65]. The ease of establishing subarachnoid block, the rapid onset of intense and reliable block without missed segments make subarachnoid block more attractive for caesarean section [59]. Spinal anaesthesia offers a fast profound and high quality sensory and motor block in women undergoing caesarean delivery. The most common complication of spinal anaesthesia for caesarean delivery is hypotension with a reported incidence greater than 80% [66]. Maternal hypotension may have detrimental

effects on uterine blood flow, foetal well-being and ultimately neonatal outcome as measured by unilateral arterial pH and APGAR scores [66]. Lateral uterine displacement and intravenous prehydration are commonly used to prevent hypotension but these have limited efficacy and a vasopressor drug is often required [66].

Continuous spinal anaesthesia can provide excellent labour analgesia and surgical anaesthesia if required and is a very reliable technique [67]. Despite its inherent advantages, it is also one of the most underutilised of regional anaesthetic techniques. Following administration of a subarachnoid technique, the patient may complain of dyspnoea. This can occur because of several factors including blunting of thoracic proprioception, partial blockade of the abdomen and intercostal muscle and increase pressure of the abdominal contents against the diaphragm in the recumbent position. Despite these diagnoses, significant respiratory compromise is unlikely as the blockade rarely affects the cervical nerves that control the diaphragm [30].

12.2. Epidural anaesthesia

Epidural block demands high technical skills and is still favoured by many when gradual establishment of block is desired to minimise hypotension, although combined spinal epidural techniques are gaining popularity [65]. The method is still same for establishing epidural labour analgesia.

12.3. Combined spinal epidural anaesthesia

The combined spinal epidural technique consists of epidural needle placement and administration of subarachnoid medications via a spinal needle placed through the shaft of the epidural needle and placement of an epidural catheter appears to combine the best of both techniques with a blockade that is rapid in onset, it reliable and can be prolonged [30].

13. General anaesthesia for caeserean section

A general anaesthesia is often needed for an emergency caesarean section if there is not enough time to put in a spinal anaesthetic or an epidural [68]. There is an increased risk during pregnancy of aspiration of gastric contents and control of gastric acidity and volume and encountering a different airway [69, 70].

Maternal mortality has decreased, thanks to the use of regional anaesthesia and decreased use of general anaesthesia, improved aids for difficult intubation, more precise respiratory and cardiovascular monitoring [69]. Maternal dangers linked to general anaesthesia in obstetrics are typically represented by pulmonary aspiration of gastric contents (known as mendelson's syndrome), hypoxaemia related to difficult or failed intubation and magnified by physiological changes of pregnancy, multifactorial hypotension(aortacaval compression and regional anaesthesia, possible obstetric haemorrhage, uterine relaxation due to inhalation agents and inhalation [70].

Failed endotracheal intubation was the leading cause of anaesthetic related maternal mortality. This result in failure to intubate, ventilate and hypoxaemia, which may eventually lead to brain damage or death [70]. The incidence of failed intubation in the general surgical population is approximately 1, 2303 \approx 0.04% and in obstetric population 1: 300 \approx 0.33%. reasons for this include a broad spectrum of anatomical and physiological changes which occur in women during pregnancy such as the presence of full dentition, increased airway oedema especially in pre-eclamptic patients, enlargement of the breasts may impact on the ability to place a laryngoscope blade into the mouth due to increased difficulty in navigating the blade handle, failure to allow adequate time for paralysis with suxamethonium and incorrectly applied or over enthusiastic cricoid pressure may distort the larynx [70].

14. Local infiltration

Local infiltration of the incision and surgical site may be done for unstable patients especially in developing countries where patients present late. Up to 100 ml of 0.5% lignocaine with adrenaline can be used to raise two weals on each side of the midline from the symphysis pubis to a point 5cm above the umbilicus. The layer of the abdominal wall should be infiltrated with the solution using a long needle. Once the baby has been delivered additional analgesia or sedation can be given to the mother. The advantage is that there are no ill effects on the mother or baby. The disadvantage is that it is unsuitable for nervous patients and needs the surgeons' co-operation. Local infiltration of the surgical sites is used in developing countries and low income countries where patients present late to health facilities and in areas where home delivery is common. It is indicated in patients with deranged electrolytes and patients who cannot withstand general or regional anaesthesia such as eclampsics.

15. Postpartum pain

Pain in the postpartum period could be 'after pain' due to acute uterine contractions which are intense during breast feeding. It could also arise from episiotomy, breast engorgement, cracked nipple or mastitis [71]. After pains made worse by the act of breastfeeding because of the effect of serum oxytocin which is secreted from the posterior pituitary gland primarily as part of the milk let down reflex [71,72]. Reassurance and mild analgesics like acetaminophen and non-steroidal anti-inflammatory drugs are usually sufficient [71].

15.1. Episiotomy

An episiotomy is a surgical incision made on the perineum to increase the diameter of the vulva outlet during childbirth [73]. Pain from episiotomy and perineal tears during childbirth is associated with significant pain in the postpartum period. Pain from episiotomy may be severe and can result in significant discomfort and interference with basic daily activities and adversely impact on motherhood [74]. Episiotomy may increase risk of chronic perineal pain, which is estimated to occur in 13% to 23% of women after episiotomy. Post episiotomy pain has been treated with systemic analgesia including non-steroidal anti-inflammatory drugs and oral or intravenous opioids [74].

15.2. Post caesarean section pain

Prompt and adequate postoperative pain relief is an important component of caesarean delivery that can make the period immediately after the operation less uncomfortable and more emotionally gratifying. Postoperative pain produces adverse physiologic effects, which manifests on multiple organ systems such as hypoventilation, atelectasis, pneumonia, stress induced hypercoagulable state and incidence of deep venous thrombosis [75, 76]. Proper management of postoperative pain can improve patient comfort, decreased peri-operative morbidity, and decreased cost by shortening the time spent in post anaesthesia care units, intensive care units, and hospitals [74]. Uncontrollable pain can impair functions such as ambulation and dietary intake breast feeding and early maternal bonding with the infant and can impair the mother's ability to optimally care for her infant in the immediate postpartum period [76,77,78,79,80]. High quality pain relief is important after delivery to promote early recovery and optimise the mother's ability to care for her new born [81]. Inadequate pain control can also negatively affect the normal development of infants by affecting nursing activities such as breast-feeding [76,79].

The ideal post caesarean section analgesic regimen would be one that is cost effective, simple to implement and which minimally affect staff workload [81].

Currently opioids form the foundation of post caesarean section analgesia with patient controlled techniques being preferred by mothers. A number of non-opioid analgesics have been used in conjunction with epidural and intrathecal opioids to optimise postoperative analgesia [81]. Patient controlled intravenous opioids are popular after caesarean delivery because of convenience, safety, and consistently high patient satisfaction. The epidural analgesia has more analgesic benefit than intravenous analgesia and provides excellent postoperative pain relief [82].

Author details

Longinus N. Ebirim and Omiepirisa Yvonne Buowari
*Department of Anaesthesiology, University of Port Harcourt Teaching Hospital,
Rivers State, Nigeria*

Subhamay Ghosh
Pain Medicine, Kettering General Hospital, Kettering, Northants, United Kingdom

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