INVITED ARTICLE

EPIDURAL ANALGESIA FOR PATIENTS IN LABOUR

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ABSTRACT

Labour pain is very real to expectant mothers. Untreated it can give rise to hypocarbia, hypoxia and fetal acidosis. Pain relief during labour dates back to Queen Victoria who was given chloroform for the birth of Prince Leopold. Since then many techniques and drugs have been used. Epidural analgesia was introduced in 1942 and since then has been regarded as a very effective method for labour pain relief. This article deals with the technique of epidural catheter insertion as well as discussing some of the common complications that can occur and their management.

Keywords : Obstetric analgesia, pain relief, technique of insertion, management of complications and epidural.

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INTRODUCTION

We must accept that the pain of labour is real. It is also the most severe as assessed in the Magill Pain Questionnaire by Melzak. The pain of labour also gives rise to hyper-ventilation which leads to hypocarbia.

Hypocarbia causes vaso-constriction and the left-ward shift of oxy-haemoglobin dissociation curve, both of which lead to fetal hypoxia and fetal acidosis. Increased sympathetic discharge due to pain causes vaso-constriction and increases free fatty acids which lead to fetal acidosis.

With all these, it will be touching on the immoral to suggest that parturient mothers should grit and bear child birth pain as a necessity or as an inevitable accompaniment of labour for which nothing should be done.

HISTORY

The history of pain relief in labour has a fairly interesting start. In 1847, Simpson used chloroform for a delivery. Then in 1853, John Snow gave Queen Victoria chloroform on the birth of Prince Leopold.

1880 – nitrous oxide was used.
1898 – Spinal anaesthesia was used.
1939 – Pethidine was used for relief of pain in labour.
1942 – Lumbar epidural was introduced for the relief of pain in labour.

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REQUIREMENTS OF A SATISFACTORY TECHNIQUE

One must be able to administer safe and effective analgesia during painful periods of labour. There should be no untoward effects on the maternal respiratory and cardiovascular systems. It should have no effect on the progress of labour and no depressant effect on baby before or after delivery. It should not be unpleasant on the mother and not difficult to administer.

PHYSIOLOGY OF PAIN IN LABOUR

First Stage

Pain originates in the contracting uterus and cervix. Afferents of the sympathetic pathway go the dorsal nerve root, then to the spinal cord and the higher centres. Initially T11 and T12 are involved. As pain progresses, T10 and L1 are involved. Backache is caused by pain originating in the uterus and peri-uterine structures which are referred to the cutaneous branches of the posterior division of T10-L1.

Second Stage

Distension of the vagina and the perineum involves S2, S3 and S4. Distension and compression of the perineum can cause pain along ilioinguinal, genitofemoral and the posterior cutaneous nerve of the thigh.

Preparation for an Epidural

Ensure that the following investigations have been done:-

a. Full blood count, platelets.
b. Urea, electrolytes.
c. PT, PTT for the following category of patients:
   i. Toxemias
   ii. Cardiac disease

iii. Renal disease
iv. Liver disease
v. History of treatment with anti-coagulants.

Equipment for Insertion of Epidural Catheters

A. Resuscitation trolley.
Ambu bag.
Laryngoscope.
Endotracheal tubes.
Stilettes (ETT Introducers).
Drugs for Resuscitation.
- Valium
- Atropine
- Ephedrine
- Adrenaline
- Sodium Bicardbonate 8.4%
- Calcium Gluconate 10%

B. Source of Oxygen and Face masks.
Wall oxygen outlet or cylinder oxygen.
Face mask of various sizes that can be connected to a ventilatory bag.

C. Vacuum suction and Suction catheters.

D. Sterile gowns; gloves, hand towels & scrubbing brushes.
Face masks.
Hibiscrub.

E. Epidural Set – Sterile tray
Sponge forceps
Gauze x 10
20mls Glass Syringe X 1
5 mls Glass Syringe X 1
18G needle X 1
27G needle X 1

F. Cleansing solutions –
70% methylated spirit, Povidine or Iodine solution.

G. Sterile pre-packed epidural set -
Epidural catheter with Tuohy needle.
(Choice between 16G and 18G to be determined by individual anaesthetists).

METHODS

Technique of giving an Epidural

The iliac crest is felt at the level of the L4 vertebra. The L2-L3 and L3-L4 interspaces are most commonly used.

An intra-dermal wheal is raised with local anaesthetic. A puncture is made in the skin with a thick sharp needle to facilitate the passage of the epidural needle.

The Tuohy needle is used for the epidural injection. Holding the skin firmly, the epidural is introduced in the mid-line. Some anaesthetists prefer a lateral approach. The skin should not be allowed to move as otherwise the needle might be inserted at a different site. The needle is advanced until it is firmly engaged in the inter-spinous ligament. It now has to penetrate the ligmentum flavum to reach the epidural space. As soon as the epidural space is entered, the loss of resistance to injection of air or saline is felt. It must be remembered that the advancement of the needle should be temporarily suspended during a uterine contraction. The stilette is withdrawn and the epidural catheter is inserted through the Tuohy needle so as to have 2 to 3 cm of the catheter in the epidural space. The catheter should be aspirated to check for blood or CSF and 2 mls of 1% lignocaine with adrenaline 1/200,000 is injected as a test dose, after which, another 4 – 6 ccs of 1.5% lignocaine is injected through the catheter. All injections and insertions of the catheter and needle should be carried out between contractions. The patient should lie on a right pelvic wedge or a semi-lateral tilt, and the mother's blood pressure and fetal heart rate must be taken:

a. Every 5 minutes of the first 15 minutes.
b. Every 10 minutes for the next half hour.
c. Thereafter half-hourly.

The effects of the epidural block like numbness and analgesia should be experienced within 20 minutes. If this does not happen, then the catheter will have to be re-inserted.

Management of an Epidural Block

The initial dose of anaesthetic must be given by the trained anaesthetist. Subsequent 'topping up' can be done by a doctor in the labour ward or a nurse if a policy to this effect has been approved. This would mean that the protocols are clearly stated by the anaesthetist in charge. The epidural can be managed by intermittent injections or a continuous block (1). After each intermittent injection, the blood pressure should be checked as stated before. The upper level of analgesia should be ascertained. The local anaesthetic should only be given if there is no backflow of CSF or blood. The anaesthetist should be informed immediately if the following occurs:

A. Respiration
- Difficulty in breathing.
- Hypoventilation.

B. Disorientation and/or convulsion

C. Blood Pressure
i. Fall of more than 20% of the initial BP.
ii. Less than 90mm systolic.
iii. Patient complains of nausea and giddiness.

D. Level of Analgesia higher than the umbilicus (T10)

If the patient has a distended bladder, catheterisation has to be done. Labour should be monitored closely and a cardiotocograph should be used.

The following medications and regimens can be used:
1. Bupivacaine 0.25% plain. 6-10mls repeated 2 hourly.
2. Lignocaine 1.5% with adrenaline 1:200,000 6-10mls repeated hourly.
3. Bupivacaine 0.125% with Pethidine 0.25% given by 10 ml intermittent injections every 75-90 minutes (2).
4. Continuous infusion of 0.2% Bupivacaine with 2 ug/ml of Fentanyl 4-8ml/hour. This is the method used in this hospital. We do not hesitate to top up with 4-6cc of 1.5% Lignocaine with 1/200,000 adrenaline if the patient complains of pain. The initial dose is 4-6ml of 1.5% Lignocaine with adrenaline 1/200,000

after a test dose of 2cc then the infusion pump is started. The patient is made to lie with a lateral tilt.

Indications

1. Pre-eclampic Toxaemia of Pregnancy. In most cases, it has been shown to have a beneficial effect on the patient (3).

2. In incoordiante uterine action, a lumbar epidural helps the uterus to have normal contractions.

3. In cardiac and respiratory diseases an epidural is useful as less stress is imposed on the mother.

4. Premature or high risk foetus, breech deliveries and multiple pregnancies, risk of birth trauma is reduced by
   i. relaxed pelvic floor
   ii. reducing the bearing down reflex. This allows a slow birth of the baby and reduces the chance of a sudden expulsion. An intervillous blood flow is improved after an epidural.

5. Maternal distress with the mother on the verge of giving up and losing all her will to carry on with the labour.

6. In conditions where there is a fear of a particularly painful experience, patients request for a painless labour.

Relative Contraindications

1. Previous LSCS. This is not a contraindication because with a lower concentration of anaesthetic, the pain of uterine rupture can be felt by the mother.
2. Previous spinal surgery.
3. Supine Hypotension.
4. Neurological Diseases.

Due to the pressure of the presenting part and position adopted during pregnancy and labour the chance of neurological sequelae is a possibility one has to bear in mind. The chances are higher particularly if there is already some neurological disease already present.

Absolute Contraindications

1. Absence of consent.
2. Sepsis at site of injection.
3. Coagulation defects: (Best to do the following investigations).

   i. PT/PTT
   ii. Platelets
   iii. Bleeding time

   Pre-eclampsia should be screened for coagulation defects before an epidural is given.

4. If the hospital has no equipment and trained staff, then it is an absolute contraindication.

DISCUSSION

Complications and Difficulties in Epidural Analgesia

A few of the problems will be discussed with the suggested management.

Reflux of blood from Tuohy needle or epidural catheter:

One must be careful not to introduce the needle or catheters when the patient is having contractions as the veins in the epidural space will be engorged and the chance of having a 'blood tap' is high.

If blood is seen in the Tuohy needle then the stilette should be replaced and after a few minutes, the stilette is removed. If the bleeding has stopped then the catheter is inserted. If the blood is present, the Tuohy needle can be rotated or pulled out slightly. If all this does not prevent reflux of blood, the Tuohy needle should be reinserted.

After the catheter is inserted, if there is blood in the catheter then it can be withdrawn slightly. Also if some saline is used to flush the catheter, it will prevent clotting as well as clear the catheter of blood. When one is sure no blood is present, then the epidural analgesia can be started.

If there is inability to thread the catheter through the Tuohy needle, the needle can be rotated 90° and the catheter can be advanced. The other alternative is to ask the patient to extend the leg before pushing the catheter further. If all fails, the catheter and the needle should be withdrawn together and an adjoining site used.

Hypotension

If the patient develops hypotension, that is, if the blood pressure falls below more than 20% then the following measures should be adopted(4).

1. Raise the leg of the patient.
2. Left lateral tilt of the patient.
3. Run in Hartman's solution. 1-2 litres may be needed.
4. If this fails, administer 5-15 mg of i/v Ephedrine to raise the BP.
5. Administer oxygen by mask.

Partial Failure of Block

There is an area in the suprapubic region where pain persists in spite of an otherwise adequate block. One of the commonest causes is a full bladder. If the pain persists then it may be due to referred pain from S1. In the instance, it is best to administer a bolus of 6-10mls of 1.5% Lignocaine. The other partial block is the one sided block which can sometimes be explained by fibrous tissue in the epidural space. Withdrawing the catheter and giving larger volumes may help.

The tip of the catheter can be in a paravertebral foramen. This results in motor and sensory loss of a single nerve when the local anaesthetic is injected. The catheter should be withdrawn and another injection made.

ACCIDENTAL INTRAVASCULAR INJECTION OF LOCAL ANAESTHETIC

The range of symptoms and signs are a relaxed feeling,

drowsiness, light headedness, tinnitus, circumoral numbness, metallic taste in the mouth, slurred speech, blurring of vision, unconsciousness, cardiac arrest.

Management of Local Anaesthetic Toxicity

a. Make sure the patient has a clear airway.
b. Make sure breathing is adequate with oxygen by face mask.
c. Artificial ventilation should be instituted if necessary.
d. Cardiovascular support if necessary.
e. Drugs like Thiopentone and Valium should be used to control seizures.

Accidental Dural Puncture

If the dura is punctured and CSF flows freely the stilette should be replaced immediately. The Epidural should be reinserted in the inter-space above. Only small amounts of local anaesthetic should be administered and the patient should be observed for any signs of a widespread block developing. It must be stressed that the anaesthetist should be the only one topping up once the dura has been punctured (5).

Prophylaxis and Treatment of Post Spinal Headache

If no treatment is instituted, 70% of patients develop a post spinal headache after an accidental dural puncture has occurred.

1. Lie flat in bed for 24 hours.
2. Use of an abdominal binder or asking the patient to lie prone on the bed.
3. 1000-2000ml of i/v Hartman. Patient is encouraged to drink up to 2 litres of fluids.
4. 1.5L of Hartman's can be given through the epidural space.

If the patient develops a headache, an autologous blood patch can be used. This should be done under strict asepsis.

Inadvertent Total Spinal

a. Respiratory support. One may have to intubate the patient.
b. Cardiac support - Fluids.
c. Drugs like ephedrine and adrenaline may have to be used.

Neurological Complications

They are rare but can be serious like epidural haematoma or an epidural abscess with compression of the cauda.

Breakage of Catheter

If the epidural catheter must be withdrawn the needle should also be withdrawn as just pulling out the catheter may result in a portion being sheared off and left behind.

This complication is very rare nowadays. If it does occur it should be recorded and the patient should be told. There seems to be no serious side-effects of a small portion of the epidural catheter being left in situ.

Instrumental Deliveries

There have been many reports of an increased incidence of instrumental deliveries(6). The reasons given are:-

1. Resistance of pelvic floor musculature is reduced so rotation of the head is slowed.
2. Weakness of lower abdominal wall muscles so unable to bear down.
3. Bearing down reflex obtunded in a proportion of mothers who have received an epidural.
4. Fergusson reflex is blocked by an epidural. Thus there will be no surge of oxytocin secretion caused by the distension of the pelvic floor. Increase in uterine activity as delivery approaches is thus not possible(7).

The unnecessary intervention of the second stage with instruments is to be discouraged unless there is fetal distress.

CONCLUSION

Since the early seventies Lumbar Epidurals have been used for Labour Analgesia in Singapore. There is an increased awareness of the need by obstetricians as well as the public to reduce labour pain.

It must be emphasised that ante-natal classes are an important part of an analgesia programme. Here one is able to explain what the patient is going to undergo during labour. The other advantage is that the patient will also be told of the other forms of analgesia and this will help her to choose the most suitable form of analgesia. In obstetric analgesia it has to be remembered that above all things no harm should be done.

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