Low Spinal Anaesthesia for Caesarian Section

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Curriculum vitae

David Wilkinson was born some 30 years ago and qualified as a medical doctor with MBChB in Manchester, England. He then obtained several diplomas, in the RSA and England: in Primary Emergency Care (PEC), in Child Health and in Tropical Medicine and Hygiene. After some house posts in surgery in the UK he worked at Jane Furse Hospital (Lebowa) from 1987 to 1990 and then went back to the UK to do GP-training in Cornwall. Since May 1991 David has been the Medical Superintendent at Hlabisa Hospital (KwaZulua) and his main interests are in rural medical care. He has a particular interest in TB, HIV and in the reduction of perinatal mortality.

Summary

Often relatively inexperienced people anaesthetize women for the commonest major operation in the developing world, the Caesarian section. Low spinal anaesthesia reduces the risk of aspiration of gastric contents and improves bonding. A technique of Low Spinal is described and the evaluation of 100 consecutive anaesthetic events. Ninety seven produced excellent surgical conditions. Eighty seven patients needed no additional analgesia. One hundred and eight babies had the following Apgar score, 90,5%, 10 at birth; 93%, 10 at 1 minute all but 1, 10 at 2 minutes and the last scored 10 at 6 minutes. Ninety nine percent of patients were prepared to have another spinal anaesthetic.

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Anaesthesia, obstetrical; Anaesthesia, spinal; Developing Countries; Apgar Score; Caesarian Section.

Introduction

Caesarian section is the single commonest major operation performed in hospitals in the developing world. Often the operator is relatively inexperienced and may have to act as his or her own anaesthetist.[1] A significant proportion of maternal deaths are associated with caesarian section and with the anaesthesia thereof in particular.[2] Many such deaths may be potentially avoidable.

Several techniques of anaesthesia for caesarian section exist, ranging from general anaesthesia to a variety of regional blocks and local anaesthetic infiltration. General anaesthesia, while producing excellent surgical conditions is complex, demanding a variety of equipment and drugs, and the majority of anaesthetic-related maternal deaths occur at induction of general anaesthesia.[1] Regional anaesthesia reduces the risk of aspiration of gastric contents and improves bonding, as the mother is awake. However major complications including hypotension and respiratory failure due to high block may threaten life. Local anaesthetic although enthusiastically employed by many[3] does limit surgical manipulation and it is not a good technique for teaching the surgery.[5] A technique of low spinal anaesthesia is described that seems to minimise these possible complications while maintaining excellent surgical conditions and a high degree of patient satisfaction.

Relevant anatomy and pathophysiology

1. *Pain pathways*

Pain impulses from the uterus pass along sympathetic fibres via the pelvic and hypogastric plexuses to enter the spinal cord at the T11 and T12 levels. Sensation from the pelvic wall peritoneum passes via the obturator nerve to the L3 level of the cord, and the parietal peritoneum is supplied segmentally with the intercostal and lumbar nerves. The dermatome at the level of the umbilicus is T10.[3,4]

2. *Sympathetic pathways*

Hypotension in spinal anaesthesia is due to blockage of the sympathetic

outflow tracts from T1 to L2. These figres are responsible for vasoconstriction. The degree of hypotension depends on the height of the block, particularly whether the T1 to T5 fibres to the heart are blocked[5], preventing a reflex, compensatory tachycardia.

Caesarian section is the commonest major operation in the developing world

Sympathetic block extends 2 segments higher than the cutaneous level as dilute solutions of drug block the smaller fibres only.

3. *Respiration*

Spinal block extending as high as C3, 4, 5 (phrenic nerve), causes total apnoea. Blocks to the thoracic level decrease partial pressure of oxygen by interfering with intercostal muscle activity and producing ventilation/perfusion imbalance. Low spinal anaesthesia has no effect on the respiratory system.

Technique employed

Intravenous access is ensured and 500-1 000ml of crystalloid solution given in theatre, antacid having been given in the ward. A lumbar puncture is made in the L3-4 interspace with the patient sitting. Hyperbaric bupivacaine 0,5% in a dose of 1,5ml is given and the patient remains seated for at least 5 minutes with a nurse to support her. After 5 minutes the patient lies flat with a left lateral tilt of 10-15 degrees to prevent aorto-caval compression and consequent hypotension. The patient's head is placed on a single pillow to reduce the small risk of cephalic spread of the bupivacaine and high spinal block.

Caesarian section procedes via a midline or low horizontal incision. The uterus is delivered to facilitate repair and tubal ligation performed if requested. The abdomen cannot be packed with this technique. Following repair and return of the uterus to the abdomen gentle suction and swabbing is performed. Syntocinon is used to contract the uterus: ergometrine can cause the conscious patient to vomit.

Pulse and blood pressure are recorded every 5 minutes and the anaesthetist maintains verbal contact with the patient at all times.

Standard precautions as for all anaesthetics are employed at all times, ie suction, oxygen, equipment for intubation and ventilation.[6]

Sympathetic block extends two segments higher than the cutaneous level

In addition ephedrine should be available to treat profound hypotension.

Methods

Prospective evaluation of a consecutive series of cases performed under low spinal anaesthesia was carried out. The health ward delivers 3 000 women a year and has a caesarian section rate of 8%.

Results

Of the 100 cases evaluated consecutively, 55 were emergencies and tubal ligation was performed in 22. The average duration of surgery was 22 minutes (range 16-47).

In 97 cases the technique of low spinal anaesthesia produced excellent surgical conditions (as assessed by the surgeon). Patient tolerance was assessed by the anaesthetist (facial expression of patient, verbal complaint etc) and judged to be fine in 87 cases. Eleven required pethidine for discomfort. Two patients needed supplementation with ketamine. No procedure was abandoned.

Hypotension is due to sympathetic blockage

No cases of high spinal block occurred.

Of the 100 patients, 59 experienced a drop in systolic blood pressure (SBP), averaging 16%. Thirty-five percent experienced a rise in SBP and in 6 the SBP remained unchanged. Only 5 patients experienced a fall in SBP of 30mm Hg or more. Two of these were due to profuse haemorrhage from the uterus; 3 seemed to be due to the anaesthetic. No cases received ephedrine.

There was no maternal or perinatal mortality. Of the 108 babies delivered 90,5% had an Apgar score of 10 at birth; 93% had a score of 10 at 1 minute and all but 1 had a score of 10 at 2 minutes. The last baby scored 10 at 6 minutes.

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Patient satisfaction was assessed on discharge; 99% expressed satisfaction with the anaesthetic procedure employed and would have been prepared to repeat it. Of those 42 who had had a previous caesarian under general anaesthesia, 38 (90,5%) said they preferred Low Spinal. Of the 4 preferring general anaesthesia, 3 said they would have a Low Spinal if so advised; only 1 would insist on a general anaesthetic.

Low Spinal was preferred by those who had experienced general anaesthesia for Caesarian previously

The incidence of post dural puncture headache was 25%.

Discussion

Obstetric anaesthesia in developing countries should be safe, simple and cheap.[8] It should also produce good operating conditions and be acceptable to patients. Although described in similar forms [8,9] the technique of low spinal anaesthesia for caesarian section is not widely practised and indeed is almost dismissed or not mentioned in modern anaesthetic text books.[3,5]

The technique described here is simple, cheap and apparently safe. The low incidence of significant hypotension apparently due to the anaesthetic (3%) and its rapid correction with intravenous fluids only, compares very favourably with the incidence described for more conventional approaches to spinal anaesthetic.[7] The absence of high spinal block is a major benefit and again compares very well with conventional techniques. As the patient is fully conscious there is no compromise of the airway, thereby avoiding the risk area of general anaesthesia.

Operating conditions were excellent and most patients tolerated the procedure very well. A feature of regional anaesthesia is the occasional partial block. Discomfort in such cases was adequately treated with pethidine 50-100mg iv. Two patients needed ketamine 0,25-0,5mg/kg because of actual pain during the procedure. Although such doses are said to be analgesic and not anaesthetic it is vital to be ready to control the airway should the need arise.

Gentle surgery is important

Patients were satisfied with the technique, only one refusing to consider a repeat. This also suggests that episodes of discomfort were adequately treated. Low Spinal was preferred by those who had experienced general anaesthesia for caesarian section because they saw their baby at birth (which improves bonding), the recovery period was much more pleasant and they had no fear of not waking up.

Post dural puncture headache is very uncomfortable but can be eliminated by a change in technique. With the patient sitting up the needle is introduced with the bevel facing laterally (thus splitting rather than cutting dural fibres.[7] Since employing this technique in 30 subsequent cases no cases of headache have occurred, whereas 7 or 8 would have been expected.

No cases of headache since introducing the spinal needle with the bevel facing laterally

Although no one technique of anaesthesia may be considered safe for all patients, in the hands of all doctors, low spinal anaesthesia is safe and satisfactory for the majority. Contraindications include hypotension and risk of bleeding diathesis. Low spinal worked well in 2 patients with cord prolapse and one mentally retarded patient.

The keys to success are to follow the "Golden Rules of Anaesthesia"[6], to employ an anaesthetist or anaesthetic nurse to monitor the patient carefully and to maintain friendly contact with her at all times. The use of small volumes of hyperbaric solution (1,5ml proved the correct dose in the Zulu women studied) with the patient kept in the sitting position for 5 minutes is responsible for the low incidence of hypotension and absence of high spinal block. Gentle surgery is important to minimise discomfort but the uterus can be delivered to aid repair and surgery can be rapid. This technique has now become the standard method in our hospital.

Conclusion

The technique of low spinal anaesthetic described here although

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not widely practised seems to be a safe and efficient method acceptable to all concerned. Consideration of its use is recommended to colleagues working in similar rural hospitals.

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