

PRACTICAL TECHNIQUES IN DEVELOPING COUNTRIES

Dr David Williams

International Nepal Fellowship

Subarachnoid Saddle Block using Pethidine

Pethidine (Meperidine) is a synthetic phenylpiperidine derivative opioid agent with local anaesthetic and anticholinergic properties, and high lipid solubility. It is presented as a 5% solution (50mg/ml), which is slightly hyperbaric with respect to cerebrospinal fluid (specific gravity 1.026) [1]. These properties make it an ideal agent to use for subarachnoid anaesthesia if local anaesthetic agents are not readily available.

With the patient in the sitting position, a dose of 0.01 ml per kg body weight 5% preservative-free pethidine (i.e. 0.5mg/kg) is diluted up to 2ml with sterile water or saline, and is slowly injected without barbotage into the subarachnoid space at the L3/4 level. The patient is kept in the sitting position for 5 minutes, then lies supine. This will give a satisfactory sensory block from S2 - S5 with an onset time of 4 - 8 minutes and duration of 1.5 - 2 hours; adequate for perineal surgery. Due to the action on spinal opiate receptors, there is good postoperative analgesia lasting for up to 5 hours; and motor block is of limited extent, facilitating early ambulation [2]. The cost per operation using pethidine is cheaper than heavy bupivacaine (100mg pethidine: 60 cents (US); 4ml 0.5% heavy bupivacaine: \$1.60 (US) [3].

The potential side effects of intrathecal pethidine are related to its modes of action; namely local anaesthetic effects (motor & sympathetic blockade, hypotension, bradycardia), and opioid effects (sedation, respiratory depression, pruritis, nausea and vomiting) [4,5,6,7]. Dose related respiratory

depression may occur with doses of >1mg/kg, and it is therefore recommended that premedication and perioperative administration of sedative drugs such as benzodiazepines should be avoided. Late onset respiratory depression is a risk of intrathecal opioid administration, and may occur several hours postoperatively. Although this is a well documented complication of intrathecal morphine administration, this problem has not been reported with pethidine due to the greater lipid solubility and hence reduced rostral spread of the latter agent [7]. However, it remains a potential complication, and therefore close monitoring in the postoperative period is mandatory, even though the patient may have full recovery of sensory and motor function. It is essential that only preservative free pethidine and diluents are used, as preservatives may cause arachnoiditis and irreversible neurological damage.

Larger doses of pethidine (up to 1 mg/kg) have been used to achieve higher levels of subarachnoid blockade up to T5 for urological, orthopaedic and gynaecological surgery [1,6,7], but the incidence of adverse effects is markedly increased. Positioning the patient supine without waiting for 5 minutes in the sitting position for the block to “fix” can lead to a higher and more variable level of block with increased adverse effects [6,7].

As with any subarachnoid block, blood pressure, heart rate, respiration and level of consciousness should be monitored continuously; and emergency drugs (fluids, atropine, vasopressors, naloxone) and equipment for intubation should be immediately available.

With these caveats in mind, saddle block using intrathecal pethidine is a cheap, safe and effective

alternative technique if local anaesthetic agents are unavailable or in short supply.

References:

1. Sangarlangkarn S et al. Meperidine as a spinal anesthetic agent: a comparison with lidocaine-glucose. *Anesthesia and Analgesia* 1987;66:235-40
2. Acalovschi I et al. Saddle block with pethidine for perineal operations. *British Journal of Anaesthesia* 1986;58:1012-6
3. *British National Formulary* 35 ed (March 1998) pp205, 552

4. Khee WDN, Khor KE. Intrathecal pethidine: a word of caution. *Anaesthesia* 1993;48:276-7
5. Critchley LAH, Morley AP. Complications of intrathecal administration of pethidine. *Anaesthesia* 1996;51:711-2
6. Grace D, Fee JP. Anaesthesia and adverse effects after intrathecal pethidine hydrochloride for urological surgery. *Anaesthesia* 1995 Dec; 50(12):1036-40
7. Ngan Kee WD. Intrathecal Pethidine: Pharmacology and Clinical Applications. *Anaesthesia and Intensive Care* 1998;26:137-146

A Simple Reservoir System for Oxygen Concentrators

Domiciliary oxygen concentrators can produce high concentrations of oxygen from room air (up to 95%), but at the expense of a low flow rate (typically 1– 4 litres per minute). They may be used to increase the inspired oxygen concentration (FiO_2) in a draw-over system and should be added using a reservoir attachment before the vaporiser inlet. During anaesthesia addition of 95% oxygen to the reservoir at a flow rate of 1 litre/minute will produce an FiO_2 of 35% - 40%; and a rate of 5 litres/min will produce an FiO_2 of up to 80% [1].

Augmentation of FiO_2 in this way is adequate for most circumstances. However, in certain situations, such as pre-oxygenation of an anxious hyperventilating patient, excessive entrainment of room air may occur with consequent reduction in FiO_2 .

A simple solution to this problem is to prefill a large plastic sack (eg a bin-liner or clinical waste disposal sack) with concentrator "oxygen" and then attach this reservoir to the inlet side of the drawover system during preoxygenation. Avoid the risk of obstruction of the circuit from an empty sack by ensuring that the sack is removed as soon as preoxygenation and intubation is completed [2,3].

The greater FiO_2 afforded by this simple system enables more effective pre-oxygenation and hence an improved margin of safety during the period of intubation or extubation. It may be also be used in the lifesaving management of acute perioperative hypoxic events, such as cardiac arrest.

References :

1. Dobson, MB. *Anaesthesia at the District Hospital* p67, WHO publications 1988
2. Johnson TW. Preoxygenation attachment for the Triservice apparatus. *Anaesthesia* 1988;43:713

3. Wilson, IH. Van Heerden, PV. Leigh J. Domiciliary Oxygen Concentrators in Anaesthesia: Preoxygenation Techniques and Inspired Oxygen Concentrations. *British Journal of Anaesthesia* 1990;65:342-345

An Improvised Precordial / Oesophageal Stethoscope

One of the most useful anaesthetic monitors is a precordial or oesophageal stethoscope. These give a continuous signal of heart rate, rhythm and breath sounds. By wearing the stethoscope in one ear only, the anaesthetist can continually monitor these parameters, whilst being able to communicate with colleagues in theatre.

Before leaving the UK to embark on a period of voluntary work, my hospital's Hearing Aid department moulded me a fitted ear-piece. A fine plastic tube was incorporated into the mould, which in turn snugly fitted and was glued into a short segment of 18Fr gauge tube.

The earpiece could either connected to an improvised precordial stethoscope (made from a 1 metre length of giving-set tubing attached to the head of a Littmann stethoscope and taped to the patient's chest) or an improvised oesophageal stethoscope (made from a second 18Fr gauge nasogastric tube, with the finger of a rubber glove securely tied and sutured to its distal end, to act as a diaphragm [1]). The combination could be worn comfortably and continuously.

This improvised system was a simple, cheap and effective method of ensuring continuous hands-free monitoring of vital signs during anaesthesia.

References

- 1) Dobson, MB. *Anaesthesia at the District Hospital* p33, WHO publications 1988