

Drugs used in Malta for Obstetric Analgesia and Anaesthesia

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This review is based on drugs used currently in Malta for the relief of pain in labour and during delivery. In my opinion the quality of analgesia offered in Malta during labour and delivery can be improved. The best possible anaesthesia is available for operative delivery as evidenced by the absence of maternal deaths associated with anaesthesia.

Identification of Drugs

For analgesia and anaesthesia the gas **Nitrous Oxide** holds pride of place followed by **Trilene** vapour and among the intravenous hypnotic agents used **Thiopentone Sodium** is the preferred drug (I would like to assert Thiopentone sodium as a hypnotic and not an anaesthetic agent as the doses we use locally of this potentially dangerous drug are so small as to induce sleep only). As a relaxant **Succinylcholine** is the one and only drug used both for intubation as well as for maintenance.

For analgesia alone, usually administered by the midwives under medical control, the drugs used are **Sparine** as an ataractic agent, **Pethidine** as a strong analgesic and a hypnotic agent and **Trilene** or **Entonox** as draw-over or demand analgesia vapours and gases.

For epidural and regional block **Bupivacaine** and **Xylocaine (lignocaine)** are used. Epidural techniques are an innovation to Malta but are gaining ground as more parturients are demanding this type of analgesia. It seems that the modern parturient wants to know more about what goes on and to participate, in an absolutely pain free interlude, during the whole of labour and delivery. But there remain a few Maltese who refuse any injection in the spine fearing a permanently painful back syndrome. Some may think that the description I have just delineated is extremely limited but one has to bear in mind the smallness of the Island, the limited monetary resources, the equipment available, and nursing and midwifery care and staffing. Indeed it is opportune to include a plea here for more qualified midwives and why not, anaesthetic nurses as well as resident anaesthetists. If a full epidural service is envisaged for the future a resident anaesthetist has to be provided for service round the clock. The annual birth rate stands at around 5000 so no one can object to the provision of a full 24 hours anaesthetic and analgesic service by a competent anaesthetist.

The Equipment

A basic technique demands very simple equipment. A simple anaesthetic machine as well as two sources of suction equipment, one based on electricity and one on a piped source of negative pressure.

A *Manley Ventilator* is at hand to take over some of the anaesthetist's humdrum work of bag inflation during a lower segment Caesarian section. A portable *Entonox* cylinder with a demand valve, to decrease losses of this costly gas, as well as a *Trilene Draw Over Inhaler* are available too. The usual intubating equipment and tubes are provided as well as small sized laryngoscopes and tubes for neonatal resuscitation. For epidural and regional blocks needles and catheters with proper filters are kept in stock.

Pharmacology of Drugs

1. Nitrous Oxide

Nitrous Oxide remains the original and surely the best gas for analgesia. It is used in different concentrations in the anaesthetic machine and as a 50/50 mixture with oxygen in a premixed state as *Entonox*. The popularity of this agent will increase as soon as a local firm is persuaded to start preparing the agent locally instead of depending on costly ready mixed cylinders imported from Italy. It is only since 1968 that a method of forcing Nitrous Oxide to dissolve in Oxygen has proved possible so that one cylinder will supply a constant 50/50 mixture of both gases. A special demand type of valve is used to prevent unnecessary wastage of this drug so that the patient draws over the gas mixture of *Entonox* and no spill occurs to pollute unnecessarily the labour room.

The advantages of Nitrous Oxide are numerous as its action is limited to the time of inhalation only, no accumulation occurs in the patient's tissues as it is easily eliminated with a few deep breaths. So long as good oxygenation is maintained the effects of the mixture on the neonate or foetus are minimal. No metabolic breakdown by-products of the gas is known to occur in the tissues following its limited use during labour.

Also the liberation of catecholamines that the gas induces, keep the blood pressure slightly raised and so placental perfusion is improved. Other advantages

include:

- (i) The lack of irritant effects on the maternal tracheobronchial tree and gastrointestinal tract.
- (ii) the safety of the method
- (iii) the simplicity of equipment and administration
- (iv) the minimal disturbance of consciousness allowing nearly full and constant patient participation and awareness.

These, in my opinion, fulfill the criteria for promoting the use of this agent.

2. Trichlorethylene (Trilene)

Trilene is the time honoured analgesic agent used for inhalation during labour and delivery. A graded dose of this bluish liquid is poured into a temperature compensated, constant delivery, portable apparatus. The patient holds the mask to her face while she breaths deeply at the start of a contraction and so draws air over the liquid vapourising it. The percentage obtained is set at 0.5% but can be reduced to 0.35% if labour is prolonged. When *Trilene* exerts its effect the drowsy patient releases her hold on the mask and so breaths room air once again. She wakes up ready for the next and other bouts of contractions and repeated *Trilene* inhalations. *Trilene* is a safe analgesic with a sweetish smell and is non irritant. It does not lower the Apgar score of neonates. As it is effective and needs simple equipment I would encourage its use in Malta.

3. Thiopentone

Thiopentone (*Pentotal*) is a hypnotic and not an anaesthetic when used for obstetric purposes. It has to be used with great care, well diluted and parsimoniously injected IV to induce sleep. I still think a sleeping dose has not to be exceeded if one desires to avoid complications such as severe hypotension, vomiting, foetal circulatory impairment and babies born with a very low Apgar score. Calculating the dose according to the patient's weight and giving it as a bolus IV has many pitfalls but this danger is not stressed enough in books. By injecting the drug slowly the acute tolerance described by Dundee of Wales is avoided and with a small dose one can really go a long way.

The time of starting off this hypnotic is also a subject under debate but in Malta an accord has been reached to delay the injection till the patient is draped and the operating obstetrician is ready with a scalpel in his gloved hands. Indeed it should be the only occasion in anaesthetic practice were the surgeon has to wait on the anaesthetist and not vice versa. A prerequisite for obstetric anaesthesia is a good, wide bore IV Cannula with a simple 5% glucose infusion running: and it is through this drip that thiopentone is to be given making sure that the drip flows easily into the vein.

A fall in blood pressure and a lowering of the

cardiac output is to be expected, and combined with the pressure of the uterus on the big veins at the pelvic brim lead to an exaggerated hypotension. As in Malta we do not use special wedges under the patient's back we rely both on a side tilt operating table as well as on the slickness of the operator to get the baby out in under three minutes and so avoid foetal hypoxia. In any case the minimal fall in blood pressure combined with dexterity of the operator helped by muscle relaxation ensures that no fall in Apgar score occurs when the baby is born. Muscle relaxation, besides allowing intubation of the trachea, lessens the incidence of laryngospasm due to thiopentone, protects against vomiting (as the abdominal muscles are relaxed, thereby avoiding pressure on the stomach) and ensures an uncluttered view of the operation field to the operating obstetrician.

4. Succinylcholine

Succinylcholine is the one and only muscle relaxant I recommend for use during a LSCS. It is to be avoided only in those patients who have had confirmation of low pseudocholinesterase activity. All pregnant women have rather lowered values of this enzyme and therefore the use of minimal dosage, usually 50 mg, is enough. This initial dose should be sufficient for intubation and also for delivery of the neonate, although occasionally an increment of 25 mg may have to be added on later. To avoid any bradycardia it is usual to administer Atropine 0.6 mg in the drip tubing at the beginning of the operation. It is to be mentioned that the big molecule of *Scoline* does not reach the foetal circulation as it will not pass through the placental barrier. Used in the doses recommended the muscarinic effects of the drug are mild and easily covered by atropine.

Occasionally some delay in reestablishing full muscle power and adequate tidal volume is encountered in patients with low pseudocholinesterase activity and in these cases ventilation is continued. Usually it is only a matter of time before full restoration of tidal volume occurs. A good fluid input combined with a quick acting diuretic given IV sees that the drug is eliminated soon and breathing restored.

In rare cases where the use of this drug is contraindicated due to familial pseudocholinesterase deficiency then the nondepolarising drug pancuronium is used.

5. Narcotics

Among the narcotic agents Pethidine or *Pethilorfan* have for the last forty years been used in Malta. Indeed there is hardly a parturient especially primipara who is being managed by IM analgesia who fails to have either. They are excellent drugs not only for their pain relief but also for their muscle relaxant effect. Abolishing pain means relaxation of anxiety and so also relief of muscle tension. This helps the cervix to

dilate and so lessens the duration of labour while the tired mother can be pain free for a time. As they cause smooth muscle relaxation they lower the blood pressure. Accompanying the fall in B.P. is tachycardia but this is rarely of a degree to warrant attention. However, the patient who has had pethidine has to remain lying down and cannot be allowed to walk around throughout the duration of labour. As all narcotics knock off the will power the patient's cooperation is not easily obtainable during delivery.

In the doses recommended pethidine will not cause depression of respiration to occur to an alarming degree in the mother but the drug should not be given if delivery of the foetus is anticipated within three hours because the drug easily crosses the placental barrier and may cause depression of respiration in the neonate. The recent arrival on the market of Naloxone in neonatal doses (*Narcan*), a specific antagonist, has eased this problem. Any precipitate delivery after pethidine injection and consequent birth of a respiratory depressed neonate can within minutes be assisted with a single dose of this wonderful antagonist that has put the old reversal agents *Lorfan* and other convulsant producing drugs out of use.

Although every student knows that narcotics can cause addiction the development of such a condition following the use of Pethidine for pain relief during labour is unknown in Malta.

6. Promazine (Sparine)

Along with Pethidine the ataractic drug Promazine (*Sparine*) is often used.

This drug, a development on *Largactil*, is a very good sedative as it tends to dissociate the patient from the surroundings and yet allows her to remain responsive to orders. *Sparine* is preferred to *Largactil* as its hypotensive effects are less. This minimal alpha blockade does not disturb the blood pressure to any great extent but lessens foetal heart responsiveness to the contractions of labour. This drug is a strong anti-emetic and in the rare patient who reacts to the emetic effects of pethidine the concurrent administration of sparine will stop retching and vomiting, besides augmenting the pain relief effect. *Sparine* is often used as a premedicant drug when the patient is to undergo regional analgesia. Its calming effect ensures a high degree of patient cooperation. *Sparine* does not depress the respiratory drive in the mother nor causes any acid-base imbalances.

Although the administration of this drug is usually in the hands of the midwives it is the local custom to ask for the advice of the resident doctor before repeating the injection.

The Epidural or Regional Techniques

Two drugs are used in Malta for all epidural blocks: Bupivacaine (*Marcaine*) and Lignocaine (*Xylocaine*).

The quick onset of action, the calculated duration of effect and lack of side effects make these drugs safe for routine obstetric use. They are amino esters of an aromatic acid prepared as a salt. Following injection the tissue alkalinity liberates the free base. This free base has a high oil/water solubility and on penetrating the axon is transmitted to the inner wall of the nerve cell where it blocks the enzymes responsible for keeping the sodium channels open. Paralyzing the sodium channels easily leads to electrical impedance and consequently the cell cannot be depolarised, remains polarised at -70mV and so it is functionless and nonconductive for a time. After a while this sodium channel block is overcome by removal, through liver breakdown, of the drug and the cell wall again allows sodium through, so that the cell can be depolarised and starts to conduct nerve impulses again. A central sedative action is also described but is minimal in importance in the doses used. Inadvertent spinal injection is however accompanied by convulsions and can also lead to central depression and death, through respiratory failure, hence the importance of continued medical attendance when continuous epidurals are in use. All the precautions usually taken with general anaesthesia are to be at hand and ready for immediate use. All patients under a block are to be carefully monitored for the first 15 minutes. Beside central effect the local analgesics also have a blocking effect on transmission at the autonomic ganglia due to depression of acetylcholine release and also a non-depolarising competitive block. This explains the fall in blood pressure, the bradycardia and the muscular relaxation. Smooth intestinal muscle is also affected and is contracted so that the risk of vomiting is less, bowel movements are decreased and the obstetrician cannot complain that the *Patient is pushing*. This same spasmolytic action is responsible for the peripheral vasodilatation and lowering of the blood pressure. Peripheral vasodilatation and fall in blood pressure are due to multi-factorial causes and the eventual degree of fall depends on physical factors such as the patient's position, age of the arteries (not patient's age... remembering the damaging effect on the arterioles of diabetes mellitus), drugs the patient has been on, such as β blockers, ganglion blockers, and, of course, to the prevalent obstetric condition... the pregnant uterus that presses on the soft vena cava and causes the hypotensive syndrome. More use should be made of the *Wedge*. This is a four feet long plastic pillow cut in the form of a wedge that is inserted under the patient's back to push the heavy pregnant uterus away from the soft collapsible veins that course down the posterior pelvic rim.

Bupivacaine has been chosen for epidural blocks because it has a high analgesic potency ratio compared with many other locals (4 times as potent as *Xylocaine*). As it acts quicker, lasts longer and penetrates tissues at a fast rate, the maximum amount injected at one dose has to be kept under 1 mg per kg body weight.

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In Malta plain *Xylocaine* is used for local infiltration prior to perineotomy but the dose has to be less than 3 mg per kg body weight.

Conclusion

Improvement in the control of labour pain by inhalation methods can be *enhanced* if midwives cooperate, and *ensured* if an anaesthetist is present in the labour ward. If we are to venture into the field of routine epidural blocks for labour and delivery, adequate budgeting has to be done beforehand in the provision of manpower, in terms of both nurses and doctors, so that the same good results can be obtained in regional analgesia as in general anaesthesia.
