POSTOPERATIVE ANALGESIA
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INTRODUCTION

Since 1952 studies have shown that up to 80% of patients suffer moderate to severe pain after surgery. In the last few years there has been increasing interest in postoperative analgesia in both the medical and lay press and in 1990 a Joint Commission of the Royal College of Surgeons and the College of Anaesthetists published a report detailing the state of acute pain relief today, its shortcomings and the means by which it may be improved.

As in many things medical the United States lead the way in postoperative pain relief, one stimulus being the extra fees paid by insurance companies to offset the major time commitment which could ensue. It is significant that since these fees have been severely restricted, interest seems to have waned considerably. Good acute pain relief, however, brings many other benefits including fewer chest infections, shorter hospital stays, a saving of nursing time and greater job satisfaction for both medical and nursing staff as well as the obvious and most important humanitarian benefits. There is no doubt, though, that it is time-consuming and this problem needs to be addressed early on in the inception of an acute pain relief service.

THE TRADITIONAL APPROACH

For many years Omnopon (papaveretum) has been the cornerstone of postoperative analgesia: why is it unsuitable for this purpose? Omnopon is a mixture of opium alkaloids containing about 50% morphine which is the main contributor to its analgesic effect. Among the other constituents is noscapine which has recently been shown to be teratogenic in animal models and its use in women of child-bearing potential and children under 12 years is now contraindicated. Morphine has largely replaced Omnopon in Lancaster and, while a noscapine-free form of Omnopon has been released, it seems unlikely that the change will be reversed.

It has been shown that 50% of ‘intramuscular’ injections are in fact subcutaneous but either route gives unpredictable absorption especially in the immediate postoperative period when regional tissue perfusion may be deranged. An intramuscular injection of Omnopon to a healthy volunteer takes about 15 minutes to achieve analgesic plasma concentrations but may take up to 45 minutes to do the same in a postoperative patient.

Pm (pro re nata) can mean anything but “when the need arises”. Drug administration depends on many factors including a patient’s desire not to disturb the nurse, a fear of injections, nurse availability, the attitude of the nurse to analgesia and potential side-effects such as the fear of addiction and respiratory depression. Even the choice of dose is something of a lottery since the minimum effective analgesic concentration (MEAC) of many analgesics varies four-fold between patients. Furthermore age, weight and sex have no bearing on the dose required. At best the anaesthetist is able to observe the patient’s response to drugs in the operating theatre and make an informed guess.

THE OPTIONS

Options available other than intramuscular Omnopon pm include other ways of administering opioid analgesics, the use of non-opiate analgesics and local anaesthetics. The special needs of day case patients and of children must be considered also.

A team approach is likely to produce the best results and was strongly recommended by the Joint Commission. Such a team would include a doctor with responsibility for acute pain relief (usually an anaesthetist), a pharmacist, a nurse and, possibly, a physiotherapist. The nurse has an important role in the day-to-day running of the service; providing liaison, assisting with training, audit and ensuring that the system is effective and efficient. The support of management is essential in view of the financial outlays for both personnel and equipment; a machine for patient-controlled analgesia costs approximately £2000, we have ten in Lancaster and two in Kendal.

INTRAVENOUS ANALGESIA

A number of different routes exist for administering pain-killers e.g. oral, sublingual, transdermal and rectal but the intravenous route has many advantages, notably that absorption is predictable, the onset rapid and the effect of a single dose can be assessed easily. The practise of titrating small doses of narcotic intravenously until analgesia has been achieved is excellent as an initial way of treating acute pain but is not suitable for continuous management. Infusions of opiates offer a way around this but since patients’ needs are very variable there must be flexible protocols for nursing staff to vary the infusion rate. Nevertheless intravenous opiate infusions are used successfully in many hospitals.

PATIENT-CONTROLLED ANALGESIA

One solution to the problem of determining the rate of administration of an analgesic is to let the patient decide it for himself and this is the basis of patient controlled analgesia (PCA). A patient who is using PCA is able to press a button to request a bolus of analgesic which is usually
delivered intravenously. The particular analgesic used, the size of the bolus dose and the lock-out time (mandatory interval between two consecutive boluses) are determined by the anaesthetist and, perhaps, a better name would be physician-controlled, patient activated analgesia. A typical programme would be morphine in 1 or 2 mg boluses with a lockout time of three minutes. Other options are available such as the addition of an antiemetic to the morphine or the administration of a background infusion of analgesic in addition to on-demand boluses to try to maintain near constant plasma drug concentrations. However they have not been shown to prevent nausea nor to improve the analgesia and may increase side-effects so we do not use them.

It has never been conclusively shown that PCA provides better analgesia than regularly administered intramuscular morphine but it does have high patient acceptability; an audit of postoperative patients at the RLI in 1991 showed a similar distribution of pain scores in patients undergoing laparotomy whether using PCA or intramuscular morphine prn but pain expectation scores were markedly skewed in favour of PCA (Figs. 1&2). An audit this year showed a high degree of acceptability for this technique among both patients and nurses (Fig. 3). Many patients comment that the presence of the button is reassuring even if not used and gives a feeling of control over their treatment.

Side-effects include respiratory depression, drowsiness, dizziness, nausea and vomiting. In 1991 339 patients used PCA, 31 had a respiratory rate of less than 10 per minute at some time and 17 of these less than eight per minute. Two patients were given naloxone and none came to any harm.

**Fig 1 – Maximum Pain Score on Day 1, PCA Morphine versus Omnopon im prn**

**Fig 2 – Pain Expectations Day 1**

**Fig 3 – Patient and Nurse Satisfaction with Patient Controlled Analgesia**

- **Patient:** Good/Acceptable/Could have been better
- **Nurse:** Better than/as good as/Inferior to conventional Omnopon im prn

**Fig 4 – Respiratory Depression: PCA Morphine versus Epidural Morphine versus im Morphine**

This 9% incidence of respiratory depression sounds alarming but is probably little different to that associated with morphine im prn (Fig. 4). It seems that episodes of severe respiratory depression with arterial desaturation may be less common with PCA than either intramuscular morphine or epidural opiates. Elderly patients may have difficulties using PCA, in the 1991 audit there were 12 patients over 80 years, six of whom had problems; four were unable to press the button, one thought it was the nurse call button and one failed to use it despite being in pain. While the nurse can help the patient, this has been shown to lead to more side-effects. Nausea and vomiting are relatively common especially in gynaecology patients; this may be because patients are receiving more analgesic than with conventional techniques and methods of overcoming this problem are being investigated at present.

Patient-controlled analgesia does not totally relieve pain, can involve large doses of morphine and does require some understanding by the patient so is not applicable in all circumstances but has had a major impact on postoperative analgesia in Lancaster.

**EPIDURAL ANALGESIA**

Epidurals have been used for many years to provide pain relief during labour but can also be used for the non-obstetric
patient. A catheter is inserted into the epidural space in theatre and can be used for both intraoperative and postoperative analgesia. An infusion technique employing dilute local anaesthetic (bupivacaine 0.125%) with small doses of diamorphine (0.1mg/ml) at 2-6ml/hr. can provide near-total analgesia with minimum effects on the cardiovascular or respiratory systems. The RLI pharmacy can produce 250ml bags of this mixture under sterile conditions which last for the whole of the postoperative period. Side effects such as itching, nausea and urinary retention are relatively common and the fear of severe respiratory depression has led to controversy as to whether this technique is suitable for use on the general surgical ward. At present epidurals are not widely used in this context in Lancaster but they are particularly useful for patients with chest disease when the ability to cough and cooperate with physiotherapy is most important, and for those who cannot manage PCA.

SYNTHETIC OPIOID ANALGESICS

The development of partial agonist analgesics such as buprenorphine, nalbuphine and meptazinol gave hope of analgesia without respiratory depression but unfortunately they have not lived up to these expectations; the degree of analgesia is inadequate after many operations and side effects such as nausea and dysphoria are common. Non-opiote pure agonists such as pethidine, fentanyl and alfentanil have exactly the same problem of respiratory depression in equianalgesic doses as morphine and have few if any advantages over it. Transdermal delivery of fentanyl has attracted much interest but is likely to prove too inflexible for routine postoperative use.

NON-OPIOID ANALGESICS

Recent interest in the non-steroidal anti-inflammatory drugs (NSAIDs) has shown that they have a morphine sparing effect not only for musculoskeletal pain but also after laparotomy. They have the major advantage that they do not depress respiration and, while they may not be adequate alone, can significantly reduce the total dose of morphine required. This group of drugs can cause gastrointestinal problems even by the parenteral route, can have an adverse effect on renal function especially in elderly or hypotensive patients and may exacerbate asthma. They cause reversible inhibition of cyclo-oxygenase and affect platelet function, prolonging bleeding time by up to 30%: while this has not been shown significantly to increase intraoperative bleeding, preoperative administration may be unwise.

Diclofenac (Voltarol) has been the NSAID most widely used in Lancaster and is available in a number of preparations for oral, rectal or intramuscular administration but the newer ketorolac (Toradol) has advantages; it is not painful on intramuscular injection, lasts longer and should soon be available in an intravenous preparation. Perhaps not unexpectedly, it is also more expensive!

LOCAL ANAESTHESIA

Local anaesthesia is suitable for many body-surface and limb operations whether used alone or with general anaesthesia to provide postoperative analgesia. The duration of a 'single shot' injection can vary between two and twelve hours but does allow the patient to wake up pain-free and can reduce total morphine requirements. A number of local blocks are widely used in Lancaster and are a particular benefit to day-case patients in hastening their 'street fitness'.

While local blocks can provide total analgesia, it must be remembered that when they wear off the patient may experience considerable discomfort and should be encouraged to take pre-emptive analgesics.

PAEDIATRIC ANALGESIA

Pain relief for children poses a number of problems: the assessment of pain is difficult, children may be unable to express their feelings, may exhibit withdrawal and hence appear comfortable, or may deny having pain in order to avoid having injections. Many children are day-cases and analgesic techniques must take this into consideration.

PCA can be used after major surgery for some children as young as five years. If PCA is not suitable, a cannula can be placed subcutaneously during anaesthesia to permit painless injections of morphine back on the ward. Local anaesthetic blocks can be most effective after circumcision, orchidopexy, herniotomy and similar operations, and allow the child home as early as possible. The role of NSAIDs in children is uncertain at present but early studies do hold some promise. The regular use of EMLA cream two hours prior to venepuncture has had a major impact on paediatric anaesthetic practise.

NEW SURGICAL TECHNIQUES

The arrival of laparoscopic cholecystectomy has alleviated the problem of analgesia in these patients. An open cholecystectomy meant PCA with 75-100 mg. morphine but of 25 laparoscopic cholecystectomy patients audited last year, ten did not receive any opiate postoperatively and the mean dose of morphine given was 12 mg! Endometrial resection may have the same impact on analgesic requirements by avoiding the need for hysterectomy and it seems certain that more surgery will be performed in this way although there will always be need for appropriate postoperative analgesia.

SUMMARY

Good postoperative analgesia offers benefits all round and the means do exist to ensure that the vast majority of patients do not experience severe pain after surgery. While considerable attention has been given to PCA, much can be gained by simple techniques and the education of medical and nursing staff would do much to improve the state of postoperative analgesia. The best way to achieve this aim is by the ‘Acute Pain Team’ approach and the appointment of an acute pain sister in Lancaster would do much to further this end.

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