

Recent developments in procedural pain management

Chris Jephcott

Department of Anaesthesia, Waikato Hospital

In the ward-based environment, the provision of adequate and safe analgesia to allow procedures such as burns dressings changes and wound debridements to be undertaken, can be a challenge.

Reports from our nursing staff, that patients seem to be suffering during these procedures led us to introduce a ketamine and midazolam PCA regimen to our burns ward. This was based on the model that had previously been developed in Western Australia to facilitate burn-related procedures for the large number of patients admitted after the 2002 Bali bombing.

Using this technique, procedures that were previously taking 2-3 hours could be completed more thoroughly in 30-45 minutes while patients remained comfortable and cooperative. Patients had little memory of the procedures and did not require the prolonged period of fasting that would have been required for general anaesthesia. Side effects were tolerable in nature and frequency.

Whilst this approach had major advantages over the options previously available, over time some limitations became apparent: specifically, after the procedure had been completed on the ward, patients could remain sedated for a number of hours. During this time, they were less inclined to eat or take part in their rehabilitation.

We addressed this by introducing a novel therapy that had recently become available in New Zealand based around methoxyflurane. Methoxyflurane is an anaesthetic vapour in common use for the maintenance of general anaesthesia prior to the 1970's. Subsequently its use declined after it was found that prolonged exposure to the drug could be associated with vasopressin-resistant renal failure. This is thought to be a dose-related effect.

Methoxyflurane has been reintroduced in Australasia for use as an inhaled analgesic. A dose of methoxyflurane well below the threshold reported to be toxic is administered via the Pentrox inhaler: a patient-utilised hand-held device. Methoxyflurane has a rapidly titratable analgesic effect at sub-anaesthetic concentrations.

The Pentrox inhaler has been widely used for analgesia in Australasia by paramedics and the military in the pre-hospital setting and in over 5 million uses to date, there have been very few reported clinically significant adverse effects providing the dose recommendations have been followed.

As far as we could determine the use of the Pentrox inhaler for burns procedures had not been reported, so with ethics committee approval we set up a prospective randomised crossover trial investigating its role in this context compared to ketamine/ midazolam. Strict inclusion criteria led to only small numbers being recruited but the results of this small trial demonstrated that for these patients, Pentrox was able to offer analgesia equivalent to that of the ketamine/ midazolam regimen with the advantage of minimal sedation following the procedure.

We have developed a protocol for the use of Pentrox on surgical wards at Waikato Hospital. Apart from burns procedures, it is currently being used successfully for other ward-based procedures including vacuum-assisted wound dressing changes and the removal of brachytherapy rods following prostatic radiotherapy.

We have introduced an in-house training package by which key personnel (including non-anaesthetist doctors and nurses) undergo training and certification in the use of the drug and in the technique of its administration. These procedures can then be carried out on the ward autonomously without the necessity of an anaesthetist to supervise. Patient safety is a key focus of

the training and of the procedures so far undertaken, there have been no patient safety issues identified.

As an acute care hospital serving a large population, we are at times in the position of admitting more acute cases for emergency surgery than we have the resources to treat. This can lead to elective surgery being cancelled to allow the backlog of emergency cases to be cleared.

In an attempt to improve theatre efficiency, we reviewed all acute admissions over the 4-month period during 2009. Of these, we are identified cases that came to acute operating theatres for surgery under general anaesthesia that we anticipated could have been undertaken using a Pentrox-based sedation technique.

We predicted that between 30 and 40 cases a month could be amenable to this technique. Of these 90% were general surgical - mostly abscesses requiring drainage. This represented just over one quarter of the total number of general surgical acute operations performed each month.

Abscess drainage has traditionally been considered to be too painful to be performed under local anaesthesia alone and patients are consequently booked for a general anaesthetic in an acute operating theatre. As the pathology is unlikely to be life threatening, they are triaged as low urgency and often spend a protracted period of time in hospital until either a space in theatre becomes available or their pathology worsens to the extent that the surgery is deemed more urgent.

We have developed a technique for the use of Pentrox to allow the incision and drainage of abscesses without the requirement for general anaesthesia. This involves a combination of topically applied and subcutaneously administered local anaesthesia as well as the use of the Pentrox inhaler to provide supplemental analgesia and sedation.

We anticipate performing these procedures in a procedural room on the general surgical ward with the Pentrox administration being supervised by a trained and certified nurse. This allows the patient to have their procedure completed within a few hours of admission rather than the 1-4 nights they currently wait in hospital for an acute operating theatre to become available.

Apart from improved convenience to the patient, this process should offload up to 8% of the cases we currently process through the acute operating theatres, thus reducing the likelihood of elective surgery needing to be cancelled. It should also save approximately 700 acute inpatient bed days per year.

We have recently published a case series of 173 procedures undertaken using Pentrox for the provision of analgesia. 97% of these were successful and clinically significant adverse effects were rare and self-limiting.

Apart from our case series, there are an increasing number of published papers that support the efficacy and safety of analgesic doses of methoxyflurane for a variety of procedures including bone marrow biopsies, colonoscopies and the management of interventions in the emergency department.

Interestingly, the Pentrox inhaler has recently been approved for use in the UK, Europe and parts of Asia, so it seems likely that the use of this drug and its applications will continue to expand Worldwide over the coming years.

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