Perioperative analgesia

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Summary

Dedicated pain services in many hospitals have improved postoperative pain management and increased the safety and efficacy of analgesia. Modern techniques follow concepts of pre-emptive analgesia (providing analgesia throughout the perioperative period to prevent long-term consequences), multimodal analgesia (balanced combination of analgesics with different modes of action) and perioperative rehabilitation. Newer drugs such as parecoxib, tramadol and enantiomer-specific local anaesthetics have increased the options for perioperative analgesia.

Key words: pain, surgery.

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Introduction

The concept of an anaesthetics-based pain service to provide postoperative analgesia on surgical wards was first suggested over 15 years ago. This concept has provided a useful framework for the improvement of postoperative pain management, has gained widespread acceptance all over the world and has permitted safe and effective advancement of analgesic techniques. There is good evidence that a regular assessment of a patient's pain by use of verbal or numerical rating or visual analogue scales increases the awareness of pain as a problem and results in more appropriate treatment of pain. This has led to the suggestion that pain should be assessed as the 'fifth vital sign'.

Treatment concepts

The approach to managing the patient's pain should begin before the operation. Management may involve pre-emptive analgesia, multimodal analgesia and perioperative rehabilitation.

Pre-emptive analgesia

In the past, pre-emptive analgesia has been interpreted by many as meaning that applying an analgesic technique before the incision results in better pain control after the operation than applying the same technique after the incision. This concept has been repeatedly shown to be valid in animal experiments, however studies in humans were never as convincing. A recent meta-analysis came to the conclusion that there is little experimental support for a pre-emptive analgesic effect in clinical settings.[1]

In many studies more severe or prolonged acute pain in the postoperative period as well as postsurgical complications, commonly leading to increased nociception, were significant predictors for the development of chronic pain.[2] It might therefore be much more logical and fruitful to expand the concept of pre-emptive analgesia. This has been done by assessing what benefits extending the balanced, multimodal analgesia approach, from the preoperative period to well into the postoperative period, may have on long-term consequences of trauma, surgery and acute pain. Effective and aggressive management of acute pain could help to prevent the development of chronic pain states.

Multimodal analgesia

Balanced or multimodal analgesia involves the selective use of specific drugs in combination. The concept relies on using multiple analgesic drugs with different modes of action (for example non-opioid combined with opioid) or via different routes of administration (for example local anaesthetic block combined with a systemic analgesic). There is now good evidence that this approach improves analgesia due to additive or synergistic effects. This permits the doses of the individual drugs to be reduced thereby reducing the incidence and severity of adverse effects.[3] Multimodal analgesia can be used for day cases as well as for inpatient surgery.[4]

Perioperative rehabilitation

Beside the pharmacological options for improving pain relief, future efforts need to focus on better organisational structures, enabling a more integrated multidisciplinary approach to patient care with a greater involvement of nurses and surgeons.

Nurses will have an increasing role in co-ordinating postoperative analgesia. Surgeons also need to be involved intensely in the postoperative management of patients if our future goal is to use the modalities of balanced analgesia, integrated into a new overall concept of postoperative rehabilitation, to reduce morbidity and mortality and speed up recovery. Such an approach to management of the postoperative patient should include preoperative patient information and teaching, attenuation of intra- and

postoperative stress, pain relief, early and effective exercise, early enteral nutrition and possibly the use of growth factors.[5]

Drug treatment

The choice of drug treatment is influenced by the likely severity of the patient's pain. A multimodal approach can include non-opioids, opioids and local anaesthetics given by a variety of routes.

Non-opioids

Non-opioid analgesics will continue to remain important 'background' medications for perioperative pain. Paracetamol is the most universally useful medication here and should become a regular prescription for all acute pain problems irrespective of severity and cause. When combined with opioids, paracetamol improves the quality of analgesia and increases patient satisfaction.

Non-steroidal anti-inflammatory drugs (NSAIDs) should not be used routinely in all postoperative patients. Their beneficial and harmful effects need to be assessed for each patient before they are prescribed. While they are very beneficial in situations of inflammatory pain, problems related to gastrointestinal erosion and ulceration, renal toxicity, platelet dysfunction, airway constriction and poor bone healing limit their usefulness, particularly in at-risk patients. However, a recent meta-analysis suggested NSAIDs should not be withheld from patients with normal preoperative renal function.[6]

Although the COX-2 inhibitors were developed for chronic use in arthritis, there is interest in their possible role in the management of acute pain. Parecoxib, a COX-2 inhibitor for parenteral administration, offers some safety advantages over ketorolac as it has a gastrointestinal safety profile comparable to placebo and no effect on platelet function. However, the renal toxicity and propensity to precipitate heart failure is similar to that of other NSAIDs and it is only approved in Australia for single use.[7]

Opioids

Opioids continue to be the mainstay of perioperative analgesia. Overall it seems that nearly any opioid that is a full agonist at opioid receptors can be used, as long as the dose is titrated to individual needs by means of devices allowing patient-controlled analgesia or by nursing staff giving doses on demand. An early change to oral administration, again on demand, is cost-effective and facilitates continuation of analgesia after increasingly earlier discharge from hospital. Pethidine might be the only opioid that should be avoided in view of its short duration of action. It has a neurotoxic metabolite (norpethidine) and a high propensity to induce drug-seeking behaviour.

Tramadol is commonly classified as an atypical centrally-acting analgesic due to its inherent multimodal action on opioid, but also noradrenergic and serotonergic, receptors. In clinical trials it has shown analgesic efficacy comparable to morphine (in a parenteral dose ratio of 10:1 and an oral dose ratio of 5:1 due to its high bioavailability). Tramadol has a reduced incidence and severity of opioid adverse effects, particularly respiratory depression, ileus and constipation. There is limited potential for tolerance, physical dependence and addiction. Dosage regimens for optimal analgesia are still being refined, and nausea and vomiting remains as problematical as with all opioids.[8]

Local anaesthetics

From wound infiltration to sub-arachnoid injection, local anaesthetics have been widely used to alleviate pain. Single shot injections do not work long enough to provide analgesia throughout the postoperative period, but can be very effective in covering the most severe pain early on, in particular facilitating return home after day-case surgery. Continuous regional analgesia by means of infusion of local anaesthetic agents via epidural, interpleural, nerve sheath or simple wound catheters has become a routine technique in many hospitals and even in the outpatient setting. Unresolved issues with regard to these techniques are related to the choice of mode of delivery (continuous infusion versus patient-controlled infusions), choice of drug (local anaesthetics, opioids, adjuvants) and, most recently, the increased risks of epidural catheters in patients given thromboprophylactic drugs such as low-molecular weight heparin or clopidogrel.

Recently, several newer alternatives to the tried and tested local anaesthetics, lignocaine and bupivacaine, have been developed. Enantiomer-specific, long-acting amide local anaesthetics such as ropivacaine and, more recently, levobupivacaine have similar pharmacokinetics and efficacy to bupivacaine, but have a lower risk of causing serious cardiotoxicity.[9]

Adjuvants

Ketamine is well known as a 'dissociative' anaesthetic and evidence for its general use is not very robust. It is currently gaining favour as an adjunct for acute pain management in some specific circumstances due to its effects as an N-methyl-D-aspartate antagonist. It is used to treat acute pain poorly responsive to opioids including neuropathic pain, but is also used for relief of procedure-related pain. Dysphoric adverse effects are minimal with low-dose regimens or adjuvant low-dose benzodiazepines. Further research into optimal dosing, administration routes and the roles of individual isomers is required.[10]

Conclusion

A better understanding of pain physiology and the increasing diversity of approaches to eliminate pain should benefit patients and help bring to an end the less than satisfactory management

of pain in the postoperative setting. Pain is subjective, and so every patient represents a new set of circumstances for which we need to extend and adapt our knowledge of pain control. Adequate analgesia provides not only comfort and satisfaction for the patient, but aids their recovery as well. This has obvious benefits for the patient, but also has implications for the patient's short- and long-term use of healthcare facilities, and subsequent costs to society.

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Self-test questions

The following statements are either true or false (answers on page 165)

3. Regular doses of paracetamol can improve the quality of opioid analgesia.
4. COX-2 inhibitors lack the renal toxicity of other non-steroidal anti-inflammatory drugs.

Book review

Drugs and breastfeeding 2004 guide. Melbourne: Royal Women's Hospital; 2004. 261 pages. Price $33 including GST*

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As a practising general practitioner/obstetrician I am always on the lookout for up-to-date but easily accessible information for my breast-feeding mothers. With the ever increasing number of drugs on the market, it is often difficult to be totally accurate.

This spiral-bound, pocket-sized book fits the bill nicely. Apart from a comprehensive list of drugs (900 in all), which are cross referenced with the trade names (for those of us who do not uniformly use generic names), the value of this book lies in the extra advice in relationship to what may happen to the baby, which is the question the mother always asks.

This is handled by five issues: M/P (milk to plasma ratio), PK (peak time), T ½ (half-life), percentage dose to infant (sometimes) and excretion into milk for each drug – listed clearly.

For example, I have always had a problem with metronidazole which I often want to prescribe to breast-feeding women. The book tells me all that I need to know: M/P 0.4–1.8, PK 1–2 hours, T ½ 6.3–8.3 hours and in the box about excretion into milk, it reassures me that I will do the baby no harm. Nice to know!

I also like the presentation of the University of California, San Diego Medical Center algorithm at the beginning of the book (page 7), which is succinct, easy to use and in itself worthy of remembering, or reflecting upon when prescribing drugs for a breast-feeding mother.

I would recommend this book to all those professionals the authors have targeted – general practitioners, hospital medical officers, obstetricians, midwives and lactation consultants.

* Order form at http://www.rwh.org.au/emplibrary/pharmacy_rwh/d&bf_order_form.pdf [cited 2004 Nov 8]