Patient-controlled analgesia: does one regimen fit all?

Patient-controlled analgesia (PCA) has long been shown to be effective in reducing postoperative pain and increasing patient satisfaction. Intravenous morphine, fentanyl, pethidine, oxycodone and diamorphine have all been used effectively. The majority of PCA programs are standardized so that adults receive morphine 1mg as a stat dose with a 5-minute lockout. Is there any evidence to suggest which drug or dose is effective in different settings, and should this affect our PCA prescribing?

Which drug?

Morphine is usually the first-line drug used in PCAs because it is considered the 'gold standard' analgesic, is cheap and familiar. It is important to remember the impact of unpleasant side effects, such as nausea, as patients balance pain against side effects.

There is a paucity of studies comparing the relative efficacy of analgesia of opioids with the incidence of side effects or complications. A double-blinded randomized controlled trial which did compare these for morphine, fentanyl and pethidine found no difference in the incidence of side effects, except that more pruritis was reported in the group given morphine (Woodhouse et al, 1996). No difference was found in patient satisfaction between the three opioid-treated groups. However, this was a small study (55 patients), and it may be that differences do exist, but a larger trial is required to discern them.

More interestingly, it would seem that individual patients' responses to opioids are highly variable, which would support the practice of changing from one opioid to another in patients experiencing intolerable side effects. Further work by Woodhouse et al (1999) identified three groups of patients: those that tolerated morphine, pethidine and fentanyl, those that were intolerant to all three, and those sensitive to one or more of the opioids with no one drug appearing preferable. In another study (Mendham et al, 2005), 55 patients (4.9% of the 1118 subjects) who were unable to tolerate the side effects of a morphine PCA were changed to an oxycodone PCA. In all cases the unpleasant symptoms settled, the PCA was used more frequently so pain relief improved, and patients were more satisfied. There are no large prospective randomized controlled studies comparing PCA oxycodone or diamorphine with the other opioids.

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What dosing?

The *British National Formulary* advises consultation with hospital protocols in preparing PCAs. Sidebotham et al (1997) looked at more than 6000 patients treated with morphine PCAs and found the overall incidence of potentially life-threatening complications to be low (0.28%). However, a background infusion was associated with a higher incidence ($P<0.05$) and a bolus dose >1 mg was one of three risk factors for respiratory depression.

Most studies have indicated that, after acute pain has been brought under control, morphine should be initiated at a dose of 1 or 1.5 mg per dose, with a lockout period of 5–7 minutes. There remains debate about appropriate dosing for the other opioids.

Which setting?

Patient factors that affect opioid dose requirements are age, height, weight, gender, smoking, alcohol and preoperative opioid use. The other two risk factors for respiratory depression in Sidebotham et al (1997)'s study were age greater than 65 years and intra-abdominal surgery. This study and many others have shown that men use more opioid postoperatively than women. However, as with all these variables, there is considerable overlap between groups.

Conclusions

One PCA regimen does not fit all. One opioid has not been shown to be superior, and intra-subject variability for opioid preference is probably more important. There is insufficient evidence to change PCA dose for individual patients, but morphine 1 mg with a 5-minute lockout has a good safety profile. In prescribing a PCA, one should start with the standard in the hospital. If a patient is struggling with side effects, the opioid should be changed promptly, and a clear protocol should exist for this opioid. Close monitoring and evaluation of the patient throughout the perioperative period are required to ensure the safe and successful use of any PCA. **BJHM**

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