ARTICLE

Postoperative pain management

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Key words
analgesia, gabapentin, neuropathic pain, pregabalin, surgery

Aust Prescr 2013;36:202–5

SUMMARY

Postoperative pain management aims to minimise patient discomfort, facilitate early mobilisation and functional recovery, and prevent acute pain developing into chronic pain.

Mental health can affect a patient's recovery and psychological vulnerability is predictive of severe postoperative pain. Education before surgery reduces anxiety and improves patient satisfaction.

The choice of analgesia depends on the type of surgery the patient is having. Using procedure-specific pain guidelines within an enhanced rehabilitation program is recommended.

Different types of analgesia can be combined for additive or synergistic pain relief. Regional analgesic techniques are being increasingly incorporated into multimodal analgesic regimens.

The diagnosis of acute neuropathic pain following surgery is often delayed.

Introduction

The amount of pain a patient suffers after surgery is related to the extent of tissue damage and the site of surgery. Operations on the thorax and upper abdomen are more painful than procedures on the lower abdomen which in turn are more painful than operations on limbs.[1] Joint replacement is associated with severe postoperative pain.[2]

Pain has both sensory and emotional components that interact to produce an overall 'pain experience'. Unrelieved pain after surgery can interfere with sleep and physical functioning and can negatively affect a patient's well-being on multiple levels.[3] This may extend into the rehabilitation period and delay hospital discharge and functional recovery.[4,5] Good pain control is important to prevent negative outcomes such as hypertension, myocardial ischaemia, arrhythmias, respiratory impairment, ileus and poor wound healing.

Preparing patients before surgery

Pre-admission consultation 1–2 weeks before surgery allows for the formulation of an individualised analgesic plan. For example, patients using opioids chronically can be identified and preoperative consultation organised. A multidisciplinary approach involving specialists in pain and addiction medicine is often required with these patients.

The preoperative consultation is also an opportunity to discuss pain relief options including invasive techniques such as epidural, spinal opioids and peripheral nerve blocks.

Written information with diagrams and simple descriptive terms helps to inform, educate and psychologically prepare patients for surgery.[6] This has been shown to shorten hospital stay and reduce the need for postoperative pain relief.[7]

Predictors of postoperative pain

Preoperative pain, anxiety, young age, obesity, fear of surgery, psychological distress and type of surgery (abdominal, orthopaedic and thoracic surgery, long duration) have been identified as predictors of postoperative pain (Box).[5,8] Early identification of these allows for more effective intervention and improved postoperative management.[1]

Psychological vulnerability

Pre-existing anxiety and psychological distress such as depression are predictors of severe postoperative pain. A patient who has previously experienced severe postoperative pain may be anxious about subsequent surgery. Addressing the patient's fears can reduce the severity of pain and suffering.[9]

Catastrophising (that is, magnifying the threat of pain) and hypervigilance (that is, a strong attention toward pain) have emerged as strong predictors of acute postoperative pain.[10,11]

Multimodal analgesia

Opioids delivered by patient-controlled analgesia are the mainstay of systemic analgesia for the treatment of moderate to severe postoperative pain. Unfortunately opioid-related adverse effects limit their use in many patients. Analgesics that act by different mechanisms and at different receptor sites can be combined to produce additive or synergistic

pain relief and can reduce opioid use.[12] Regimens that use non-opioid analgesics include:

- paracetamol
- non-steroidal anti-inflammatory drugs (NSAIDs), including cyclo-oxygenase inhibitors
- alpha$_2$ agonists (clonidine, dexmedetomidine)
- gabapentin and pregabalin[13]
- ketamine
- lignocaine infusions
- peripheral nerve blocks, local anaesthetic wound infiltration and continuous wound infusion techniques.

Despite evidence showing the benefit of multimodal analgesia, it is still underused.[14] For example, NSAIDs are valuable adjuvant drugs, with the potential benefits outweighing the potential disadvantages in most surgical patients.[15,16]

Box **Risk factors for chronic postsurgical pain**

Preoperative factors

Pain, moderate to severe, lasting more than a month
Repeat surgery
Psychological vulnerability
Preoperative anxiety
Female gender
Younger age (adults)
Workers' compensation
Genetic predisposition
Inefficient diffuse noxious inhibitory control *

Intraoperative factors

Surgical approach with risk of nerve damage

Postoperative factors

Pain (acute, moderate to severe)
Radiation therapy to area
Neurotoxic chemotherapy
Depression
Psychological vulnerability

* Diffuse noxious inhibitory control (also called conditioned pain modulation) is an endogenous descending pain-modulating pathway which is activated when two concomitant painful stimuli are applied ('pain inhibits pain'). Inefficient diffuse noxious inhibitory control is associated with functional pain syndromes (fibromyalgia, irritable bowel syndrome) and is thought to be a risk factor for developing chronic pain following surgery.

Source: Adapted from references 5, 43 and 45

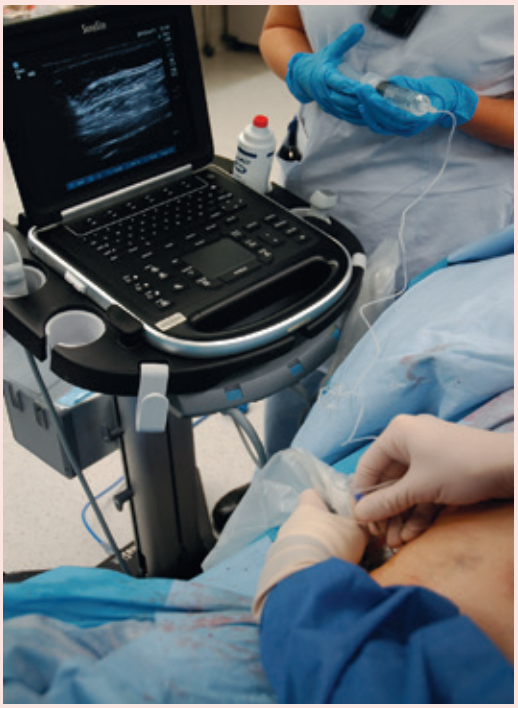
Regional analgesia

Although epidural techniques can provide excellent analgesia following major surgery, there is increasing evidence that less invasive regional analgesia can be as effective.[17] This includes paravertebral block for thoracotomy, pre-peritoneal local anaesthetic infusion following laparotomy and caesarean section, and local infiltration analgesia for knee replacement.[18-22]

Local anaesthetic wound infusions can have significant benefits in procedures as diverse as open nephrectomy, mastectomy and inguinal hernia repair.[23-25] The transversus abdominis plane block (Fig. 1) reduces pain scores and opioid requirement in inguinal hernia repair, open appendicectomy, laparoscopic cholecystectomy, laparotomy, lower segment caesarean section, hysterectomy and laparoscopic gynaecological procedures.[26] Wound infusions are typically continued for 2–5 days postoperatively.

Ultrasound-guided peripheral nerve blocks are increasingly being used for postoperative pain.[27] Commonly used sites include the brachial plexus to manage shoulder and upper limb pain, femoral nerve block for knee surgery pain, and sciatic nerve block

Fig. 1 **Ultrasound guided transversus abdominis plane (TAP) block**



Normal saline injected by an assistant is used to locate the TAP before catheter placement and instillation of a local anaesthetic solution

for foot and ankle pain. The duration of analgesia can be extended from hours to days by connecting a catheter to an elastomeric or electronic infusion device next to the peripheral nerve or plexus.[28] Patient-controlled regional analgesia provides equivalent or superior pain relief with less anaesthetic compared to continuous infusions alone with a variety of perineural techniques.[29] With appropriate support, portable patient-controlled regional analgesia can be managed at home.[30]

Procedure-specific analgesia

Each type of surgical procedure has its own unique postoperative pain characteristics and clinical consequences. The choice of analgesia should be based on the evidence for that particular surgical procedure. For example, thoracic epidural reduces movement-related pain, ileus and postoperative nausea and vomiting compared to other analgesia after open colorectal procedures. However, it is clearly not appropriate for minimally invasive laparoscopic abdominal procedures with limited tissue injury.[14] Ideally, multimodal procedure-specific analgesia should be incorporated into a rehabilitation program after surgery to improve patient outcomes.[31-34] Guidelines for procedure-specific analgesia are available online.[35,36]

Discharge planning

Pain management for day surgery patients remains the responsibility of the anaesthetist or the surgeon. The severity and likely duration of the pain should be assessed before discharge. Analgesic regimens to address the pain include:

- mild to moderate pain – paracetamol and/or ibuprofen
- moderate to severe pain – oxycodone (5–10 mg 4–6 hourly) is preferable to codeine-containing medicines.

Acute neuropathic pain

Neuropathic pain is caused by a lesion or disease of the somatosensory nervous system.[37] It can result from surgery and is a condition that is under-recognised, often difficult to treat and one that may progress to persistent pain and disability.[38]

Unfortunately there are no guidelines on how to diagnose a significant neuropathic component to postoperative pain. Operations that damage peripheral nerves have a relatively high risk of producing neuropathic pain (for example amputation, thoracotomy, mastectomy, inguinal herniorrhaphy) and it is often a component of burn injury pain.[39,40]

The diagnosis of neuropathic pain is based on the patient's description of pain (burning, shooting, spontaneous) and altered sensation (pins and needles, numbness), and on simple bedside tests for hyperalgesia (an exaggerated response to a painful stimulus) and allodynia (pain evoked by light touch or gentle pressure to deep tissues).

Unfortunately, the diagnosis is often made retrospectively when there has been a poor response to opioids and a good response to anti-neuropathic analgesics.[41] As few studies have investigated acute neuropathic pain, treatment guidelines are based on the experience in chronic pain.[5] Intravenous ketamine (0.1 mg/kg/hour) or lignocaine (1–1.5 mg/kg/hour) can be used initially in patients who are 'nil by mouth'. This can be followed by amitriptyline (10–25 mg orally) at night and gabapentin or pregabalin titrated to response.[38,42,43]

Acute to chronic pain transition

Acute postoperative pain can develop into chronic pain. This is defined as pain still present three months after surgery. The overall incidence of chronic postsurgical pain is estimated to be 10–50%. In some patients (approximately 6%) the pain may be severe and disabling and referral to a pain clinic is needed.[44-46]

Predisposing risk factors for chronic postsurgical pain can be patient- or surgery-specific (see Box).[5] Severe acute postoperative pain is a major predictor for chronic postsurgical pain and effective analgesia may reduce this.[47] In at-risk patients, the duration of analgesia may need to be extended for as long as the nociceptive input from the wound persists (sometimes weeks).[48,49] Drugs such as gabapentin and pregabalin, which have an effect on surgically-induced central sensitisation, may prevent chronic postsurgical pain.[50,51] Early referral to a pain clinic is recommended for at-risk patients with pain that persists or those who are using complex analgesics (high doses of opioids or gabapentinoids) before discharge.[52]

Conclusion

A patient-specific approach to pain management is recommended, taking into account the surgical procedure, preoperative medical and psychological status, age, concurrent opioid use and patient preference. Using regional analgesia (for example, epidural or peripheral nerve analgesia) with a local anaesthetic is associated with significantly lower pain scores than is seen with systemic opioids. It also facilitates earlier rehabilitation and reduced hospital stay.[53] There is increasing evidence of an association between the severity of the acute pain and the risk of developing chronic postsurgical pain. <

Conflict of interest: none declared

Q:

SELF-TEST QUESTIONS

True or false?

7. Patients with neuropathic pain usually respond well to opioid analgesia.

8. Severe acute pain after surgery is a major risk factor for chronic pain.

Answers on page 219

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