Post-surgical pain management: time for a paradigm shift

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Treating post-surgical pain (PSP) is an established part of anaesthetic practice. For many years, the objectives of treating PSP were purely humanitarian. In the 1990s, the importance of promoting the return of normal function and reducing the magnitude of the surgical stress response was recognised, and this is the bedrock of both enhanced recovery programmes and day surgery. At the same time, the phenomenon of acute PSP transitioning to persistent PSP was beginning to be appreciated. More recently, there has been the recognition of harm from the prescribed opioid crisis and opioid-induced ventilatory impairment (OIVI). This narrative explores the tension that now exists for clinicians, between the identified benefits of adequate post-surgical analgesia and the risks of opioid usage; not limited only to the immediate postoperative period, but extending into the longer term with opioid dependency issues.

Tension exists between the identified benefits of adequate post-surgical analgesia and the risks of opioid usage. Treating PSP has been an established part of anaesthetic practice for decades. PSP management was initially driven by the humanitarian imperative to alleviate suffering, but the pioneering work of Kehlet highlighted the additional benefits of effective pain relief in attenuating the stress response to surgery and facilitating early mobilisation. Consequently, high

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quality analgesia has become the cornerstone of enhanced recovery programmes. 2 Despite these insights, there remains compelling evidence that pain after surgery is often poorly managed, and up to 40% of patients report severe pain that negatively impacts on their recovery. 3

Chronic PSP was first defined by Crombie and colleagues, 4 with a recent modification suggested by Werner and Kongsgaard 6 to parallel developments in our understanding of chronic pain states. The current definition includes a minimum duration of 3 months, either continuing from an episode of acute pain or after an asymptomatic period and of sufficient severity to impact on health-related quality of life. The term persistent PSP (PPSP) is now preferred as it has better acceptability to patients and the general public. PPSP affects 5–60% of patients after all types of surgery and can be a severe and debilitating entity. Several mechanisms are likely to be involved and risk factors for its occurrence have been identified. These include: patient characteristics, genetic, preoperative pain states, severe postoperative pain, type of surgery, and associated comorbidity. The preoperative use of opioids for prior chronic pain, particularly when ineffective, appears to be a key risk factor. 6 PPSP comprises at least 25% of the workload of pain clinics in the UK. 4 The majority of patients with PPSP are managed with limited resources in primary care. One unintended consequence of this is increasing numbers of patients with complex persistent pain receiving long-term opioid medication, even though this approach has resulted in poor outcomes. 7

Recently, the risk of inappropriate long-term opioid treatment after surgery has been highlighted, and this figure may be as high as 5.9–6.5% in previously opioid naïve patients. 8 Prolonged opioid use may either reflect suboptimal management of PPSP, or development of opioid substance use disorder, or a combination of both phenomena. Opioid prescribing has been increasing in the UK over recent years, with a fivefold increase in strong opioid prescribing in some areas. 9 More than 5% of the UK population regularly takes prescribed opioids, and this may be as high as 18% in parts of the UK. 9 10 A proportion of these patients will have developed opioid use disorder after initial exposure to opioid medication at the time of surgery. The US prescribed opioid crisis has had profound social, medical, and economic consequences and continues to do so. 11

Opioid use in the postoperative period increases the risk of respiratory depression resulting in morbidity and mortality. 12–14 Several risk factors have been identified for OIVI including simultaneous use of multiple opioid drugs, opioid infusions, modified release opioid preparations in addition to immediate release preparations, concomitant use of CNS depressant drugs (such as alcohol, antidepressants, anxiolytics, and z2 calcium channel antagonists [gabapentinoids]), and concurrent illness.

Clinicians must now strike a balance between the identified benefits of adequate post-surgical analgesia and the risks of excessive opioid use. Opioid-related risks are not limited to the immediate postoperative period, but extend into the longer term with prolonged inappropriate opioid usage. Consequently, the objectives of modern PSP management include: (1) humanitarian imperative to relieve suffering; (2) reducing the physiological stress response to pain; (3) promoting functional recovery and mobility; (4) preventing the transition from acute pain to PPSP; (5) preventing harm from OIVI; and (6) avoidance of prolonged inappropriate opioid use and substance use disorder.

Traditional approaches to managing acute post-surgical pain

Lacking any guidance developed specifically for the management of PSP, many practitioners have used tools such as the WHO analgesic ladder. 23 The WHO analgesic ladder was developed for the management of cancer pain, which tends to worsen, unlike PSP, which usually improves with time. It also relies heavily on the use of opioids. Opioid tolerance, opioid-induced hyperalgesia, and substance use disorder are not as great a concern where life expectancy is limited, though these are now increasingly recognised in cancer survivors. 24 In addition, the WHO analgesic ladder differentiates opioids into ‘weak’ and ‘strong’, though this is not a helpful distinction. The term ‘weak’ does not necessarily mean that the drug has a lower risk profile (e.g. opioid use disorder or dysphoria), or that side-effects occur less frequently than with strong opioids. It simply denotes that the drug is either less potent or less efficacious. There is now a body of evidence that convincingly shows that many individuals begin their journey to opioid use disorder whilst being treated with ‘weak’ opioids. 9 17

Currently, pain assessment tends to be linked to the delivery of analgesic drugs with the aim of reducing subjective pain scores. In 1996, the American Pain Society launched the ‘Pain as the fifth vital sign’ campaign. This approach was introduced as a response to the finding that 45% of hospital inpatients may experience ‘excruciating’ pain during their admission. 18 The campaign promoted the use of the Numerical Rating Scale (NRS) for pain (also termed the Numerical Pain Score) for competent adults and recommended that these pain scores were routinely recorded. High pain scores triggered prompt action. The campaign popularised the use of unimodal pain intensity scores which, amongst other things, do not assess functional recovery, the psychosocial aspects of the pain experience, or patients’ level of sedation, and tend to increase opioid consumption. It is now acknowledged that the campaign directly contributed to the increased use of prescribed opioids. 14 As an example, after introduction of a treatment algorithm based on numerical pain scores, a hospital in Florida reported an increase in the postoperative opioid medication administered and an increase in opioid-induced ‘oversedation’ by almost 150%. 25 Subsequently, the ‘pain as the fifth vital sign’ campaign is now being abandoned. 19

In 1994, Kehlet 3 noted that pain scores are not designed to promote a return to functional recovery. Despite this, there has only recently been more widespread acknowledgment that current methods of assessing and treating pain need revision to reduce iatrogenic harm. 15 21–23

Pain management plans that simultaneously provide relief from suffering, alongside rapid functional recovery, whilst aiming to minimise PPSP and inappropriate long-term opioid use, need to be multifaceted. The following section explores new paradigms that are being increasingly used to achieve these goals.

Pain assessment tools that promote movement

In his early papers Kehlet 1 identified the aim of postoperative pain relief was firstly to provide subjective comfort, secondly to reduce the magnitude of the surgical stress response, and thirdly: ‘to enhance restoration of function by allowing the
patient to breathe, cough and move easily’. Despite this insight from more than 20 yr ago, the routine use of pain scores that promote restoration of function has not been widely adopted and no scoring tools have been validated. The American Pain Society recommends an 8 point assessment tool, and one of these questions assesses how the pain impacts on function.22 This tool may be too cumbersome to be of use for routine care on hospital wards. An alternative, simplified 3 point functional activity score has been developed by Scott and McDonald and is:

A—no limitation of (relevant) activity because of pain
B—mild limitation of activity because of pain
C—unable to complete activity because of pain

This simple score utilises functional ability to determine pain relief and is currently being trialled in South Australia.21

Notwithstanding the advances in anaesthesia, analgesia, and surgery, PSP remains ubiquitous and it is a humanitarian imperative to treat it effectively. Despite the best intentions of the American Pain Association in advocating ‘pain as the fifth vital sign’ and the widespread use of pain scales such as the NRS, these interventions have not led to improvements in pain management, and paradoxically may have caused harm. Thus functional pain scores are now being advocated for the monitoring of PSP.19,21,22

Procedure-specific analgesic strategies

Rather than using the WHO analgesic ladder to guide practice, procedure-specific analgesic strategies are now being endorsed. This often involves the use of simple analgesics, augmented with regional anaesthesia techniques that are appropriate for that surgery. The use of regional anaesthesia techniques closer to the site of surgery are advocated to minimise impairment in motor function and reduce systemic side effects.2,23 Non-pharmacological strategies to improve pain relief, such as preoperative psychological preparation, and physical techniques such as cold compresses after knee surgery, should form part of the multifaceted approach to managing PSP.21 Routine use of epidural analgesia or patient-controlled analgesia for major abdominal surgery, with inevitable restriction in mobility and associated morbidity, is becoming more difficult to justify, especially when other analgesic techniques may achieve earlier mobilisation and shorter lengths of stay. Procedure-specific regional anaesthesia and anaesthetic techniques designed to minimise opioid use will reduce the morbidity associated with opioid use, including: OIVI, delayed return of gut function, urinary retention, postoperative nausea and vomiting, delirium, and subsequent prolonged opioid use. However, additional opioids may still be necessary. Where feasible, oral immediate-release formulations in age-appropriate doses should be used. The oral route should be used over parenteral opioid administration to aid rehabilitation.

Reducing the risk of persistent PSP

Patients who have multiple risk factors for PPSP should be identified before operation. It is possible to identify those generally at higher risk of PPSP.24 In addition to a procedure-specific analgesic strategy, these patients may benefit from an ‘individualised’ pain management plan. Currently, there is some evidence to support the use of the following interventions in preventing PPSP: preoperative education and psychological preparation; low dose ketamine and other atypical analgesics (e.g. lidocaine, magnesium, and the gabapentinoids); regional and local anaesthetic techniques before surgery; reducing preoperative opioid use, and avoidance of remifentanil.21,25

The continued use of daily pain intensity scores is useful in identifying patients whose pain is not following the expected postoperative trajectory and allows earlier referral and intervention by either the ‘acute pain team’ or by a ‘transitional pain service’.26

Prevent opioid use disorder and prolonged inappropriate opioid use

There is universal acceptance that a global prescribed opioid crisis exists and it is timely for clinicians to reflect on their role in potentially facilitating this crisis. While the drivers for the opioid crisis have been studied, there is a paucity of literature identifying ameliorating factors. There is some evidence that reducing the duration of discharge medication prescriptions may reduce the incidence of subsequent opioid dependence. Consequently, utilising techniques which reduce reliance on opioid prescribing perioperatively will avoid the necessity to initiate an opioid during a hospital encounter.27

If opioids are deemed necessary, they should be administered principally to promote a return of function and within a framework of goals agreed at each stage of recovery. These goals may include deep breathing, coughing, movement, and walking.2 Before surgery, patients should be given information about goal targeted pain relief during recovery and expectations of pain management should be addressed as part of this educational package. Psychological risk factors for long-term opioid use and PPSP should be assessed and addressed.21,25

Simple analgesics are a vital component of the multimodal opioid sparing strategy and should be administered as long as opioids are required. These drugs should be included as a key component of discharge medication.25 The preferred route of administration for all analgesics is oral (provided this route is available). Morphine when required should be prescribed at an age-appropriate dose. In the UK, liquid morphine (10 mg per 5 ml) is a schedule 5 drug and does not need a witness to countersign its administration, and this allows it to be rapidly dispensed.29 There is some evidence to suggest that oxycode done is more ‘likeable’ than morphine, and this may be a risk factor for subsequent opioid use disorder.30

Codeine was once a popular drug for the treatment of PSP for many years either as the sole drug or as a compound analgesic, but in addition to its propensity to subsequent dependence,9,17 its usefulness is limited as it is a prodrug and is metabolised variably to morphine. This variable metabolism results in an unpredictable analgesic efficacy, a high number needed to treat, and a concurrent risk of inadvertent overdose. Subsequently, codeine is not recommended for use in children, pregnancy, or breastfeeding mothers.21 In addition, compound analgesic preparations have a reduced scope for effective titration29 and should be avoided.

Modified release opioid preparations have been identified as one of the main causes of the prescribed opioid crisis and ideally should be avoided in the management of PSP in the opioid naïve surgical patient.31 If an institution does decide to use modified release preparations in perioperative pain
management, they should be strictly dose- and time-limited and must not be included in discharge medication.

In order to prevent opioid diversion and stockpiling of drugs, patients should be given an appropriate duration of medicines on discharge and the suggestions are that this is either procedure-specific or based on their in-patient consumption the day before discharge. Patients should also be informed of how and where to dispose of their excess medication. Patients and prescribers should avoid opioids being dispensed as part of repeat prescriptions as this ‘rollover’ prescribing has also been identified as a contributor to subsequent opioid use disorder.29,33

The use of electronic prescribing coupled with the intelligent implementation of individually tailored patient pathways has the potential to promote widespread adoption of best practice.30 Patients will still require counselling on safe opioid stewardship, which includes weaning from the opioid, safe disposal, avoidance of opioid diversion, and prevention of harm from drug-driving.11,33

Prevent harm from OIVI

Acute opioid toxicity results in OIVI. Comorbidity and co-administration of other sedating drugs (e.g. gabapentinoids, benzodiazepines, and other opioids) increases the risk of harm.31 In 2017, the UK Medicines and Healthcare products Regulatory Agency issued a safety alert on the dangers of the concomitant use of gabapentin with opioids and mandated that these patients should be carefully observed for signs of respiratory depression.29 With the increasing recognition of the harm caused by OIVI, and the unpredictable dose requirements of individual patients, sedation scoring should now be mandatory for all patients receiving opioids, and the concomitant use of other sedative agents avoided where possible.

Summary and conclusions

In the past 25 yr, there have been significant advances in our understanding of the impact of ineffective assessment and treatment of PSP. Opioid use disorder, prolonged ineffective opioid use and PPSP are now recognised iatrogenic post-operative complications. Clinicians need to be aware of the risk of these significant complications and modify their practice to reduce harm. Optimal pain relief to achieve functional goals and promote recovery should still be our primary aim, but this must not be at the cost of negative long-term outcomes, resulting in a significant impact on patients’ quality of life.

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Anterior cruciate ligament repair and peripheral nerve blocks: time to change our practice?

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Effective pain control after anterior cruciate ligament repair (ACLR) is vital for recovery and rehabilitation and to reduce the need for potent analgesics such as opioids. In the past 30 yr the analgesic care of these patients has evolved from a model predominantly focused on opioids, subsequently complemented by peripheral nerve blocks such as femoral nerve block (FNB)1,3 and then adductor canal block (ACB),4 all in the context of a multimodal analgesic regimen.5–8 Although these regional anaesthesia techniques can provide very effective pain control, their use has to be balanced against the time, expertise, and resources required for their placement in addition to potential adverse effects such as motor block and longer-term, albeit much less common, complications such as nerve injury, persistent motor weakness, and myotoxicity.3

More recently, local instillation analgesia (LIA) during ACL surgery has been used in addition to, or as a replacement for, peripheral nerve blocks. Recent studies and subsequent systematic reviews have shown that FNB or ACB may not produce additional analgesic advantage when compared with multimodal analgesia (MMA) alone,5,10 whereas LIA can provide effective analgesia compared with placebo for ACLR.11 Although previous studies have compared FNB with LIA,12–14 until now a direct comparison between ACB and LIA for ACLR has not been reported.