



## What is optimal analgesia for major surgery?

Alongside successful surgery and survival, pain is amongst the primary concerns for patients undergoing major surgery. The provision of high-quality analgesia is one of the cornerstones of perioperative care and getting perioperative analgesia right can directly affect postoperative outcomes, leading to benefits for the patients (avoidance of complications, quicker recovery and return to pre-morbid function, better experience), healthcare systems (shorter hospital stays, reduced requirement for additional treatment, reduced costs and enhanced institutional reputation) and for society as a whole. But what constitutes optimal analgesia? Clinicians can sometimes focus on unrealistic aims, such as being ‘pain free’ resulting in an excessive use of analgesics (in particular opioids) whereas a more moderate approach that strikes a balance between pain control and minimising its unwanted side effects may be more appropriate (1). Patients often tend to place greater emphasis on whether they receive compassionate care focused on optimising outcomes rather than whether their pain is completely controlled or ‘zero pain’ (2).

A variety of factors can influence perioperative analgesic requirements causing them to vary significantly between individuals and settings. In order to understand the efficacy of a given analgesic regimen regular and repeated pain measurements are essential, as is an assessment of analgesic side-effects such as nausea, respiratory depression and sedation (3). Assessment of pain in the postoperative setting needs to include both static (at rest) and dynamic (on movement) pain. Static measures can relate to functions such as sleep whereas dynamic measures determine if pain relief is adequate for recovery of function (4). The importance of this kind of assessment has become widely recognised and as such in 2018, the USA Joint Commission on Accreditation of Healthcare Organizations (JCAHO) introduced a new pain assessment and management standard focusing more on how pain affected patients physical function (5).

Attempts to build on dynamic pain scoring, have seen the development of a variety of tools, one such being the functional activity scale (FAS). This is a simple three level ranked categorical score, recorded as A, B or C, with A representing no limitation due to pain; B mild limitation (i.e., the patient is able to undertake activity despite experiencing moderate to severe pain); and C significant limitation, where the patient is unable to complete the activity due to pain. Through quantifying the pain in this way, it is then possible to tailor analgesic interventions in order to facilitate function, rather than simply treating a self-reported pain score (1).

Optimal perioperative pain management is essential to aid mobilisation postoperatively, enable early feeding and ultimately enhance recovery after surgery. To help improve pain management, the American Pain Society introduced a campaign encouraging clinicians to consider pain as the fifth vital sign (6) and that the provision of adequate analgesia be a fundamental human right for patients (7). Despite the almost universal agreement that optimal analgesia is vital for optimal postoperative outcomes, evidence suggests that in many circumstances it continues to be managed poorly. A recent survey of surgical patients in the US found that 75% had moderate/extreme pain during the immediate post-surgical period, with 74% still experiencing these levels of pain after discharge. Issues around post-surgical pain were the most common pre-surgical concern with almost 50% of patients reporting high/very high anxiety levels about this. Problems with analgesic efficacy and side-effects were also common –80% experienced adverse effects and 39% reported moderate/severe pain even after receiving their first dose (8).

Whilst the overall aims of perioperative analgesia—namely good pain control with minimal side-effects and the facilitation of eating, drinking, mobilisation and quality sleep—may be readily agreed by all concerned, the methods/techniques by which this is achieved continue to be the subject of a great deal of discussion and research.

Thoracic epidurals have long been considered the gold standard analgesic regimen for open abdominal surgery. Over the years there have been a great number of studies demonstrating a variety of benefits associated with this technique including: reduced surgical stress response, reduced pulmonary complications and superior pain control (9). However, despite the volume of evidence there is a great deal of heterogeneity amongst studies and relatively few well-designed randomised controlled trials. In addition, most of the research in this area was conducted pre-ERAS where early mobilisation and feeding etc. were not encouraged, raising question marks over its validity/applicability in the modern era. There are also significant negative effects associated with epidurals including a high failure rate (50% in some studies), increased vasopressor requirements and a risk of motor block and subsequent impairment of mobilisation. This may be particularly pertinent as early mobilisation is

possibly the most important element of a successful ERAS programme (10). Finally, providing effective perioperative epidural analgesia requires significant input from both medical and nursing staff and so it is for all these reasons that recent times have seen a slow move away from the use of epidurals and the emergence of a plethora of potential successors. Amongst the alternative regional anaesthetic techniques that have enjoyed a rise in popularity are the trunk blocks: transversus abdominis plane (TAP) blocks, rectus sheath catheters, erector spinae blocks etc. Evidence directly comparing these with epidural is scant and of low quality however there is some that suggests they are at least not inferior in terms of pain scores. Two studies, comparing epidural with rectus sheath catheters found pain scores to be equivalent, with faster mobilisation in the rectus sheath group. It is however worth noting that this did not translate into a reduction in length hospital of stay (11,12).

Analgesia for laparoscopic surgery has undergone a similar evolution. Historically epidurals were popular and even recommended in ERAS guidelines (13). However, given that in general the analgesic requirements following laparoscopic surgery can be met by oral analgesics after 24 hours (compared with 72 hours post open surgery) and as the importance of early mobilisation for enhanced recovery became more recognised, question marks over the use of epidural in this setting arose. Evidence emerged demonstrating that spinal anaesthesia not only reduced postoperative opioid requirements and pain scores but, in comparison with epidural, facilitated earlier mobilisation, had a lower failure rate and reduced length of hospital stay (14). This has seen the use of spinal anaesthesia as an analgesic adjunct become widespread for laparoscopic procedures

Intrathecal opiates may also have a role in open surgery, however the requirement for a longer duration of analgesia means that longer acting agents should be considered (e.g., preservative free morphine as opposed to fentanyl).

A recent systematic review of studies comparing IT morphine and epidural analgesia for open hepato-biliary surgery demonstrated improved outcomes, reduced intravenous fluid requirement and a reduced length of hospital stay with IT morphine (15).

Despite all of this, globally the mainstay of analgesia for both laparoscopic and open surgery remains intravenous opioids (16). Whilst undoubtedly they provide pain relief, they have a number of limitations including high incidences of nausea and vomiting, sedation, constipation and hyperalgesia as well as a possible link with cancer recurrence/progression. Added to that their addictive nature and ubiquitous prescription (particularly in the developed world) has led to what has been termed an ‘opioid crisis’, with large numbers of patients worldwide chronically addicted to their use. This in turn has created a drive to find ways of reducing opioid usage and in some quarters avoiding opioids completely when managing perioperative pain. Whilst a multimodal approach to pain management, which encompasses several pain reducing mechanisms in order to achieve pain control thereby reducing the reliance on opioids and their subsequent negative side effects, has gained popularity in perioperative care in recent times (17), does eliminating opioids entirely actually lead to benefits? This question along with a review of the factors creating (and solutions for) the opioid crisis are explored in greater detail in two of the articles making up this special series on pain.

With advances in surgical treatment, an ageing population, increasing incidence of comorbidities such as obesity, diabetes, cardiovascular disease and cancer, the global surgical workload is set only to increase in volume and complexity. Add to this the desire to constantly improve outcomes, the ever-increasing societal expectations around the perioperative experience and the requirement to minimise costs and maximise productivity and it is clear to see that that issue of optimal perioperative analgesia will remain central to our practice as those involved in the perioperative care of patients. This special series aims to give the reader a comprehensive overview of all the salient points in the field of perioperative pain management and highlight why getting it right is so vital to providing high-quality care.

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