Perioperative pain management in colorectal surgery

Vinay Ratnalikar

Catrin Williams

Thomas Moses

Abstract

Postoperative pain management has a bearing on postoperative recovery and outcomes. This is particularly so in Enhanced Recovery After Surgery (ERAS). Use of proven techniques such as central neuraxial blockade, advances in regional analgesic block techniques and the multimodal combination of drugs with newer range of adjuvant analgesics are presented. This article discusses pain management options and practices.

Keywords Adjuvant analgesics; colorectal; intrathecal; regional blocks

Introduction

Enhanced Recovery After Surgery (ERAS) involves various, multimodal interventions which help to reduce the endocrine, metabolic and inflammatory stress response to surgery. Maintaining and restoring organ function enables early mobilization and oral intake in the postoperative period. Extensive work by Kehlet formalized the concept and successfully shown the benefits of it various components which have already been in practice for many years. A through preoperative assessment and optimization of co-morbidities is essential for better outcome and this has been established beyond doubt. Effective analgesia and optimal fluid administration can have a significant impact on postoperative recovery. Despite this knowledge, poorly controlled postoperative pain continues to be one of the most undesirable effects following surgery.

Pain pathways

Acute pain is a physiological response that warns us of danger. Pain processing occurs at three primary sites: (1) the peripheral nerve and dorsal root ganglion; (2) the dorsal horn of the spinal cord; and (3) the brain or brainstem (Figure 1). Different pharmacological agents work by targeting different sites along this anatomical pathway. Painful stimuli cause release of neurotransmitters at both peripheral and central levels. Neurotransmitters acting on specific receptors can either produce excitation and pain or inhibition and analgesia. Drugs cause analgesia by either antagonizing the effect of the excitatory neurotransmitters or by stimulating and/or preventing the breakdown of inhibitory neurotransmitters.

The WHO step ladder approach to pain relief was first published in 1986 as a guideline for managing cancer pain. This approach has become widely accepted and used for the management of pain of all types. There is some debate as to whether this simple step-wise approach is still valid but there can be no doubt that it has had a major impact on how the rationale for treating acute pain has been developed. What is clear is that a multi-modal approach to postoperative pain relief is essential. Various drugs and techniques are now used to improve analgesia, reduce opioid consumption and opioid related side-effects. This article aims to give an overview of some of the established techniques along with some of the newer adjuvant agents.

Regional analgesia for open surgery

Traditionally and in the early days of ERAS, thoracic epidural analgesia was considered the 'gold standard' for laparotomy and colorectal procedures. It has been shown to be superior to intravenous opioids in the management of postoperative pain and also in the reduction in the pituitary, adrenocortical and sympathetic stress responses to surgery (Box 1).

However, new evidence suggests that epidural analgesia may be harmful in colonic surgery. Significantly high failure rates have been associated with management of epidural analgesia, though it may apparently look effective in the immediate postoperative period. In contrast, intrathecal analgesia carries higher insertion rates, does not require further care, makes early ambulation possible and reduces work load on nursing staff.[1]

The MASTER trial (Multicentre Australian Study of Epidural Anaesthesia) compared adverse outcomes for high-risk patients undergoing major abdominal surgery with epidural block or alternative analgesic strategies with general anaesthesia. This study concluded that they are unable to demonstrate any significant effect of epidural analgesia on the overall frequency of complications after major abdominal surgery, except for a modest reduction in the incidence of respiratory failure.[2]

There is data to suggest that intrathecal analgesia may be effective in open surgery. We have found that the postoperative opioid requirement is minimal with satisfactory pain scores, comparable to laparoscopic surgery. We have also observed a further postoperative opiate sparing effect of combining intrathecal analgesia with ultrasound guided abdominal wall blocks as discussed later.

Analgesia for laparoscopic surgery

Laparoscopic resection of the colon was first reported in 1991. Guidance from the UK National Institute for Health and Clinical Excellence recommended that all patients considered suitable must be offered laparoscopic surgery due to the perceived benefits (Box 2).

Vinay Ratnalikar *MBBS MD FRCA is a Consultant Anaesthetist at ABM University Health Board, Singleton Hospital, Swansea, UK. Conflicts of interest: none declared.*

Catrin Williams *BSc(Hons) MB BCh FRCA is a Specialist Registrar in Anaesthesia at ABM University Health Board, Morriston Hospital, Swansea, UK. Conflicts of interest: none declared.*

Thomas Moses *BMBCh BA FRCA is a Specialist Registrar in Anaesthesia at Aneurin Bevan University Health Board, Royal Gwent Hospital, Newport, UK. Conflicts of interest: none declared.*

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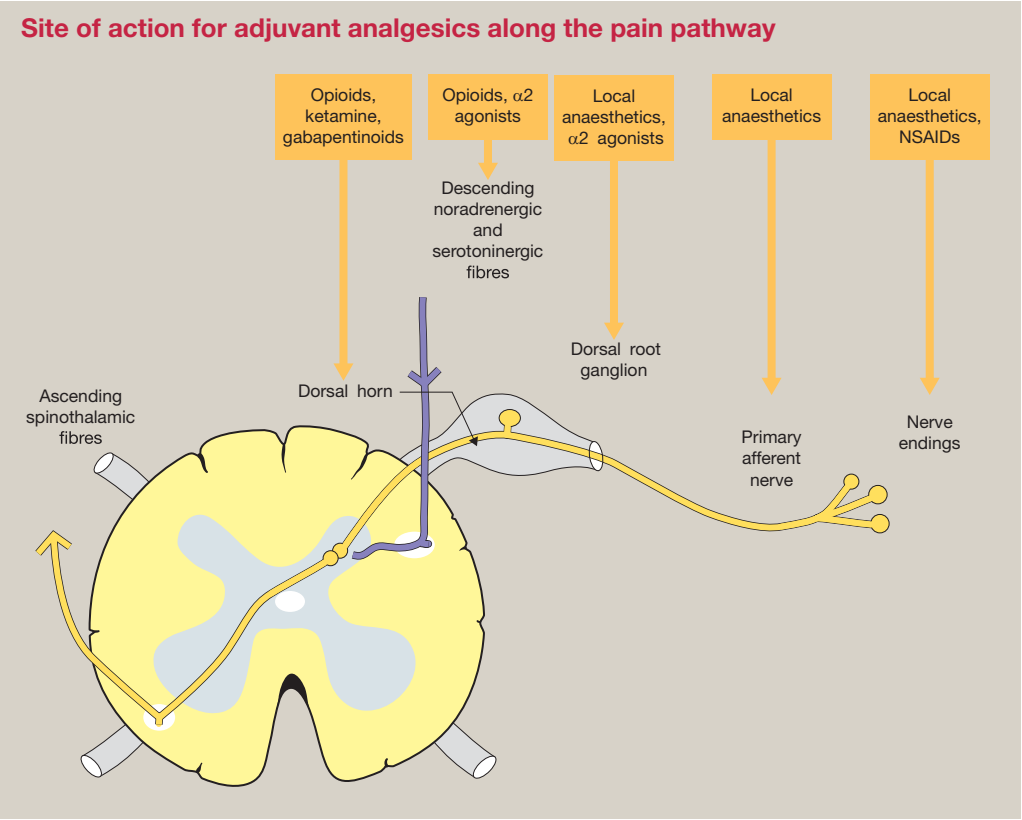

Figure 1

There is relatively little data regarding the optimum analgesic technique in laparoscopic colorectal surgery but undoubtedly high-quality analgesia is needed to prevent delayed recovery. In laparoscopic surgery, parietal pain is less intense due to smaller incisions but the visceral component remains the same and the majority of patients require opioids perioperatively. By 24 hours postoperatively, simple oral analgesics are usually sufficient with a combination of paracetamol, non-steroidal anti-inflammatory drugs (NSAIDs) and weak opioids.

There are several important differences when comparing laparoscopic to open surgery that can affect the neuraxial block. The presence of a pneumoperitoneum increases intraoperative cardiopulmonary stresses; therefore the effects of a block may be magnified. Positioning can affect block height and cardiorespiratory physiology, especially extended periods of steep Trendelenberg positioning. Pneumoperitoneum or head down positioning before the drug is fixed to nervous tissue will result in high block. The abdominal incision is often smaller, transverse and below the umbilicus which may affect the decision of which level to insert the block. Shoulder tip pain can be a problem postoperatively and this cannot be covered by a neuraxial block. Post-laparoscopic shoulder pain is preventable by evacuating residual CO_2

Local anaesthetic (LA) techniques

LA infiltration techniques and abdominal wall blocks have become commonplace with advances in ultrasound technology skills allowing improvements in the reliability and efficacy of blocks. They have come to prominence as a safe alternative to a central neuraxial technique in patients who are coagulopathic, have systemic sepsis or in those who may not tolerate the haemodynamic sequelae often associated with neuraxial block. However they are increasingly used electively as part of a multi modal pain management following abdominal surgery.

Wound infiltration

Surgical wound infiltration with LA is a simple low cost well-recognized technique that reduces the postoperative pain originating from the surgical incision. However, the duration of analgesia is limited by the time that LA remains effective; normally between 4 and 8 hours for commonly used agents. Infiltration with local anaesthetics before surgical incision, as opposed to infiltration at the end of the procedure, has the advantage of reducing the amount of analgesia and anaesthesia required intraoperatively. This should also reduce the nociceptive input and hence preemptively block the N-methyl-D-aspartate-induced wind-up phenomena and release of inflammatory mediators. There have been concerns over the use of incisional infiltration. It was suggested that infiltration with local anaesthetics might increase the risk of postoperative wound infection. This concern has not been substantiated by clinical studies and it appears that local anaesthetics, particularly bupivacaine, may have both bacteriostatic and bactericidal actions.[3] Continuous infusion of LA via catheters placed subcutaneously into the anterior abdominal wall at the time of surgery has been shown to reduce opiate consumption following laparoscopic surgery.

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