

## Neural blocks at the helm of a paradigm shift in enhanced recovery after surgery (ERAS)

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**Sukhminder Jit Singh Bajwa, Divya Jain<sup>1</sup>, Smriti Anand<sup>2</sup>, Sanjeev Palta<sup>3</sup>**

Department of Anaesthesiology and Intensive Care, Gian Sagar Medical College and Hospital, Banur, Patiala, Punjab, <sup>1</sup>Department of Anaesthesia and Intensive Care, Post Graduate Institute of Medical Education and Research, Chandigarh, <sup>2</sup>Department of Anaesthesia, Maharishi Markandeshwar Medical College and Hospital, Solan, Himachal Pradesh, <sup>3</sup>Department of Anaesthesiology and Intensive Care, Government Medical College and Hospital, Chandigarh, India

**Address for correspondence:** Dr. Sukhminder Jit Singh Bajwa,  
Department of Anaesthesiology and Intensive Care, Gian Sagar Medical College and Hospital, Banur,  
Patiala, Punjab, India.  
E-mail [sukhminder\\_bajwa2001@yahoo.com](mailto:sukhminder_bajwa2001@yahoo.com)

The paramount perils of major surgeries have always been functional incapacitation in the form of pain, respiratory complications, ileus etc., which delay recovery and augment the hospital stay. The concept of a multimodal approach to recovery after surgery was first introduced by a Danish surgeon, Dr. Kehler, which later developed into enhanced recovery after surgery (ERAS) protocols referring to a patient-centred, evidence-based, multimodal, bundled approach to improve outcomes after surgery.<sup>[1]</sup> While ERAS was initially introduced in colorectal surgeries at its inception, it has now reached a consensus in a number of surgical specialities.

ERAS essentially incorporates all the elements of perioperative care starting from pre-admission to preoperative and intraoperative care and culminating with postoperative care.<sup>[2,3]</sup> The fundamental principles of the ERAS protocol include optimised preoperative patient preparation, counselling, nutrition, avoidance of preoperative fasting, carbohydrate loading up to 2 h preoperatively, standardised anaesthetic and analgesic regimens, attenuation of stress responses to surgery and early mobilisation.<sup>[4,5]</sup>

The implementation of ERAS has been found to have effectively reduced the length of hospital stay, morbidity and readmission rates.<sup>[6]</sup> The anaesthesiologist plays a predominant role in many aspects of the ERAS protocols, including patient education, preoperative

evaluation and optimisation, choice of anaesthesia and medication, fluid therapy, temperature monitoring, and most importantly postoperative analgesia.<sup>[7]</sup>

Increasing evidence shows that the types of anaesthesia and analgesia administered in the perioperative period may affect the rates of surgical site infection, urinary retention, ileus, nausea and vomiting, and the ability to safely participate in early postoperative rehabilitation.<sup>[8,9]</sup> Regional anaesthesia (RA) has the ability to reduce the need for general anaesthetics and improve postoperative pain management; nonetheless, RA and multimodal analgesia including regional analgesia techniques with the incorporation of nerve blocks are an intrinsic part of ERAS. Various multimodal analgesic regimens in assorted cocktail combinations with opioids, non-opioids like non-steroidal anti-inflammatory drugs, local anaesthetics, wound infiltration, RA and neural blocks are available for the same depending upon the type of surgery, available resources and expertise. Though opioids have always remained the linchpin of postoperative pain management, their accompanying aftermaths in the form of nausea and vomiting, pruritus, respiratory depression, urinary retention etc., preclude their use. This emphasises the utilisation of opioid-free multimodal analgesia techniques including RA and neural blocks.

A comprehensive review by McIssac in 2015 evaluated the impact of RA on pain, postoperative nausea and

vomiting (PONV), mobility, and organ function. Of the 36 studies that compared pain outcomes between an RA containing and a non-RA containing path of care after colorectal, orthopaedic and gynaecological procedures, 58% found that the addition of an RA technique was associated with significant improvement in pain, 28% reported improvement in PONV and 46% stated improved mobility.<sup>[10]</sup> Various RA and analgesia techniques have been included in ERAS protocols and these include epidural intervention via the catheter, subarachnoid block, transversus abdominis plane (TAP) block, femoral nerve block, paravertebral block, pectoral nerves (PECs) block, etc.

TAP blocks though customarily used for infraumbilical surgeries have now been extended with a modified subcostal technique to surgeries being done with subcostal incisions like open cholecystectomies, laparoscopic cholecystectomies, or liver resection.<sup>[11,12]</sup> These blocks are also being currently utilised as a part of multimodal analgesia regimen in various gynaecological, obstetric procedures as well as laparoscopic bariatric surgeries.<sup>[13-15]</sup>

Similarly, the paravertebral blocks and PEC blocks have been found to be associated with enhanced recovery after microvascular breast surgeries. Quadratus lumborum blocks and erector spinae blocks have also been explored and have provided superior parietal as well as visceral analgesia in abdominal laparoscopic procedures.<sup>[16]</sup> Continuous thoracic epidurals have been used to fast track thoracic surgeries, and pudendal nerve blocks have been used in fast track protocols for vaginal hysterectomy.<sup>[17,18]</sup> Various interfascial plane chest wall blocks as well as intercostal blocks have been advocated as a part of ERAS analgesia protocol for minimally invasive cardiac surgical procedures.

ERAS bundled analgesia pathways have been successfully implemented in various orthopaedic procedures like knee and hip arthroplasties for providing superior pre-emptive as well as postoperative opioid-sparing analgesia.<sup>[19]</sup>

The assimilation of ultrasound-guided nerve blocks in various surgery-specific ERAS protocols can offer significant benefits and transform modern perioperative care. The use of ultrasound-guided nerve blocks has emanated in reduction in acute postoperative pain scores, opioid consumption, improvised patient satisfaction scores, hastened recovery and dramatically reduced length of hospital

stay with significant cost-effectiveness and reduction of morbidity and mortality.<sup>[20-29]</sup>

In breast cancer surgery, the incorporation of a wide range of inter-fascial nerve blocks including the PECs block, serratus anterior block, erector spinae plane block into the anaesthetic regimen has led to the feasibility of such surgeries for the ambulatory setup.<sup>[30-35]</sup>

A recent analysis on the peripheral nerve blocks (PNBs) in breast cancer patients showed a significant escalation in the proportion of mastectomy cases receiving nerve blocks from 0.5% in 2010 to 13% in 2018 (trend  $P < .0001$ ). In such surgeries, inter-fascial blocks score over regional anaesthetic techniques such as paravertebral block as they have no risk of sympathetic blockade, intrathecal or epidural spread which may lead to haemodynamic instability and prolonged hospital stay.<sup>[36]</sup> However, a study published in this issue of the Indian Journal of Anaesthesia (IJA) concludes that balanced anaesthesia supplemented with modified PEC block performed after general anaesthesia does not improve the postoperative pain in patients undergoing modified radical mastectomy. In this study, 50 patients scheduled to undergo modified radical mastectomy under balanced anaesthesia were randomised to receive either a modified PEC block consisting of 30 mL of ropivacaine 0.2% after induction of general anaesthesia (GA) (PEC group) or no block (GA group).<sup>[37]</sup>

A multicentre cohort study of 15326 cases analysing patient satisfaction and perioperative pain management after knee replacement surgery found decreased postoperative need for pain medication, side effects, pain scores, and improved patient satisfaction with the addition of PNBs.<sup>[38]</sup>

Another domain, other than postoperative pain relief where the employment of nerve blocks has extended significant benefit, is PONV. Drugs like opioids and nitrous oxide have been implicated in PONV. Minimalistic drug therapy and avoiding the so-called culprit drugs in regional anaesthesia techniques involving nerve blocks play a significant role in decreasing the incidence of PONV. Spinal anaesthesia does not always reduce PONV, compared to GA, possibly because of hypotension, intrathecal opioid additives, or sympathetic blockade resulting in vagally mediated overactivity of the gastrointestinal system.<sup>[39]</sup> Conversely, PNBs

alone which do not have centrally mediated effects offer a consistent benefit.

Newer blocks have also brought a revolutionary change in outcomes like post-surgical patient mobility. The benefit of adductor canal block over the traditional spinal-epidural anaesthesia has revolutionised postoperative rehabilitation after orthopaedic surgery.<sup>[40]</sup> Several recent trials show that adductor canal catheters and femoral catheters provide equivalent analgesia without quadriceps weakness.<sup>[41]</sup>

From the times when regional anaesthesia was limited to the epidural/spinal space, and the femoral/sciatic/brachial plexus, nerve blocks have come a long way. The advent of ultrasound-guided RA in the twenty-first century has raised the bar and set up new standards for perioperative care. Improvement in ultrasound technology has allowed visualisation of targets previously obscured, ushering in a new era of PNBs. In this era of unrestrained enthusiasm, there seems to be a quest to find a nerve block and a good adjuvant for the local anaesthetic used in the nerve block for almost every surgical and post-surgical condition. A study in this issue of the IJA explores the use of ultrasound-guided superficial cervical plexus block in patients undergoing modified radical mastoidectomy. The authors found that ultrasound-guided superficial cervical plexus block with 5 mL of 0.5% ropivacaine was effective in reducing analgesic requirements in the first 24 h postoperatively.<sup>[42]</sup> Another study published in this issue investigates the use of adjuvants like dexmedetomidine and dexamethasone to ropivacaine in TAP block for cesarean section in 100 parturients.<sup>[43]</sup> The recent proliferation of fascial plane blocks is largely related to the advancements and improvements in technology. Although the research in peripheral nerve blockade is going on at a phenomenal pace, the potential of PNBs in head and neck surgeries like tonsillectomy and craniotomies still needs to be explored. A meta-analysis of ten studies published in a previous issue of the IJA concluded that scalp block might be useful at less than 6 h postcraniotomy with very low-quality evidence.<sup>[44]</sup> It is observed that a majority of scientific literature is focussed towards the immediate outcomes of surgery; nevertheless, the assessment of intermediate and long-term outcomes with nerve blocks is also important and needs further evaluation.

It is clear that the use of a multimodal analgesic pathway incorporating ultrasound-guided nerve block techniques as a part of multimodal analgesia

offers definitive benefits; however, we still need to gear up. It is essential that we master and embrace ultrasound-guided regional anaesthesia techniques and incorporate them into surgery-specific ERAS programs that satisfy the needs of both the patient and the clinicians. An interesting survey published in this issue questions whether the anaesthesiologists in India are prepared to implement various steps of the ERAS protocols and thus create a paradigm shift in perioperative care.<sup>[45]</sup> Nevertheless, the increasing number of studies being published on different types of ultrasound-guided nerve blocks in the IJA are a testimony to the fact that the routine use of ultrasound-guided nerve blocks in ERAS protocols will soon produce significant transformations and improvement in modern perioperative care.

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#### Conflicts of interest

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