Perioperative Pain Management in Bariatric Anesthesia

ABSTRACT

Weight loss (bariatric) surgery is the most commonly performed elective surgical procedure in patients with morbid obesity. In this review, we provide an evidence-based update on perioperative pain management in bariatric anesthesia. We mention some newer preoperative aspects—medical optimization, physical preparation, patient education, and psychosocial factors—that can all improve pain management. In the intraoperative period, with bariatric surgery being almost universally performed laparoscopically, we emphasize the use of non-opioid adjuvant infusions (ketamine, lidocaine, and dexmedetomidine) and suggest some novel regional anesthesia techniques to reduce pain, opioid requirements, and side effects. We discuss some postoperative strategies that additionally focus on patient safety and identify patients at risk of persistent pain and opioid use after bariatric surgery. This review suggests that the use of a structured, step-wise, severity-based, opioid-sparing multimodal analgesic protocol within an enhanced recovery after surgery (ERAS) framework can improve postoperative pain management. Overall, by incorporating all these aspects throughout the perioperative journey ensures improved patient safety and outcomes from pain management in bariatric anesthesia.

Key words: Acute pain, anti-hyperalgesics, bariatric anesthesia, dexmedetomidine, enhanced recovery after surgery (ERAS), ketamine, lidocaine, morbid obesity, multimodal analgesia, neuraxial techniques, obesity, obstructive sleep apnea (OSA), opioid-sparing analgesia, pain management, prehabilitation, regional anesthesia, truncal blocks

Introduction

With its rising global prevalence, increasing numbers of patients with morbid obesity are undergoing a wide variety of elective and emergency surgery. Morbid obesity is a chronic systemic illness that reduces the quality of life and life expectancy and simultaneously increases patients' perioperative morbidity and mortality. We have previously reviewed the management of acute and perioperative pain for patients with morbid obesity.[1,2]

Bariatric surgery is now almost universally performed laparoscopically and is the most commonly performed elective surgery in patients with morbid obesity. Bariatric anesthesia has provided the opportunity to study and standardize perioperative pain management protocols.[3-5] The recently enhanced recovery after surgery (ERAS) society guidelines for bariatric anesthesia have also emphasized the need for protocol standardization and implementation.[6]

The importance of bariatric anesthesia and analgesia research cannot be overstated. These bariatric studies can inform

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and improve the perioperative protocols for other patients with morbid obesity irrespective of the surgical procedures they are undergoing.[1,2] This review aims to provide an evidence-based update for perioperative pain management in bariatric anesthesia with a separate focus on preoperative preparation, intraoperative management, and postoperative care.

Preoperative Preparation

As with all other elective surgery, patients with morbid obesity require careful screening and evaluation for co-morbidities before bariatric surgery. It must be emphasized here that preoperative co-morbidity optimization can significantly impact postoperative pain management after bariatric surgery.[2,6] Though the perioperative implications of all the individual medical conditions in bariatric anesthesia are beyond the scope of this review, there are certain aspects of preoperative preparation directed specifically towards improving perioperative pain that merit further discussion [Figure 1].

First and foremost, *medical optimization* should focus on the diagnosis and treatment of sleep-disordered breathing (SDB) including obstructive sleep apnea (OSA). This is not only an important modifiable risk factor for morbidity and mortality in bariatric anesthesia, but the diagnosis and treatment of OSA can specifically improve the safety and outcomes of postoperative pain management.[7] The management of acute pain and the tenuous relationship of opioids with OSA in patients with morbid obesity has been described elsewhere.[8] Especially in moderate to severe OSA that remains undiagnosed or untreated, an opioid-centric approach to pain management in the perioperative period should be avoided. In a dose-dependent manner, opioids

impair the arousal response, worsen the degree of airway obstruction, and reduce respiratory rate and ventilatory effort with increasing periods of apnea that can trigger cascades of complex physiological derangements. This is the well-known opioid-induced ventilatory impairment (OIVI) that has been identified as an important preceding or triggering event in serious postoperative respiratory adverse events (PRAEs) in patients with morbid obesity.[1,2] Additionally, certain patients have pre-existing risk factors for poorly controlled acute pain - chronic pain, chronic opioid use, substance abuse, complex psychiatric history, or previous experience of poorly controlled pain [Table 1].[9-14] These subsets of patients often have a perioperative escalation of their opioid requirements and hence should be meticulously screened and tested for OSA. Many of these patients will need specialist consultations for their pain before elective surgery and plan for extended postoperative stay with appropriate level and duration of monitoring.

The second aspect of the preoperative period that can improve pain management after bariatric surgery is the recent

Table 1: Risk factors for poorly controlled acute postoperative pain, persistent postoperative pain, and persistent opioid use identified in bariatric surgical patients

| Risk Factors in Postoperative Bariatric Patients		
Poorly Controlled Pain	Persistent Pain	Persistent Opioid Use
Younger age	Younger age	Pre-existing pain
Female	Female	Preop opioid and other analgesic use
Pain score >3 on PACU arrival	Smoker	Preop anti-anxiety agents
Poor pain control on PACU discharge	Unemployment	Hospital opioid use
	Pre-existing symptoms	Prolonged postop non-opioid use
		Benzodiazepine use
		Smoker
		Subsequent surgeries
		Ethnicity
		Marital status
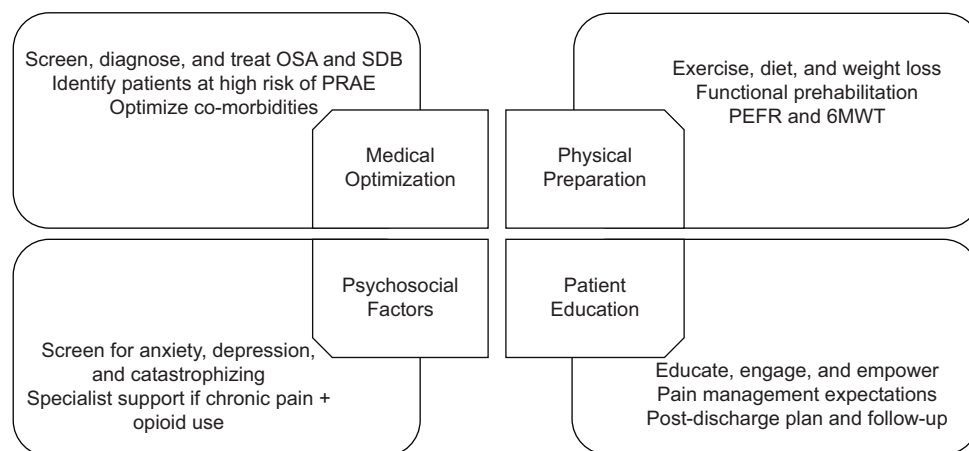
Figure 1: Preoperative preparation for improving postoperative pain management in bariatric surgery. OSA: Obstructive sleep apnea, SDB: Sleep-disordered breathing, PRAE: Postoperative respiratory adverse events, PEFR: Peak expiratory flow rate, 6MWT: 6-min walk test

emphasis on the better *physical preparation* of patients. Within the ERAS paradigm, active deep breathing and coughing with early ambulation all contribute to early discharge and return to baseline function. Therefore, bariatric programs, including our center, have reported the use of functional prehabilitation to improve these outcomes after surgery. These interventions, including the 6-min walk test and peak expiratory flow rate, are intended to concurrently prepare patients, engage them in their own care, and improve their functional status before bariatric surgery.[3,4]

The third aspect of preoperative pain management is *patient education*. Ongoing work at our center and elsewhere are looking at how better education can help set realistic expectations for the postoperative period with regards to reducing pain, analgesic requirements, and expected side effects.[3-5] For this, we have seen the evolution of patient education from hard copy booklets and web-based programs to app-based interactive modules providing patients in contemporary bariatric programs with the necessary tools to have the best possible experience and outcomes.

Fourth and finally, special attention should be made towards addressing *psychosocial factors*. Among these, optimizing anxiety, depression, and catastrophizing can contribute to reductions in postoperative pain.[15] Patients with chronic pain or chronic opioid use should be referred preoperatively to appropriate pain specialists to better optimize their pain management and followed up after their elective surgery.

While further studies are required to confirm the importance of all these preoperative interventions, initial experience in bariatric anesthesia suggests significant benefits in terms of pain management from preparation, prehabilitation, and education [Figure 1].

Intraoperative Management

The perioperative pharmacology of acute pain management can be discussed using the framework of the WHO pain ladder.[1,2] In this approach, the pain ladder divides analgesics that are directed towards "nociceptive pain" into three steps - foundational analgesics (acetaminophen and non-steroidal anti-inflammatory drugs (NSAIDs)), weak opioids, and strong opioids. We briefly discuss their individual roles in pain management for patients undergoing bariatric surgery.

For most medications and as a general guideline, the use of ideal body weight (IBW, Height cms- 100) is the most widely applicable scalar to bariatric anesthesia.[1] This standardization of drug dosing to IBW is important to ensure the safety of pain management protocols in patients with morbid obesity with various oral drugs, intravenous infusions, and other parenteral therapies.

Acetaminophen

Acetaminophen is widely considered the cornerstone of perioperative analgesia in the general surgical population. In patients with morbid obesity, especially those with or at risk of having OSA, routinely administered acetaminophen reduces pain, opioid requirements, and side effects when compared to the more traditional opioid-centric approach. The benefits of using the later introduced intravenous formulation of acetaminophen have been supported by studies and experience in bariatric centers.[16] Additional benefits of parenteral acetaminophen include administration to patients unable to tolerate oral formulations - in the early postoperative period or postanesthesia care unit (PACU), those with significant postoperative nausea and vomiting (PONV), remaining strict nil per os (NPO) due to surgical reasons, and also those who are intubated and ventilated in intensive care unit (ICU).[17] Irrespective of the route of delivery, acetaminophen 1 g should be started at or 2 h before surgery and then continued every 6 h postoperatively for the first few days.

Non-steroidal anti-inflammatory drugs

The other components of foundational analgesia for nociceptive pain are the NSAIDs, which can contribute to additional excellent opioid-sparing analgesia. When not contraindicated, these drugs should be routinely scheduled for pain after bariatric surgery. The well-known perioperative concerns with NSAIDs (nephrotoxicity, gastrointestinal (GI) ulceration, and increased bleeding risk) are less likely with cyclooxygenase-2 (COX-2) inhibitors. In the bariatric surgical population, additional concerns include the risk of marginal ulcers, anastomotic leaks, and potentiation of acute renal failure in patients at risk or prolonged procedures where the risk of rhabdomyolysis increases. Ketorolac is a widely available parenteral anti-inflammatory that has been widely incorporated into many bariatric protocols.[18] While best given as a scheduled analgesic, in patients at risk for adverse effects (older, diabetics, and those with borderline renal function), the ketorolac dose and duration of use can be effectively reduced to "on demand" (prn) as a rescue analgesic in the early postoperative period. We have observed an interesting conundrum (yet unpublished) with the use of NSAIDs in bariatric anesthesia. Especially seen in patients with undiagnosed and/or untreated OSA, profound

respiratory depression can be seen after the administration of ketorolac in the PACU. This phenomenon is explained by the pain relief from the NSAIDs that "unmasks" the respiratory depressant effects of previously administered opioids. It is therefore important clinically that NSAIDs should be scheduled round the clock or, when used "on demand," precede the administration of opioids. This caveat further emphasizes the need for following a step-wise, severity-based, opioid-sparing approach, where foundational analgesics are administered on schedule and before the more potent opioids.

Tramadol

The second step on the nociceptive side of the WHO ladder was "reserved" for weak opioids.[2] While codeine and tramadol were previously considered here, their perioperative use remains controversial. Tramadol is a unique agent as it is "inherently multimodal" - weak mu-opioid receptor agonist with serotonergic and noradrenergic properties. These properties make tramadol especially effective not only for moderate nociceptive pain; it also has modest anti-hyperalgesic (see below) activity. Perioperative tramadol side effects in the bariatric surgical population include increased PONV, serotonin syndrome-inducing interactions (with anti-depressants), and more non-specific intolerance. Despite these, tramadol has been found useful in postoperative pain management after bariatric surgery.[19] Tapentadol is a newer molecule, approximately twice as potent as tramadol and devoid of the serotonin-related side effect profile.[20] Despite these promising advantages over tramadol, the evidence for tapentadol use in bariatric anesthesia is currently limited. As with any other pure mu-opioid receptor agonist, all these second-step "weak opioids" also have the potential for serious sedation and respiratory depression, especially in bariatric anesthesia and particularly in patients who have undiagnosed or untreated OSA. If encountered, these PRAEs should be treated with standard opioid reversal protocols.

Opioids

The "strong opioids" remain on the third step of the WHO nociceptive ladder. Opioid naïve patients with morbid obesity can be given titrated doses of opioid analgesics for moderate to severe pain that is not adequately controlled with step 1 and step 2 analgesics. Before initiating opioid analgesic therapy, the presence of hyperalgesia should ideally be sought using the DN4 (Douleur Neuropathique 4 Questions) questionnaire (see below) and appropriately treated.[1,2] In the postoperative period, if prolonged parenteral opioid therapy is required, the use of intravenous patient-controlled analgesia (IVPCA), with similar settings as in non-obese patients, has been described.[14] The use of continuous opioid infusions is generally contraindicated after bariatric surgery; patients who remain intubated and ventilated in ICU may be the only exception to this rule.

Opioid-dependent and tolerant patients should continue to receive their baseline opioid drugs, possibly with reduced doses, throughout the perioperative period. Opioid conversions and rotations may allow for improved analgesia with reduced doses in the chronic pain setting, but perioperatively these require both expertise and individualization of care and are generally not recommended. Similarly, the perioperative management of more complex pain patients undergoing bariatric surgery with methadone maintenance therapy, opioid antagonist therapy, and transdermal opioid therapy should always involve consultations with specialists with expertise in their use. The risk of poorly controlled acute pain has to be balanced against the risk of opioid overdose and acute withdrawal, both of which are most likely in these sub-groups of surgical patients with chronic opioid use. Therefore, for patients undergoing bariatric surgery with chronic opioid use, extended postoperative monitoring will be required - same-day discharge, ambulatory, or outpatient bariatric surgery should be avoided.[7,8]

Non-opioid Adjuvants

Over the past decade, perioperative pain management has seen a paradigm shift away from the traditional opioid-centric approach towards the use of more non-opioid analgesic adjuvants for acute pain.[1] We have integrated the non-opioid anti-hyperalgesic drugs into a modification of the WHO Pain Ladder and used a novel concept of the "Ottawa Step Ladder" to better understand this paradigm.[2] The Ottawa Step Ladder integrates the perioperative use of anti-hyperalgesic drugs (gabapentinoids, ketamine, lidocaine, and dexmedetomidine) into acute pain management. The use of these non-opioid adjuvants should be based on the identification of pro-nociception or acute neuropathic pain, which presents as hyperalgesia. Published evidence has described acute hyperalgesia or "pro-nociception" occurring more frequently in some patients undergoing certain surgical procedures.[21] This diagnosis of acute neuropathic pain can be objectively made with the validated DN4 questionnaire.[2] In our opinion, the presence of pronociception or hyperalgesia connects poorly controlled acute pain with the progression to chronic post-surgical pain and persistent opioid use after elective surgery. We believe an appreciation of this concept will improve immediate patient safety and long-term

outcomes in these patients, especially since there is a small but not insignificant risk of persistent opioid use after bariatric surgery [Table 1].

Gabapentinoids

These drugs have been used in a wide variety of surgical procedures with mixed results-some improvements in acute pain management and potential for prevention of progression to chronic post-surgical pain. Pregabalin has been studied and shown to reduce pain scores and analgesic consumption, but more so in patients undergoing painful procedures. Sedation and respiratory depression are well-known side effects when gabapentinoids are prescribed as routine premedication or in less painful procedures.[21] This may not be desirable or safe in patients with morbid obesity, with or without OSA, who are already at increased risk of PRAE. As mentioned previously, bariatric surgery is almost universally done laparoscopically with limited risk in progression to chronic pain or needing persistent opioid use. These latter two are other proposed benefits of perioperative gabapentinoids. Pregabalin is more widely studied as an adjuvant to improve perioperative pain management in bariatric anesthesia with mixed results.[22] Even if started in the postoperative period, gabapentin and pregabalin may increase sedation and potentiate opioid-induced respiratory depression, adversely impact sleep architecture, and impair balance and vision. Their use in the perioperative period should require a very careful assessment of the risk–benefit in patients after bariatric surgery, especially those with OSA.[21,22] Hence, the routine use of the gabapentinoids is not useful or justified in bariatric anesthesia unless the patient is already on them or develops acute hyperalgesia postoperatively.

Ketamine

Despite decades of use and other recent advances in the pharmacotherapy of acute pain, the NMDA antagonist ketamine remains the most widely available, easily administered, and relatively inexpensive non-opioid analgesic with a wide range of doses and applications. The popularity of ketamine in the perioperative period can be attributed to its analgesic, anti-hyperalgesic, and opioid-sparing effects. In contrast to opioids, ketamine provides additional cardiorespiratory stability and improvements in mood without sedation or respiratory depression. It should be noted that the beneficial effects and side effects of ketamine are primarily dependent on the dose administered and these can be considered as "high or anesthetic," "low or analgesic," and "ultra-low or anti-hyperalgesic" doses.

"High or anesthetic" dose of ketamine (bolus >1 mg/kg IBW and/or infusion of >1 mg/kg IBW/h) will result in profound analgesia but an unpredictable loss of consciousness and significant emergence phenomena. This should be reserved for use in trauma and/or anesthetic management where the patient's airway has been secured and prolonged controlled ICU ventilation is planned. "Low or analgesic" dose ketamine (bolus 0.5 mg/kg IBW and/or infusion of 0.5 mg/kg IBW/h) also provides excellent analgesia but can often be accompanied by psychomimetic effects, emergence reactions, and prolonged sedation. This dose range is widely used as an anesthetic adjunct, especially when regional anesthesia techniques and/or opioids have not been used. "Ultra-low" dose ketamine refers to the use of sub-analgesic doses (bolus <0.1 mg/kg IBW and/or infusion of <0.1 mg/kg IBW/h) and is almost always devoid of any neuropsychiatric effects. This is our recommended dose as a component of multimodal analgesia for laparoscopic bariatric surgery.[4,5] While studies support the use of ketamine in patients with morbid obesity as an analgesic, pragmatically it is almost always described in conjunction with other modalities.[23] In our experience, this allows for significant opioid-sparing analgesia without using larger doses that are associated with unpredictable emergence phenomena.

Dexmedetomidine

This novel short-acting intravenous α2-agonist is closely related to its predecessor, clonidine. Clonidine was also used as oral premedication in patients with morbid obesity and studied for the reduction of postoperative pain. The popularity and use of clonidine are limited by intraoperative bradycardia, hypotension, and postoperative sedation. These cannot be adjusted for, within the small clinically relevant dose range, especially when clonidine is given as a single oral dose before surgery.

Dexmedetomidine is a highly selective centrally acting intravenous α2-receptor agonist with fewer cardiovascular and CNS side effects than clonidine and was introduced as a "sedative without respiratory depression."[24] This clinical profile of dexmedetomidine was thought to be uniquely beneficial for use in patients with morbid obesity. Though tempered by the initial higher cost considerations, the excellent safety of dexmedetomidine in patients with SDB and OSA has led to its current popularity and widespread use in bariatric anesthesia. Dexmedetomidine significantly reduces opioid consumption and PONV in patients undergoing bariatric surgery, with earlier discharge from the recovery room and the hospital.[25] The administration of dexmedetomidine during laparoscopic surgery still requires

careful consideration. In our center, we use the IBW, avoid giving a bolus at induction, and initiate the infusion at a fixed rate (0.5 mcg/kg IBW/h) only after the pneumoperitoneum has been established. These three measures significantly reduce the otherwise frequent and sometimes problematic bradycardia, which has the potential to progress rapidly to asystole and cardiac arrest. Additional benefits of intraoperative dexmedetomidine include reductions in emergence phenomena and shivering in the PACU.

Lidocaine

This amide-type sodium channel blocker, when administered intravenously, is an anti-inflammatory and anti-hyperalgesic agent with additional opioid-sparing analgesic and anti-stress effects. Through direct and indirect effects on the gut, it promotes motility and prevents the development of postoperative ileus.[26] In the general surgical population, lidocaine has shown significant improvements in postoperative pain management and outcomes, especially after abdominal surgery.[27] The most commonly reported dose is 1–2 mg/kg IBW given as a bolus at induction of anesthesia and followed by an infusion of 1–2 mg/kg IBW/h continued till emergence. We have previously described the indications for the perioperative use of IV lidocaine and broadly divided it into two categories - as an alternative to regional anesthesia and in patients whose pain is expected to be difficult to treat.[26] In bariatric anesthesia, if any other regional block is planned (see below), the use of intraoperative intravenous lidocaine is to be avoided as it can increase the incidence of local anesthetic systemic toxicity (LAST). If, however, no regional technique is planned, intraoperative lidocaine infusions can be used to decrease pain and postoperative opioid requirements.[28] In our center, intravenous lidocaine is reserved only for revision bariatric surgery, previous intra-abdominal surgery, some patients with chronic pain, and those who have had previous prolonged ileus. In these situations, the intraoperative lidocaine infusion is stopped 20 to 40 min before the end of surgery to allow for wound infiltration or truncal blocks with other longer-acting local anesthetics (ropivacaine or bupivacaine). If a patient who has received a large volume local anesthetic block with these longer-acting agents develops an ileus and requires postoperative lidocaine, then lidocaine infusion can be started (without a bolus) 2 to 4 h after the block.

Regional Anesthesia

As mentioned previously, bariatric surgery is almost universally now performed laparoscopically. This has significantly diminished the role of neuraxial techniques. In patients with chronic pain or opioid use, those undergoing revision surgery with the possibility of conversion to open, there may be a role for epidural analgesia.[29] Akin to the evolution in laparoscopic colorectal pain management, intrathecal morphine may be useful in a small subset of bariatric surgical patients, especially when there are multiple or significant risk factors for poorly controlled acute pain or risk of conversion to open surgery.[30]

Currently, as different regional techniques are being investigated, overall, it appears that truncal blocks may provide additional or extended analgesia when compared to simple wound infiltration. Our group continues to study novel techniques in bariatric anesthesia - for example, intraperitoneal local anesthetic (IPLA) instillation and surgical laparoscopic transversus abdominus plane (LapTAP) block.[3-5] Overall, regional techniques have significant opioid-sparing benefits, high safety, and efficacy with the additional advantage of a minimal patient-to-patient variability in terms of clinical efficacy. Further techniques and research are needed to establish these as the standard of care in bariatric anesthesia.

Postoperative Pain Control

In postoperative pain, a scheduled step-wise, severity-based, opioid-sparing approach should be continued. Most patients recovering from bariatric anesthesia should be able to tolerate analgesics by the oral route immediately after surgery. With meticulous preoperative screening and testing, suspected or untreated OSA should be exceedingly rare. In patients with diagnosed and treated OSA, resumption of continuous positive airway pressure (CPAP) therapy can be initiated, especially if they are experiencing pain that is requiring opioid analgesia. In keeping with this cautious approach, poorly controlled pain in patients should be identified early and treated appropriately with the same step-wise approach. Opioids can be used, but in smaller and more frequent doses that are carefully titrated within the monitored setting, as there can be an exaggerated and delayed CNS depression in some patients recovering from bariatric anesthesia. Additional increased sensitivity to sedative effects of premedication, residual anesthetics, and inadequate neuromuscular blockade reversal can significantly potentiate the risk of PRAE, respiratory failure, and the need for either non-invasive ventilation or re-intubation. If left undetected, this "deadly triad of obesity, opioids, and OSA" can contribute significantly to postoperative mortality where OIVI results in severe hypercarbia and hypoxia and presents as sudden cardiac death - also referred to as the "dead in bed" syndrome.

A bariatric surgical patient with an elevated serum bicarbonate level is at high risk for sedation and/or serious respiratory depression from opioids. We recommend avoiding or decreasing doses of opioids and increasing the frequency of (or continuous) monitoring. Early and prompt reversal of CNS depression with naloxone (40–80 mcg IV bolus repeated every 5 min, up to 400 mcg) should be part of all standard bariatric anesthesia postoperative protocols. While postoperative monitoring should be directed towards detecting hypoxia, pulse oximetry alone may not detect hypoventilation and brief apneic episodes, especially when supplemental oxygen is administered. Despite its drawbacks, respiratory rate monitoring should be considered after bariatric surgery - using continuous electrocardiogram (ECG) monitoring to measure respiratory rate may provide important information about patients at risk. More accurate postoperative respiratory monitoring can be achieved by measuring exhaled CO_2 (capnography) and newer monitors available have been adapted to nasal prongs and face masks. All these monitoring techniques will improve the safety of acute pain management in bariatric surgical patients.

If an IVPCA is required after bariatric surgery, a premixed solution containing opioids with ketamine can be considered. The combination of ketamine with morphine (1:1) can be prescribed for delivery via a standard IVPCA device. This combination has significant benefits - decreases opioid consumption, pain scores, and improves the quality of analgesia (mood and patient satisfaction) with reductions in PRAE, sedation-respiratory depression, and PONV.[31]

In the immediate and delayed postoperative period, continuing analgesic medications after bariatric surgery may require dose adjustments due to changes in pharmacokinetics due to altered gastric motility, volume and acid content, surface area for absorption, and first-pass metabolism.[32]

Some patients will require follow-up for pain management after bariatric surgery as readmissions for poorly controlled pain have been reported.[33] Postoperative in-hospital opioid use following laparoscopic bariatric surgery may also predict opioid use after discharge.[34]

Studies continue to evaluate the prediction and prevention of chronic post-surgical pain, persistent opioid use, and long-term pain outcomes after bariatric surgery [Figure 1 and Table 1]. The evidence thus far supports preoperative education and prehabilitation, implementation of ERAS programs, and the use of structured pain management protocols.[9-14] Therefore, perioperative pain-related interventions have benefits beyond early discharge and enhanced recovery. We believe that this focus on long-term reductions in pain and persistent opioid use will allow for these patients to achieve all the benefits of undergoing weight loss surgery.

Conclusions

Laparoscopic bariatric surgery has become the standard of care for surgical management of obesity and morbid obesity. Standardization of perioperative pain management has benefitted from pragmatic and practical ERAS pathways that ensure excellent analgesia with perioperative opioids. Patients with morbid obesity who have OSA continue to be a challenge with regard to PRAE and require extended monitoring. Regional techniques continue to evolve and standardized integration of non-opioid adjuvants shows promising improvements. As rapid advances and further improvements in perioperative pain management and general care of the bariatric surgical population continue, it is hoped that other surgical patients with morbid obesity would benefit from being included in these processes, protocols, and programs.

Conflicts of interest
There are no conflicts of interest.

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