

Opioid Free Anaesthesia; An Epoch Making Turn in the Newage of Laparoscopic Surgeries: A Mini Review

Ramanayanan Raghupathy, Dhivya Thiyagarajan*

Department of Anaesthesiology, Velammal Medical College Hospital and Research Institute, Madurai, Tamil Nadu, India

ABSTRACT

Pain is often severe after laparoscopic surgeries which can be a incisional pain, visceral pain or shoulder pain and the postoperative pain relief is often provided by NSAIDs, paracetamol and opioids. The opioid epidemic and the opioid side effects have led perioperative physicians to find a way of decreasing the use of opioids. Increasing the use of regional anaesthesia techniques is one of the measures to this end. This review focusses on the various opioid free anaesthesia techniques that can be used in laparoscopic surgeries. Constipation, respiratory depression, urine retention, and postoperative nausea and vomiting are only a few of the side effects that are frequently linked to the administration of opioids.

Keywords: Magnesium; Opioid; Postoperative pain; Block

INTRODUCTION

The number of opioid overdoses has increased in recent years due to the increased use of opioids in the management of chronic pain and increasing use of highly potent opioids in the illicit drug market. Peri-operative opioid administration has long been one of the three pillars of balanced anaesthesia, with the goals of providing peri-operative pain relief and pre-emptive analgesia [1]. People nowadays opt for laparoscopic surgeries as it is a relatively painless procedure; it causes severe pain especially in the first 4 hours in the immediate postoperative period. Opioid administration is often associated with many side-effects such as constipation, respiratory depression, urinary retention and postoperative nausea and vomiting. Peri-operative opioid administration has been one of the contributing factors for opioid abuse and has led to the current world-wide opioid epidemic. There is a shift in paradigm from opioid based anaesthesia to opioid free multimodal analgesia. We as anaesthesiologists are in a place to manage the pain effectively by reducing opioid usage and implementing non opioid analgesic regimens which include a cocktail of drugs like lidocaine, magnesium, dexmedetomidine, clonidine, paracetamol along with regional fascial plane blocks.

LITERATURE REVIEW

Role of lidocaine in opioid free anesthesia

Lidocaine, prototype of amino-amides is a weak base and short acting local anaesthetic. At higher levels side effects like confusion, agitation, metallic taste, perioral numbness, dizziness, slurred speech, diplopia, tinnitus, muscular spasms, and seizures were being reported. Perioperative advantages of intravenous lignocaine include reduction in pain, nausea, opioid consumption, early bowel function and inflammation after surgery. Analgesic effects of lignocaine are noted with levels lower than 5 mcg/ml. Lignocaine has analgesic, anti-hyperalgesic and anticonvulsant properties. Intraoperative lidocaine infusion reduces the requirement of inhalational agents, muscle relaxants, and reduces postoperative pain and ileus.

A Cochrane review study which included 68 Randomised Controlled Trial (RCT) showed that continuous infusion of lidocaine versus placebo group did not show significant difference in pain scores at 24 hours. Also effects of IV lignocaine on anaesthetic requirement and intraoperative hemodynamics have been evaluated by numerous clinical trials.

Correspondence to: Dhivya Thiyagarajan, Department of Anaesthesiology, Velammal Medical College Hospital and Research Institute, Madurai, Tamil Nadu, India, E-mail: dhivyasingh@gmail.com

Received: 10-Jul-2023, Manuscript No. JACR-23-25439; **Editor assigned:** 12-Jul-2023, Pre QC No. JACR-23-25439 (PQ); **Reviewed:** 26-Jul-2023, QC No. JACR-23-25439; **Revised:** 02-Aug-2023, Manuscript No. JACR-23-25439 (R); **Published:** 09-Aug-2023, DOI: 10.35248/2155-6148.23.14.1109.

Citation: Raghupathy R, Thiyagarajan D (2023) Opioid Free Anaesthesia; An Epoch Making Turn in the Newage of Laparoscopic Surgeries: A Mini Review. J Anesth Clin Res. 14:1109.

Copyright: © 2023 Raghupathy R, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Adouble blinded RCT showed no significant differences in Mean Arterial Pressure (MAP) and heart rate before induction, during surgery and in the recovery but also showed that mean end tidal sevoflurane concentration was 48% lower in the lignocaine group.

Role of magnesium in opioid free anaesthesia

Also, magnesium an N-Methyl-D-Aspartate (NMDA) receptor antagonist exerts its analgesic effects by regulating calcium entry into the cells, prevents central sensitization and abolishes hypersensitivity post injury states. Data's have been published regarding the role of magnesium in reducing anaesthetic requirements and achieving controlled hypotension.

Intraoperative use of Magnesium Sulphate ($MgSO_4$) was associated with better hemodynamics, good analgesic effect and no side effects postoperatively. A meta-analysis of four RCTs with 263 patients on the analgesic effect of magnesium after laparoscopic cholecystectomy reported a substantial decrease in pain scores at an early stage (at 2 and 8 hours) and reduction in analgesic consumption. Also a systemic review of 11 RCTs showed that perioperative administration of $MgSO_4$ intravenously could reduce adverse effects such as vomiting, nausea, shivering and also postoperative analgesic consumption.

Role of fascial plane block in opioid free anaesthesia

Incisional pain contributes more in postlaparoscopic pain than visceral pain; hence studies should focus on decreasing this type of pain. Hence abdominal wall fascial plane blocks using local anaesthetics should be utilised in decreasing this type of pain which provide effective pain relief in the first 24 hours. Erector Spinae Plane (ESP) block is a recently described technique, by Forero for treating chronic thoracic neuropathic pain. Diffusion of the local anaesthetic along the thoracolumbar fascia and also its effects on the ventral and dorsal rami of the spinal nerve provides visceral and somatic analgesia. A study showed that continuous ESP blocks produced significant decrease in morphine consumption, rapid patient mobilization and reduced pain. As this procedure is safe and easy to perform, several authors have expressed their opinion that it could be part of the multimodal analgesia of the enhanced recovery after surgery programs.

A meta-analysis of RCTs conducted by Koochang, et al. included 8 RCTs evaluating the effects of erector spinae plane block on postoperative pain after laparoscopic cholecystectomy showed that postoperative opioid consumption was significantly lower in the erector spinae plane block group with Mean Difference (MD)-4.72, 95% CI-6.00 to-3.44, $p<0.001$ compared to the control group. This meta-analysis demonstrated a significant difference in the 12 h pain scores (MD-0.56, 95% CI-1.04 to-0.07, $p=0.031$), whereas no significant difference in the 24 h pain scores between the two groups was observed (MD-0.25, 95% CI-0.69 to 0.18, $p=0.194$). Others include Transverse Abdominis Plane (TAP) block, Oblique Subcostal Transverse Abdominis Plane (OSTAP) block, Rectus sheath block which can be supplemented in laparoscopic surgeries [2].

A prospective study by Raghupathy, et al. comparing opioid free anaesthesia with opioid based anaesthesia for post-operative pain relief was conducted among 60 patients posted for laparoscopic surgeries. Anaesthetic doses of lidocaine, magnesium and paracetamol in combination with fascial plane block (Erector spinae plane block) for postoperative pain relief was given for 30 patients and the other 30 patients received the conventional opioid based anaesthesia. Results showed that the VAS scores were higher in conventional group as compared to opioid free group at 0, 2, 4, 6 hours during rest and at 0, 2, 4, 6, 24 hours during movement and was statistically significant (P value <0.05). Duration of analgesia for conventional group was 13.8 ± 6.7 hours and for opioid free anaesthesia was 6.7 ± 2.2 hours. Analgesic requirement was higher in conventional group. Hemodynamic parameters did not show statistically significant results except systolic blood pressure (P value 0.013). Ketamine was excluded in this study due to its adverse effects and impact on recovery [3].

A Randomized control trial showed that using propofol, dexmedetomidine and lignocaine infusions for laparoscopic cholecystectomy was associated with lower pain scores, reduced rescue analgesia consumption and also as an alternative to opioid, especially for patients at high risk for postoperative nausea and vomiting [4].

A systemic review and meta-analysis of 23 RCT by Frauenknecht, et al. investigated whether opioid-inclusive, compared with opioid-free anaesthesia, would reduce postoperative pain, without increasing the rate of postoperative nausea and vomiting in 1304 patients and concluded that pain scores at rest and at two postoperative hours were equivalent and the rate of postoperative nausea and vomiting were reduced in the opioid free group [5].

Toleska et al., conducted Hospital based randomized, single-blind study. A total of 60 patients scheduled for elective laparoscopic cholecystectomy were the study participants. They were divided into 2 groups. 30 patients received anaesthesia with fentanyl (F group-FG), and the other half received opioid-free general anaesthesia. Postoperatively Visual Analogue Scale (VAS) scores were followed at rest and when coughing 1 hour, 4 hrs, 8 hrs, 12 and 24 hrs. It was found in the Opioid Free Anaesthesia (OFA) group 24 hours after surgery none of the patients reported pain at rest and when coughing number 7, 8, 9 and 10 hours according to the VAS pain score. The total opioid requirement in the postoperative period was significantly higher in the Fentanyl Group (FG) at rest and when coughing, compared to the OFA group. The author concluded opioid-free anaesthesia as a part of multimodal analgesia anaesthesiology technique is a safe procedure, in patients undergoing elective laparoscopic cholecystectomy [6].

What's new in opioid free anaesthesia?

Regional anaesthesia adds another new dimension to opioid free anaesthesia. A new era of regional anaesthesia belongs to segmental spinal anaesthesia which is considered as an alternative to general anaesthesia especially in high risk patients with cardiac, respiratory (post COVID) compromise which is

nothing but blocking of required dermatomes using very low effective local anaesthetic drug dose. Laparoscopic cholecystectomies can be performed using segmental spinal using low dose of 0.5% isobaric Bupivacaine (1.5 ml) and Dexmedetomidine (10 mcg) can be used as an adjunct thereby avoiding opioid usage. This provides less postoperative problems and shorter hospital stay.

DISCUSSION

This review focusses on the opioid free anaesthesia techniques that can be used in laparoscopic surgeries. Based on literature review, we have found that opioid free anaesthesia provides a better and safe alternative to opioid based anaesthesia. Opioid free anaesthesia requires a learning curve in the administration and monitoring to become effective. Although opioid free anaesthesia is considered better its usage has been limited because of its side effect profile (hallucinations with ketamine, respiratory depression and muscle relaxation with magnesium, nephrotoxicity with NSAIDS, hepatotoxicity with paracetamol, hemodynamic instability with alpha 2 agonists), lack of training, cost of opioid free techniques, need for more evidence based research and guidelines on its usage. Also with the advent of ultrasonogram, regional anaesthesia techniques and nerve blocks play an integral part in the management of multimodal anaesthesia. Enhanced Recovery After Surgery (ERAS) protocol forms a better guide in implementing opioid free anaesthesia by minimising postoperative nausea and vomiting and shorter hospital stay. Also opioid free anaesthesia usage has spread its wings into various other specialities like neurosurgery (role of dexmedetomidine in neurosurgery and neuroradiology), oncoanaesthesia (opioid free anaesthesia has been implicated in preventing cancer recurrence). Evidence based studies are still required for a better future towards opioid free anaesthesia.

CONCLUSION

Fascial plane block along with intravenous opioid free anaesthesia provides not only an additive but also a synergistic effect on postoperative pain relief with mild pain scores, lesser anaesthetic drug requirement, reduced or nil opioid consumption.

Opioid free anaesthesia can serve as alternatives for selected patients towards unwanted effects from opioids. Regional anesthesia techniques and nerve blocks play a crucial role in the treatment of multimodal anesthesia, which was also made possible by the development of the ultrasonogram. The Enhanced Recovery After Surgery (ERAS) protocol, which reduces postoperative nausea and vomiting and reduces hospitalizations, also provides a better structure for implementing opioid-free anesthesia.

ACKNOWLEDGEMENT

I thank my institution and my mentors for providing me with the opportunity to do this study.

CONFLICTS OF INTEREST

Nil

REFERENCES

1. Wardhan R, Chelly J. Recent advances in acute pain management: understanding the mechanisms of acute pain, the prescription of opioids, and the role of multimodal pain therapy. *F1000Res*. 2017;6.
2. Koo CH, Hwang JY, Shin HJ, Ryu JH. The effects of erector spinae plane block in terms of postoperative analgesia in patients undergoing laparoscopic cholecystectomy: a meta-analysis of randomized controlled trials. *J Clin Med*. 2020;9(9):2928.
3. Ragupathy R, Prabhu SG, Thiyagarajan D, Vijay Anto . Opioid-free anaesthesia for laparoscopic surgeries-A prospective non-randomised study in a tertiary care hospital. *Indian J Anaesth*. 2022;66(3):207.
4. Bakan M, Umutoğlu T, Topuz U, Uysal H, Bayram M, Kadioglu H, et al. Opioid-free total intravenous anesthesia with propofol, dexmedetomidine and lidocaine infusions for laparoscopic cholecystectomy: a prospective, randomized, double-blinded study. *Braz J Anesthesiol*. 2015;65:191-199.
5. Frauenknecht J, Kirkham KR, Jacot-Guillarmod A, Albrecht E. Analgesic impact of intra-operative opioids vs. opioid-free anaesthesia: a systematic review and meta-analysis. *Anaesthesia*. 2019;74(5): 651-662.
6. Toleska M, Dimitrovski A. Is opioid-free general anesthesia more superior for postoperative pain versus opioid general anesthesia in laparoscopic cholecystectomy?. *pril*. 2019;40(2):81-87.