

Post-Operative Pain Management in Elective Laparotomies in a Tertiary Care Facility: A Prospective Observational Assessment

Alok Kumar Niranjan¹, Sanjeet Kumar²

¹Senior Resident, Department of General Surgery, Jannayak Karpoori Thakur Medical College and Hospital Madhepura, Bihar, India

²Senior Resident, Department of General Surgery, Jannayak Karpoori Thakur Medical College and Hospital Madhepura, Bihar, India

Received: 25-05-2022 / Revised: 20-06-2022 / Accepted: 10-07-2022

Corresponding author: Dr. Sanjeet Kumar

Conflict of interest: Nil

Abstract

Aim: Prospective analysis of post-operative pain management in elective laparotomies in a tertiary care centre in Bihar region.

Methods: This prospective observational study conducted in the Department of General Surgery, Jannayak Karpoori Thakur Medical College and Hospital Madhepura, Bihar, India, India from August 2020 to July 2021. 100 patients who underwent elective laparotomy were provided details about the study and method. Informed written consent was obtained. Detailed history of the patient, condition, surgery performed, analgesics used were documented. NRS score was calculated.

Results: A total of 100 patients were included among which 41(41%) were female and 59 (59%) were the male patients. Most common mode of analgesia used was combined analgesia. Injection tramadol 50 mg in 100 ml normal saline with continuous epidural bupivacaine in 48 (48%) patients followed by injection diclofenac AQ 75 mg in 100 ml N.S with continuous epidural in 32(32%) patients. Pearson's Chi square test for intravenous and epidural analgesics: value-2.31, df (degrees of freedom)-8, p=0.88. By the second day 53(53%) patients were shifted to oral analgesics most common drug used was the combination of aceclofenac, paracetamol and serratiopeptidase. 7(7%) patients were on transdermal patch on post-operative day 2 and 2 (2) patients were on diclofenac patch and 5 (5%) patients were on fentanyl patch. The use of analgesics was shifted from parenteral to oral route from post-operative day 2. All the patients received analgesics within 6 hours of surgery. NRS score was recorded for all the 100 patients on postoperative days 1, 2 and 3. Severity of pain gradually reduced from postoperative days 1-3 with the use of various analgesics.

Conclusion: Multimodal analgesia was used in most of the patients for management of postoperative pain combined analgesia was better mode of pain management method than a single analgesic. For 48(48%) of patient's opioid with epidural was used for post-operative pain and for 32 (32%) of patients NSAID with epidural was used for post-operative pain.

Keywords: analgesia, NSAID, transdermal patch, laparotomies

This is an Open Access article that uses a fund-ing model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Pain continues to be a significant problem following laparotomy. [1,2] In this era of fast track surgery, the ERAS (enhanced recovery after surgery) group has suggested that a multimodal rehabilitation programme with epidural analgesia, short laparotomy, early feeding and early mobilisation improve outcomes after elective colonic surgeries. [3] Pain is subjective, and it is modified by developmental, behavioural, personality factors. Post-surgical pain is initially of acute it may be nociceptive, inflammatory or neuropathic in nature. It is a common postoperative complication. Post-operative pain may progress to chronic pain leading to prolonged rehabilitation and recovery. Poorly controlled pain is associated with poor mobility, prolonged hospital stays, and increased complication rates. Pain assessment scales were-Numerical rating scale (NRS), visual analog scale (VAS), defence and veterans pain rating scale (DVPRS), Adult non- verbal pain scale (NVPS), pain assessment in advanced dementia scale (PAINAD), Behavioural pain scale (BPS) and critical-care pain observation tool (CPOT). Commonly used to evaluate pain intensity, the visual analogue scale, verbal rating scale and numerical rating scale are valid, reliable and appropriate for use in monitoring postoperative pain in patients who are able to self-report. [4]

Material and methods

This prospective observational study conducted in the Department of General Surgery, Jannayak Karpoori Thakur Medical College and Hospital Madhepura,

Bihar, India, India from August 2020 to July 2021. All patients who underwent elective laparotomy were provided details about the study and method. Informed written consent was obtained. Detailed history of the patient, condition, surgery performed, analgesics used were documented. NRS score was calculated.

Inclusion criteria

- Patients who had undergone an elective laparotomy
- Had a stay of at least 3 days post operatively

Exclusion criteria

- Patients with cognitive impairment, critically ill and intubated patients
- Patients under the age of 18 years

Statistical analysis

The collected data were analysed with IBM SPSS Statistics for Windows, version 25.0. (Armonk, NY: IBM Corp). To describe about data descriptive statistics frequency analysis, percentage analysis was used for categorical variables and the mean and SD were used for continuous variables. In both the above statistical tools probability value 0.05 is considered as the significant level.

Results

A total of 100 patients were included among which 41(41%) were female and 59 (59%) were the male patients. The patients who underwent elective laparotomies were aged between 20 and 38 (38%) patients were in the age group of 40-50 years (Table 1).

Table 1: Age distribution

| Age (Years) | No. of patients |
|-------------|-----------------|
| 20-30 | 5 |
| 30-40 | 26 |
| 40-50 | 40 |
| 50-60 | 22 |
| 60-70 | 7 |

The 20 different types of surgeries were recorded. The most common surgery performed in our study was open appendectomy which included 21 (21%) patients followed by open cholecystectomy (for carcinoma gall bladder and other indications) which included 9(9%) patients (Table 2).

Four different types of anaesthesia were used. Most common was general anaesthesia with transverse plane block which was used in 53 (38%) patients, followed by general anaesthesia with quadratus lumborum block which was used in 30 (21%) patients as shown in the Table 3.

Table 2: Surgery details

| Type of surgery | N |
|---|----|
| Gastrectomy | 7 |
| Gastrojejunostomy + truncal vagotomy | 3 |
| Open cholecystectomy with CBD exploration | 8 |
| Open partial nephrectomy | 2 |
| Whipple's procedure | 5 |
| Lap converted to open cholecystectomy | 3 |
| Open appendectomy | 21 |
| Open cholecystectomy (carcinoma gall bladder and other indications) | 9 |
| Right hemicolectomy | 5 |
| Left hemicolectomy | 4 |
| Exploratory laparotomy (tuberculosis abdomen) | 6 |
| Hydatid cyst of the liver (excision of the cyst) | 4 |
| Splenectomy | 1 |
| Lateral pancreaticojejunostomy | 3 |
| Tran-shiatal esophagectomy | 2 |
| Ileocecal resection and anastomosis (ileocecal tuberculosis) | 6 |
| Ileocecal resection and anastomosis (other indications) | 4 |
| Abdominoperineal resection | 3 |
| Abdominal wall reconstruction | 1 |
| Exploratory laparotomy for other indications | 7 |

Table 3: Anaesthesia details

| Type of anaesthesia | N |
|---|----|
| General anaesthesia (propofol) | 20 |
| Spinal anaesthesia (bupivacaine in hyperbaric solution) | 18 |
| GA+TAP [general anaesthesia+ transversus abdominis plane block (propofol with bupivacaine)] | 38 |
| GA+QL [general anaesthesia+ quadratus lumborum block (propofol with bupivacaine)] | 21 |
| SA+TAP (spinal anaesthesia + transversus abdominis plane block) | 3 |

Single analgesia

Injection tramadol 50 mg in 100 ml normal saline, injection PCT (paracetamol) 100

ml, injection diclofenac aq. 75 mg/ml in 100 ml normal saline and the tablet Ultracet.

Combined analgesia

Injection tramadol 50 mg in 100 ml normal saline with Epidural top-up (bupivacaine), injection diclofenac 75 mg/ml in 100 ml normal saline with epidural top up (bupivacaine).

Tablet aceclofenac with paracetamol (PCT) and serratiopeptidase, tablet aceclofenac with PCT, Diclofenac transdermal patch with tablet Ultracet, fentanyl transdermal patch with tablet ltracet.

Analgesics used on post-operative days 1-3

Most common mode of analgesia used was combined analgesia. Injection tramadol 50 mg in 100 ml normal saline with continuous epidural bupivacaine in 48 (48%) patients followed by injection

diclofenac AQ 75 mg in 100 ml N.S with continuous epidural in 32(32%) patients.

Pearson's Chi square test for intravenous and epidural analgesics: value-2.31, df (degrees of freedom)-8, p=0.88 (Table 4). By the second day 53(53%) patients were shifted to oral analgesics most common drug used was the combination of aceclofenac, paracetamol and serratiopeptidase. 7(7%) patients were on transdermal patch on post-operative day 2 and 2 (2) patients were on diclofenac patch and 5 (5%) patients were on fentanyl patch. The use of analgesics was shifted from parenteral to oral route from post-operative day 2. All the patients received analgesics within 6 hours of surgery. Pearson's Chi square test for oral and transdermal patch analgesics: value-2.11, df-5, p=0.75.

Table 4: Analgesics (Intravenous with epidural) used on post-operative day 1-3

| Type of analgesic (Intravenous + epidural) | N (%) POD1 (<6 hours) | N (%) POD2 (24-48 hours) | N (%) POD3 (48-72 hours) |
|--|-----------------------------|-----------------------------------|-----------------------------------|
| Inj. tramadol 50 mg/ml in 100 ml NS (tid) | 12 | 5 | 2 |
| Inj. diclofenac aq. 75 mg in 100 ml NS | 5 | 33 | 1 |
| Inj. pct 100 ml (tid) | 3 | 2 | Nil |
| Inj. Tramadol 50 mg in 100 ml NS (tid) + continuous epidural (bupivacaine) | 48 | 24 | 8 |
| Inj. Diclofenac aq. 75 mg/ml in 100 ml NS (tid) + continuous epidural (bupivacaine) | 32 | 10 | 4 |

NS- normal saline, tid-three times a day

Table 5: NRS score on post-operative days 1-3

| NRS score | N (%), POD 1 | N (%), POD 2 | N (%), POD 3 |
|----------------|--------------|--------------|--------------|
| Mild (1-3) | 18 (18) | 34 (34) | 46 (46) |
| Moderate (4-6) | 34 (34) | 42 (42) | 26 (26) |
| Severe (7-10) | 48 (48) | 24 (24) | 8 (8) |
| No pain | Nil | Nil | 20 (20) |

POD-post-operative day

Numerical rating scale

NRS score was recorded for all the 100 patients on postoperative days 1, 2 and 3.

Severity of pain gradually reduced from post-operative days 1-3 with the use of various analgesics.

Pearson's chi square test for NRS score: value-121.37, df-6, p=0.0005 (Table 5).

Discussion

The prevention and alleviation of post-operative pain are core responsibilities for healthcare professionals. [5] Publication of the joint working party report pain after surgery by the Royal college of surgeons and college of anaesthetists propelled an expansion in multidisciplinary IPSs across the UK. [6] This was in response to an acknowledgement that postoperative pain management was inadequate, having 'not advanced significantly for many years. [6]

Multimodal analgesia involves choosing drugs that act on different parts of the anatomical pain pathways. In general, analgesic medications act by inhibiting ascending pain signals, either in the periphery or centrally in the spinal cord and brain and facilitating descending inhibitory spinal pathways. [7]

Drugs with different mechanisms of action are then combined to produce synergistic effects, allowing use of lower doses, thus reducing the burden of side-effects from single-drug strategies. When given prophylactically, intravenous paracetamol is associated with reduced postoperative nausea and vomiting, postulated to be due to superior pain control. [8] Observational cohort study of 9264 patients undergoing elective or emergency gastrointestinal surgery reported that use of NSAIDs was not associated with major complications, acute kidney injury or postoperative bleeding after propensity score matching and adjusting for confounding factors. [9]

Opioids have long been the cornerstone treatment for moderate and severe acute pain. In the USA, a survey of patients receiving chronic opioid therapy revealed that 27% were first started on opioids after surgery. [10]

Current ERAS guidelines for elective colorectal surgery recommend thoracic epidural analgesia (EA) for open surgery but not for laparoscopic procedures. Recommendations appear surgery-specific, as thoracic EA is recommended as in the past decade, new abdominal truncal blocks, including transversus abdominis plane (TAP) and rectus sheath blocks, have grown in popularity. [11,13] The TAP block provides analgesia by blocking the seventh to 11th intercostal nerves (T7-T11), the subcostal nerve (T12), and the ilioinguinal and iliohypogastric nerves (L1-L2). [12]

In our study A total of 100 patients were included among which 41(41%) were female and 59 (59%) were the male patients. The patients who underwent elective laparotomies were aged between 20 and 38 (38%) patients were in the age group of 40-50 years. Similar study was conducted by enhanced recovery of surgery which included 378 patients. In a multicenter drug utilization study done by Vallano et al in Spain, nine hundred and ninety-three patients (547 men) were included. [16]

The 48(48%) and 34(34%) number of patients experienced severe and moderate pain on postoperative day 1 of surgery in the current study. In a 2016 cross-sectional observational study of over 15 000 UK patients undergoing surgery, 11% reported severe pain and 37% reported moderate pain in the first 24 hours. [14]

A German prospective cohort study of 50 523 patients reported that up to 47.2% of patients experienced severe pain (numerical rating scale score at least 8) in the first 24 hours after surgery. [15] The 20 different types of surgeries were recorded. The most common surgery performed in our study was open appendectomy which included 21 (21%) patients followed by open cholecystectomy (for carcinoma gall bladder and other indications) which included 9(9%) patients. In the study

conducted by Vallano et al the more common surgical procedures were inguinal hernia repair (315 patients, 32%), cholecystectomy (268, 27%), appendectomy (140, 14%), bowel resection (137, 14%), and gastric surgery (58, 6%). [16] Most common mode of analgesia used was combined analgesia. Injection tramadol 50 mg in 100 ml normal saline with continuous epidural bupivacaine in 48 (48%) patients followed by injection diclofenac AQ 75 mg in 100 ml N.S with continuous epidural in 32(32%) patients.

Pearson's Chi square test for intravenous and epidural analgesics: value-2.31, df (degrees of freedom)-8, p=0.88. Vallano et al in their study included five hundred and eighty-seven patients (59%) who only received a non-opioid analgesic, and 89 (9%) only received an opioid analgesic. [16] NRS scoring system was used to measure the degree of pain in our study. Vallano et al used visual analogue scale (VAS) to measure the degree of pain. [16]

Our study used combined analgesia with epidural for 81(81%) patients to control postoperative pain. Continuous thoracic epidural analgesia is recommended by prospect for postoperative pain management following laparotomy, ensuring an appropriate level according to the site of incision. [17] Rodgers et al, Beattie et al, and Ballantyne et al that showed reductions in mortality and morbidity in patients receiving epidurals compared with postoperative systemic morphine. [18-21]

Conclusion

Multimodal analgesia was used in most of the patients for management of post-operative pain combined analgesia was better mode of pain management method than a single analgesic. For

48(48%) of patient's opioid with epidural was used for post-operative pain and for 32 (32%) of patients NSAID with epidural was used for post-operative pain.

Reference

1. Ahmed A, Latif N, Khan R. Post-operative analgesia for major abdominal surgery and its effectiveness in a tertiary care hospital. *J Anaesthesiol Clin Pharmacol* 2013;29:472-7.
2. Singh PK, Saikia P, Lahakar M. Prevalence of acute post-operative pain in patients in adult age-group undergoing inpatient abdominal surgery and correlation of intensity of pain and satisfaction with analgesic management: A cross-sectional single institute-based study. *Indian J Anaesth* 2016;60:737-43.
3. King PM, Blazeby JM, Ewings P, Longman RJ, Kipling RM, Franks PJ, et al. The influence of an enhanced recovery programme on clinical outcomes, costs and quality of life after surgery for colorectal cancer. *Colorectal Dis* 2006;8:506-13.
4. Breivik H, Borchgrevink PC, Allen SM, Rosseland LA, Romundstad L, Hals EKB et al. Assessment of pain. *Br J Anaesth*. 2008;101:17-24.
5. Brennan F, Carr DB, Cousins M. Pain management: a fundamental human right. *Anesth Analg*. 2007;105:205-221.
6. Royal College of Surgeons of England and College of Anaesthetists. Pain after Surgery. Royal College of Surgeons: London. 1990;67:353-9.
7. Kehlet H, Dahl JB. The value of 'multimodal' or 'balanced analgesia' in postoperative pain treatment. *Anesth Analg*. 1993;77:1048-56.
8. Apfel CC, Turan A, Souza K, Pergolizzi J, Hornuss C. Intravenous acetaminophen reduces postoperative nausea and vomiting: a systematic review and meta-analysis. *Pain*. 2013;154:677-89.
9. STAR Surg Collaborative. Safety of nonsteroidal anti-inflammatory drugs in major gastrointestinal surgery: a prospective, multicenter cohort study. *World J Surg*. 2017;41:47-55.

10. Callinan CE, Neuman MD, Lacy KE, Gabison C, Ashburn MA. The initiation of chronic opioids: a survey of chronic pain patients. *J Pain*. 2017;18:360-65.
11. Gustafsson UO, Scott MJ, Hubner M, Nygren J, Demartines N, Francis N et al. Guidelines for perioperative care in elective colorectal surgery: Enhanced Recovery After Surgery (ERAS®) Society recommendations: 2018. *World J Surg*. 2019;43:659-95.
12. Low DE, Allum W, De Manzoni G, Ferri L, Immanuel A, Kuppusamy M et al. Guidelines for perioperative care in esophagectomy: Enhanced Recovery After Surgery (ERAS®) Society recommendations. *World J Surg*. 2019;43:299-330.
13. National Institute of Academic Anaesthesia (NIAA) Health Services Research Centre. Perioperative Quality Improvement Programme Annual Report 2018-19. NIAA: London, 2019.
14. Walker EMK, Bell M, Cook TM, Grocott MPW, Moonesinghe SR. Central SNAP1 Organisation; National Study Groups. Patient reported outcome of adult perioperative anaesthesia in the United Kingdom: a cross-sectional observational study. *Br J Anaesth*. 2016;117:758-66.
15. Gerbershagen HJ, Aduckathil S, Van Wijck AJM, Peelen LM, Kalkman CJ, Meissner W. Pain intensity on the first day after surgery: a prospective cohort study comparing 179 surgical procedures. *Anesthesiol*. 2013;118:934-44.
16. Vallano A, Aguilera C, Arnau JM, Baños JE, Laporte JR. Management of postoperative pain in abdominal surgery in Spain. A multicentre drug utilization study. *Br J Clin Pharmacol*. 1999;47(6):667-73.
17. Prospect. Available at: https://www.postoppain.org/sections/?root_id=27323_§ion=4. Accessed 16 Jan 2019.
18. Rodgers A, Walker N, Schug S. Reduction of postoperative mortality and morbidity with epidural or spinal anaesthesia: results from overview of randomised trials. *BMJ*. 2000;321(7275):1493.
19. Beattie WS, Badner NH, Choi P. Epidural analgesia reduces postoperative myocardial infarction: ameta-analysis. *Anesth Analg*. 2001;93(4):853-8.
20. Ballantyne JC, Carr DB, De Ferranti S. The comparative effects of postoperative analgesic therapies on pulmonary outcome: cumulative meta-analyses of randomized, controlled trials. *Anesth Analg*. 1998;86(3):598-612
21. Good A., Wells A., Katz B., Alexander M., Klokol D., Chen M. K., Wong M. B., Cox, D. C., & Lakey J. R. MALDI-ToF Analysis of Mitochondrial Peptides. *Clinical Medicine Insights*, 2022;3(2), 297–303.