

## Original Research Article

# Prospective analysis of post-operative pain management in elective laparotomies in a tertiary care centre

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## ABSTRACT

**Background:** The study was conducted to record the drug used for postoperative pain in elective laparotomies and to determine the effectiveness of multimodal analgesics used.

**Methods:** A prospective observational study for a period of 15 months from March 2019 to May 2020 in 140 patients who underwent elective laparotomies from the department of general surgery Rajarajeswari medical college and hospital (tertiary care center).

**Results:** A total of 140 patients were included among which 58 (41.4%) were female and 82 (58.6%) were male patients. The 20 different types of surgeries were recorded. In our study the most common surgery performed was open appendectomy followed by open cholecystectomy. Most common mode of analgesia used was combined analgesia. Opioids, NSAIDS (non-steroidal anti-inflammatory drugs), epidural and transdermal patch was used. NRS (numerical rating scale) score was recorded for all 140 patients on postoperative days 1, 2 and 3.

**Conclusions:** Combined analgesia was better mode of pain management method than a single analgesic. Due to different multimodal analgesics used in different institutions patients experienced different degrees of pain, hence we need a standard protocol for a best pain management method.

**Keywords:** Post-operative pain, Multimodal analgesia, Numerical rating scale

## INTRODUCTION

Pain is defined as an unpleasant sensory and emotional experience arising from actual or potential tissue damage. Many patients suffer from severe pain after surgery.<sup>1,2</sup> 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 post-operative 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.<sup>3</sup>

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.<sup>4</sup>

Numerical rating scale-Pain assessment scale where 0 is considered no pain to 10 which is considered as worst imaginable pain (Figure 1).



**Figure 1: Pain score-in a numerical rating scale patients are asked to circle number between 0 and 10 that fits best to their pain intensity.**

## METHODS

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.

### Study type

The present study was prospective observational study.

### Study place

This study was conducted by the department of general surgery Rajarajeswari medical college and hospital.

### Study period

The present study was conducted for period of 15 months from March 2019 to May 2020.

### Sample size

A sample size of 140 patients fulfilling eligibility criteria was taken for the study.

### Inclusion criteria

For the study was all the patients who had undergone an elective laparotomy and had a stay of at least 3 days post operatively were included in the study.

### Exclusion criteria

Patients with cognitive impairment, critically ill and intubated patients, patients under the age of 18 were excluded in the study.

### Ethical approval

The study was approved by the institutional Ethics committee.

### Statistical analysis

The collected data were analysed with IBM SPSS Statistics for Windows, version 23.0. (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. To find significance in categorical data Chi-Square test was used similarly if the expected cell frequency is less than 5 in 2x2 tables then the Fisher's Exact was used. In both the above statistical tools probability value 0.05 is considered as the significant level.

## RESULTS

### Patient characteristics

A total of 140 patients were included among which 58 (41.4%) were female and 82 (58.6%) were the male patients.

The patients who underwent elective laparotomies were aged between 20 and 70.53 (37.9%) patients were in the age group of 40-50 years (Table 1).

**Table 1: Age distribution.**

Age (Years)	No. of patients
20-30	8
30-40	36
40-50	53
50-60	30
60-70	13

### Surgery details

The 20 different types of surgeries were recorded. The most common surgery performed in our study was open appendectomy which included 28 (20%) patients followed by open cholecystectomy (for carcinoma gall bladder and other indications) which included 13 (9.2%) patients (Table 2).

### Anaesthesia details

Four different types of anaesthesia were used. Most common was general anaesthesia with transverse plane

block which was used in 53 (37.8%) patients, followed by general anaesthesia with quadratus lumborum block which was used in 30 (21.4%) patients as shown in the Table 3.

**Table 2: Surgery details.**

Type of surgery	N
Gastrectomy	9
Gastrojejunostomy + truncal vagotomy	4
Open cholecystectomy with CBD exploration	10
Open partial nephrectomy	3
Whipple's procedure	7
Lap converted to open cholecystectomy	4
Open appendectomy	28
Open cholecystectomy (carcinoma gall bladder and other indications)	13
Right hemicolectomy	7
Left hemicolectomy	5
Exploratory laparotomy (tuberculosis abdomen)	8
Hydatid cyst of the liver (excision of the cyst)	5
Splenectomy	2
Lateral pancreaticojejunostomy	4
Transhiatal esophagectomy	3
Ileocecal resection and anastomosis (ileocecal tuberculosis)	8
Ileocecal resection and anastomosis (other indications)	5
Abdominoperineal resection	4
Abdominal wall reconstruction	2
Exploratory laparotomy for other indications	9

**Table 3: Anaesthesia details.**

Type of anaesthesia	N
General anaesthesia (propofol)	29
Spinal anaesthesia (bupivacaine in hyperbaric solution)	25
GA+TAP [general anaesthesia+ transversus abdominis plane block (propofol with bupivacaine)]	53
GA+QL [general anaesthesia+ quadratus lumborum block (propofol with bupivacaine)]	30
SA+TAP (spinal anaesthesia + transversus abdominis plane block)	3

#### *Types of analgesic used and their route of administration*

*Opioids:* Parenteral-tramadol and enteral-tablet tramadol.

*NSAID'S (non-steroidal anti-inflammatory drugs):* Parenteral-diclofenac and paracetamol.

*Enteral:* Tablet aceclofenac and tablet paracetamol.

*Blocks:* Transversus abdominis plane and quadratus lumborum.

*Epidural top-ups:* Bupivacaine.

*Transdermal patch:* Diclofenac and fentanyl.

The analgesics were used singly or in the combination they were as follows:

#### *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 67 (47.9%) patients followed by injection diclofenac AQ 75 mg in 100 ml N.S with continuous epidural in 45 (32.14%) patients.

Pearson's Chi square test for intravenous and epidural analgesics: value-2.377, df (degrees of freedom)-8, p=0.967 (Table 4).

By the second day 74 (52.9%) patients were shifted to oral analgesics most common drug used was the combination of aceclofenac, paracetamol and serratiopeptidase. Ten (7.14%) patients were on transdermal patch on post-operative day 2 and 3.3 (2.14) patients were on diclofenac patch and 7 (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-2.026, df-5, p=0.846 (Table 5).

**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)	16 (59.3)	9 (6.42)	2 (1.42)
Inj. diclofenac aq. 75 mg in 100 ml NS	9 (69.2)	3 (2.14)	1 (0.71)
Inj. pct 100 ml (tid)	3 (60)	2 (1.42)	Nil
Inj. Tramadol 50 mg in 100 ml NS (tid) + continuous epidural (bupivacaine)	67 (59.3)	34 (24.2)	12 (8.6)
Inj. Diclofenac aq. 75 mg/ml in 100 ml NS (tid) + continuous epidural (bupivacaine)	45 (62.5)	18 (12.9)	9 (6.42)

NS- normal saline, tid-three times a day

**Table 5: Analgesics (Oral with transdermal patch) used on post-operative day 1-3.**

Type of analgesic (Oral + transdermal patch)	N (%), POD1 (<6 hours)	N (%), POD2 (24-48 hours)	N (%), POD3 (48-72 hours)
T. Aceclofenac + PCT + Serratiopeptidase (tid)	Nil	28 (20)	10 (7.1)
T. Aceclofenac+ PCT (tid)	Nil	17 (12.1)	8 (5.7)
T. PCT 650 mg (tid)	Nil	4 (2.9)	3 (2.1)
T. Ultracet (bd)	Nil	15 (10.7)	4 (2.9)
Diclofenac transdermal patch + T. Ultracet	Nil	3 (2.1)	2 (1.4)
Fentanyl transdermal patch + T. Ultracet	Nil	7 (5)	4 (2.9)

PCT-paracetamol, tid-three times a day, bd-twice a day, POD-post-operative day

**Table 6: NRS score on post-operative days 1-3.**

NRS score	N (%), POD 1	N (%), POD 2	N (%), POD 3
Mild (1-3)	25 (17.9)	47 (33.6)	64 (45.7)
Moderate (4-6)	48 (34.3)	59 (42.1)	37 (26.4)
Severe (7-10)	67 (47.9)	34 (24.3)	11 (7.9)
No pain	Nil	Nil	28 (20)

POD-post-operative day

### Numerical rating scale

NRS score was recorded for all the 140 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-120.356, df-6, p=0.0005 (Table 6).

### DISCUSSION

The prevention and alleviation of post-operative pain are core responsibilities for healthcare professionals.<sup>5</sup>

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.<sup>6</sup> This was in response to an acknowledgement that postoperative pain management was inadequate, having 'not advanced significantly for many years.'<sup>6</sup>

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.

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.<sup>8</sup> 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.<sup>9</sup>

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.<sup>10</sup>

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.<sup>11,13</sup> 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).

In our study 140 patients were included of which 58 (41.4%) were female patients and 82 (58.6%) were male

patients. Age group were taken from 20-70 with interval of 10. 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.<sup>16</sup>

The 67 (47.9%) and 48 (34.3%) number of patients experienced severe and moderate pain on post-operative 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.<sup>14</sup>

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.<sup>15</sup>

In present study 20 different type of surgery was recorded. The most common surgery performed was open appendectomy which included 28 (20%) patients followed by open cholecystectomy which included 13 (9.2%) 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%).<sup>16</sup>

Most common mode of analgesia used in present study was combined analgesia. Injection tramadol 50 mg in 100 ml normal saline with continuous epidural bupivacaine in 67 patients followed by injection diclofenac AQ 75 mg in 100 ml NS with continuous epidural bupivacaine in 45 patients. 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.<sup>16</sup>

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.<sup>16</sup>

Our study used combined analgesia with epidural for 112 (80%) patients to control post-operative 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.<sup>17</sup> 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.<sup>18-20</sup>

Present study includes only a single tertiary care centre. Since it is a subjective analysis using NRS score, critically ill and intubated patients could not be assessed due to inability of patients to communicate.

## 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 67 (47.9%) of patient's opioid with epidural was used for post-operative pain and for 45 (32.1%) of patients NSAID with epidural was used for post-operative pain.

Due to different multimodal analgesics used in different institutions patients experienced different degrees of pain, hence we need a standard protocol for a best pain management method.

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