



COMPARISON OF POSTOPERATIVE PATIENT-CONTROLLED AND CONTINUOUS INFUSION EPIDURAL ANALGESIA VERSUS INTRAVENOUS PATIENT-CONTROLLED ANALGESIA WITH OPIOIDS IN MAJOR ABDOMINAL SURGERY

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ABSTRACT

Background And Objectives-Use of patient-controlled epidural analgesia after various operations has been associated with earlier return of bowel function and thus decrease the length of stay (LOS). The primary aim of this study was to compare LOS after abdominal surgery between patients who received epidural analgesia versus those who received intravenous patient controlled analgesia. Our secondary analysis included the assessment of other metrics such as total opioid requirements, pain scores, return of bowel function and complication rates between the two groups. **Methods**-In present study we have studied sixty patients of ASA (American Society of Anesthesiologists) I and II patients of either sex between the ages of 18–65 years undergoing major abdominal surgery. We aimed to understand if epidural analgesia was associated with a reduced length of stay compared to patient controlled intravenous opioid analgesia. We also aimed to identify performance improvements as a function of epidural analgesia status using various metrics such as pain management, bowel function return, and complication rates. **Conclusion**-Almost without exception, epidural analgesia, regardless of analgesic agent, epidural regimen, and type and time of pain assessment, provided superior postoperative analgesia compared to intravenous patient-controlled analgesia.

KEYWORDS

Epidural, Opioid, Patient controlled Analgesia

INTRODUCTION

The most common type of acute pain that the anesthesiologists deal with, is postoperative pain with resultant neuroendocrine stress response causing protein catabolism, hyperglycemia, poor wound healing, decreased respiratory function, and increase in myocardial oxygen demand.[1] Pain relief can be provided by systemic opioids and non opioid analgesics, regional neuraxial and peripheral analgesic techniques, and epidural route being safer resulting in shorter Intensive Care Unit stays.[2] Addition of opioids has several benefits such as improved dynamic pain relief, limited regression of sensory blockade, Use of lipophilic opioid (fentanyl) is preferred to hydrophilic as it provides rapid onset of action, rapid clearance, and prevents delayed respiratory depression. In present study we have studied sixty patients of ASA (American Society of Anesthesiologists) I and II consenting adult patients of either sex between the ages of 18–65 years undergoing major abdominal surgery. Exclusion criteria-Patients with ASA III and IV, those with infection at the site of epidural injection, coagulopathy or bleeding disorders, severely hypovolemic patients, those with raised intracranial pressure, sepsis, preexisting neurological deficit, demyelinating disorder, or severe spinal deformities were excluded from this study. Sample size of thirty in each group, Pain management after major abdominal surgery is important for limiting complications and helping patient recovery. Insufficient pain control can have detrimental effects on the cardiovascular, respiratory, and endocrine systems. Furthermore, inadequate pain control, nausea, and delay in gastrointestinal recovery have all been linked to prolonged hospitalization and to increased costs. Intravenous patient-controlled analgesia (IV PCA) has been considered the standard of care for pain management after major abdominal surgery.

Patient-controlled epidural analgesia (PCEA) is commonly used for postoperative pain management. Multiple studies, including randomized prospective trials, have linked the use of PCEA to improved patient pain scores, decreased rates of respiratory failure, earlier ambulation, and improved time to return of bowel function when compared to IV PCA use after major abdominal surgery. Epidural analgesia, when used as part of a multi-modal analgesic regimen, has also been of increased interest for study as part of fast track surgery protocols. Our primary objective was to determine, whether epidural analgesia was associated with a reduction in hospital LOS compared to opioid.

Group A ($n = 30$) received 10 $\mu\text{g/ml}$ fentanyl and Group B ($n = 30$) received intravascular opioid and non-opioid analgesia postoperatively. Both groups were comparable with respect to their demographic

data. Baseline blood pressure, pulse rate, and SpO₂ were recorded. Adequate preloading (500 ml) was done with 18-gauge intravenous cannula. Patients received injection glycopyrrolate (0.004 mg/kg) and pantoprazole 40mg intravenously given as premedication. Thereafter, an epidural catheter was inserted at the lumbar level (L1–L2 or L2–L3). The space was checked by loss of resistance technique and confirmed by the meniscus sign. Epidural test dose was given with 3 ml 2% adrenalized lignocaine. The absence of tingling numbness in the lower limbs and tachycardia was confirmed after 5–7 cm of catheter was placed in the epidural space. After fixation of catheter, patient was made supine and free injection of saline through the catheter was checked. In the postoperative period, mean pulse rate, diastolic and systolic blood pressure were comparable in both the groups. However, 1 patient in the group A developed hypotension and 2 patient in the group B developed pruritis [Figure 1]. There was no significant change observed in mean saturation between the two groups and the same trend continued till the end of 24 h. Mean VAS scores, and mean Bromage score, were comparable in the two groups [Figures 2 and 3]. Till the end of 120 min, the sensory blockade was comparable in both the groups. In our study, adverse events (hypotension, respiratory depression, need for rescue analgesia, and others) were reported in 3 cases of Group A as compared to 8 cases of Group B. None of these side effects were severe or life-threatening and were easily treated.

METHODS:

In present study we have studied thirty patients of ASA (American Society of Anesthesiologists) I and II of either sex between the ages of 18–65 years undergoing major abdominal surgery. Exclusion criteria-Patients with ASA III and IV, those with infection at the site of epidural injection, coagulopathy or bleeding disorders, severely hypovolemic patients, those with raised intracranial pressure, sepsis, preexisting neurological deficit, demyelinating disorder, or severe spinal deformities were excluded from this study. Sample size of fifteen in each group, While the procedure remained the same throughout the study period, patients were split into 2 groups based on postoperative pain management type. IV PCA. Or PCEA. Patients were included only if either PCEA or IV PCA was used for their postoperative pain management. Patients receiving IV PCA were given, Fentanyl based on the discretion of the surgical team. Preoperatively, all epidural catheters were inserted within the vertebral interspaces between L1 and L2 or L2 and L3. Confirmatory testing was then performed for 4 all epidurals with 3ml of 2% Lidocaine with 1:200,000 Epinephrine. Preoperatively, all patients were treated with an identical bowel preparation consisting of two bottles of magnesium citrate over 2 days and a clear liquid diet on the day before surgery. In post operative period oral intake with clear liquid began on postoperative day 2 unless

contraindicated by bowel distention or nausea and vomiting. No other major changes, except for change to PCEA, were made to the care pathway during the time periods studied. To identify patients with a delay in bowel function recovery, those who had a cessation of diet order placed by the covering physician because of the inability to tolerate oral intake. These patients were considered to have delay in bowel function recovery. Patients were considered to have return of bowel function if they were able to tolerate oral intake after having their diet stopped because of symptoms. Additionally, total opioid use for the first 3 post-operative days was obtained from nurse recorded Post-operative pain scores for days 1 through 3 were recorded from standardized 0-10 (10 being extreme pain) pain scale responses taken by the covering nurse from the patient every 4 hours routinely. The average (mean) score from each post-operative day was compared between the two pain management modalities.

RESULTS

Out of sixty patients included for analysis, 30 received PCEA and received 30 iv PCA.

The crude and adjusted differences in quality metrics are listed in Table 1. For our primary outcome metric of LOS, we identified appreciable differences as a function of analgesic type Table 2 shows baseline characteristics of each group. They were similarly matched in age, BMI, sex, ASA score. Additionally, there were statistical differences in bowel function return, complicate rates, and fluid bolus requirement. Median total opioid use in the first three post-operative days was significantly higher in the IV PCA group as compared to the PCEA group. Analgesic efficacy was significantly improved in patients who received PCEA on post-operative day 1 ($p=0.0001$) and 2 ($p=0.004$).

Table-1 Multivariate Analysis Of Postoperative Features By Pain Management Type

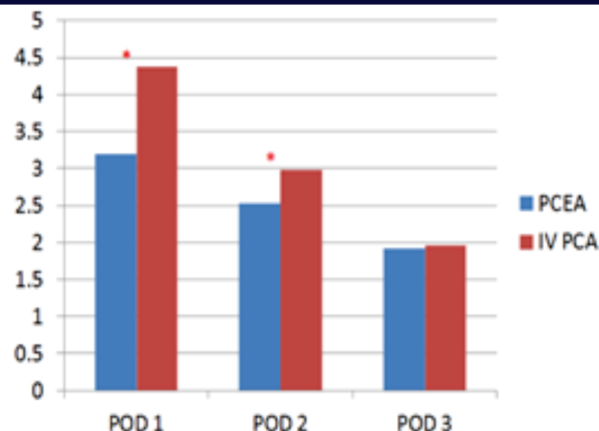
Statisti		PCEA	IV PCA	P Value
Length of stay (days)	Mean (SD)	9.7 (6.9)	9.6 (5.3)	0.2
Delayed return of bowel function	N (%)	10.5 (35%)	9.9(33%)	0.6
Fluid bolus within 3 postoperative days	N (%)	12.3(41%)	12 (40%)	0.2

Table-2

	PCEA (N=30)	IV PCA (N=30)	p-value
Age at surgery (years)	65 (59, 73)	68 (60, 74)	0.3
Days on pain management	5 (4, 6)	5 (4, 6)	0.2
Body mass index	28 (26, 30)	28 (25, 31)	0.8
ASA Score			
Neoadjuvant chemotherapy	(35%)	(37%)	0.7
Previous radiation therapy	(12%)	(6%)	0.042
Mean Pain Score			
POD 1	3.2	4.38	0.0001
POD 2	2.53	2.99	0.004
POD 3	1.92	1.96	0.77

Baseline characteristics and crude rates were analyzed with the rank-sum test and chi-square test for continuous and categorical variables, respectively. To assess differences in LOS, return to bowel function, fluid bolus, any post-operative complications, and grade 3 or greater postoperative complications, we built multivariable regression models with pain management type as a predictor. The models were adjusted for age, operating time, estimated blood loss (EBL), American Society of Anesthesiologists (ASA) score (I/II vs. III/IV), body mass index (BMI), previous radiation therapy, neoadjuvant chemotherapy, and intraoperative blood transfusion. Linear regression was used to assess differences in LOS.

Patients were considered to have return of bowel function if they were able to tolerate oral intake after having their diet stopped because of symptoms. Additionally, total opioid use for the first 3 post-operative days was obtained from nurse recorded patient records the values between the two groups were compared. Post-operative pain scores for days 1 through 3 were recorded from standardized 0-10 (10 being extreme pain) pain scale responses taken by the covering nurse from the patient every 4 hours routinely. The average (mean) score from each post-operative day was compared between the two pain management modalities.



* Statistically significant unpaired t-test, p-value <0.05 for mean pain scores

Figure 1. Mean pain scores compared between patients who received PCEA and IV PCA on POD#1-3

DISCUSSION

We compared our findings on two group of patients whose postoperative pain was managed by either PCEA or IV PCA following major abdominal surgery. As defined by pain scores, analgesia was significantly improved in the PCEA group on post-operative days 1 and 2. In concordance with previous reports median total opioid requirement was significantly less in the epidural group for the first three post-operative days, further substantiating our analysis.

LOS was less in epidural group Postoperative pain management is an important aspect of surgical convalescence impacting such factors as bowel function, early mobilization, and patient psyche. Additionally, delay in recovery of any of these factors can exacerbate complications of other organ systems and prolong hospital length of stay. In accordance with the findings demonstrated in this study, several randomized trials have shown improvement in early postoperative pain control with epidural use after major abdominal surgery. It has been proposed that epidural use may hold further benefits to patient recovery than just improving patient comfort. These suggested benefits include reductions in cardiovascular complications, venous thromboembolic events, and postoperative infections, as well as improved pulmonary recovery and return of bowel function. We have shown that patients may have improved pain control with PCEA after surgery.

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