Use of Epidural Analgesia as an Adjunct in Elective Abdominal Wall Reconstruction: A Review of 4983 Cases

Efstathios Karamanos, MD; Sophie Dream, MD; Anthony Falvo, DO; Nathan Schmoekel, DO; Aamir Siddiqui, MD

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ABSTRACT

Context: Use of epidural analgesia in patients undergoing elective abdominal wall reconstruction is common.

Objective: To assess the impact of epidural analgesia in patients undergoing abdominal wall reconstruction.

Design: All patients who underwent elective ventral hernia repair from 2005 to 2014 were retrospectively identified. Patients were divided into two groups by the postoperative use of epidural analgesics as an adjunct analgesic method. Preoperative comorbidities, American Society of Anesthesiologists status, operative findings, postoperative pain management, and venothromboembolic prophylaxis were extracted from the database. Logistic regressions were performed to assess the impact of epidural use.

Main Outcome Measures: Severity of pain on postoperative days 1 and 2.

Results: During the study period, 4983 patients were identified. Of those, 237 patients (4.8%) had an epidural analgesic placed. After adjustment for differences between groups, use of epidural analgesia was associated with significantly lower rates of 30-day presentation to the Emergency Department (adjusted odds ratio [AOR] = 0.53, 95% confidence interval [CI] = 0.32-0.87, adjusted $p = 0.01$). Use of epidural analgesia resulted in higher odds of abscess development (AOR = 5.89, CI = 2.00-17.34, adjusted $p < 0.01$) and transfusion requirement (AOR = 2.92, CI = 1.34-6.40, adjusted $p < 0.01$). Use of epidural analgesia resulted in a significantly lower pain score on postoperative day 1 (3 vs 4, adjusted $p < 0.01$).

Conclusion: Use of epidural analgesia in patients undergoing abdominal wall reconstruction may result in longer hospital stay and higher incidence of complications while having no measurable positive clinical impact on pain control.

INTRODUCTION

Ventral hernias represent a challenging problem for the surgeon. Abdominal wall reconstruction for ventral hernias can result in lengthy hospitalizations, especially for recurrent hernias with substantial loss of domain.[1-5] These abdominal wall reconstructions can result in major postoperative complications with subsequent increases in hospital costs and morbidity. In the modern era of health care, quality is not only expected but also reportable. The focus on potentially preventable complications after major surgery has taken center stage not only for caregivers and patients but also administrators, regulators, and payers. In the context of quality control, pain management has become an area of concern. Depending on the physician's preference and the anticipated complexity of the surgery, many patients undergoing abdominal wall reconstruction are offered epidural analgesia as an adjunct to the traditional narcotic analgesia. The potential benefits of the use of epidural analgesia include more steady analgesia, limited exposure to opioids and their side effects, and better cooperation with mobility programs.

Several studies have favored the use of epidural analgesia in major abdominal surgeries. In a randomized controlled trial of 915 patients undergoing major surgery, Rigg et al,[6] in 2002, concluded that the use of epidural analgesics resulted in a significant decrease in pulmonary complications. However, the data on patients undergoing abdominal wall reconstruction are scant. The present study aims to assess the impact of the use of epidural analgesics as an adjunct to conventional analgesia in patients undergoing abdominal wall reconstruction for initial or recurrent ventral hernias in an elective setting. A multi-institution collaborative database was used to review outcomes.

METHODS

This retrospective study used the Michigan Surgical Quality Collaborative Database, a collaborative of 52 Michigan hospitals dedicated to overall surgical quality improvement, including better patient care and lower costs.[7] After institutional review board approval from Henry Ford Hospital, Detroit, MI, all patients undergoing elective ventral hernia repair, from January 2005 to December 2014, were identified using Current Procedural Terminology codes (49560: Repair initial incisional or ventral hernia; reducible and 49565: Repair recurrent incisional or ventral hernia; reducible).

All patients received intravenous anesthesia for induction that was subsequently maintained during the course of the case via an endotracheal tube. All patients received intravenous fluids for intraoperative resuscitation in the usual standard of care. The patients were divided into two groups on the basis of the use of epidural analgesia postoperatively. Patient variables extracted included age, sex, body mass index, alcohol use, tobacco abuse, functional status preoperatively, presence of comorbidities (diabetes, chronic obstructive pulmonary

Efstathios Karamanos, MD, is a Surgeon in the Division of Acute Care Surgery in the Department of Surgery at Henry Ford Hospital in Detroit, MI. E-mail: ekarama1@hfhs.org. **Sophie Dream, MD,** is a Surgeon at Henry Ford Hospital in Detroit, MI. E-mail: sdream1@hfhs.org. **Anthony Falvo, DO,** is a Surgeon at Henry Ford Hospital in Detroit, MI. E-mail: afalvo1@hfhs.org. **Nathan Schmoekel, DO,** is a Surgeon in the Division of Acute Care Surgery at Henry Ford Hospital in Detroit, MI. E-mail: nschmoeke2@hfhs.org. **Aamir Siddiqui, MD,** is a Plastic and Reconstructive Surgeon at Henry Ford Hospital in Detroit, MI. E-mail: asiddiq1@hfhs.org.

disease, sleep apnea, congestive heart failure, arrhythmias, coronary artery disease, hypertension, use of β-blockers or statins, peripheral vascular disease, deep vein thrombosis, and history of malignancy), American Society of Anesthesiologists (ASA) classification, and wound classification at the end of the surgery. To control for any confounding factors, the type of adjunct pain control was identified for the database (use of nerve block, infiltration of local anesthesia, use of intravenous or oral narcotics, and use of patient-controlled anesthesia) perioperatively and on postoperative day 1. The type of venothromboembolic prophylaxis was also identified.

Outcomes

The primary outcome included severity of pain on postoperative day 1 and postoperative day 2. A Likert-type pain scale was used to measure pain, with 0 being no pain and 10 being the worst pain the patient has experienced.[8] Secondary outcomes included presentation to the Emergency Department within 30 days, readmission and/or reoperation within 30 days, development of surgical site infection, myocardial infarction, need for transfusion, and development of postoperative deep vein thrombosis and pulmonary embolism.

Statistical Analysis

The patients were stratified into 2 cohorts: patients who had epidural analgesia as an adjunct vs patients who did not. The 2 groups were compared for differences between the baseline characteristics using Pearson χ^2 or Fisher exact test as appropriate for categorical variables. Continuous variables were examined for normality of distribution using the Shapiro-Wilk test. Parametric variables were compared between the 2 groups using the Student *t* test whereas nonparametric variables were compared using the Mann-Whitney U test. To assess the impact of the use of epidural analgesia in patients undergoing abdominal wall reconstruction, logistic regressions were used with the dependent variable being the use of epidural analgesia. Variables that differed at a $p < 0.05$ between the 2 groups were inserted in the logistic regressions. Adjusted odds ratios (AORs) and 95% confidence intervals (CIs) were derived from the regressions. To assess the impact of the use of epidural analgesia on hospital length of stay and pain score on postoperative days 1 and 2, we used linear logistic regression, inserting variables that differed between the 2 groups at a $p < 0.05$. For assessment of the impact of epidural analgesia in patients with significant comorbidities, the study population was stratified into 2 groups by their ASA class (ASA 1/2 vs ASA 3/4). The same process as described above was repeated for the ASA classes. All analyses were performed using SPPS for Windows, Version 19 (IBM Corp, Armonk, NY).

RESULTS

During the study period, 11,324 patients underwent elective abdominal wall reconstruction for a ventral hernia. Of those, 4983 had documentation regarding the use of epidural analgesia as an adjunct and were subsequently included in the analysis. A total of 237 patients received epidural analgesia and 4746 patients did not. The mean age was 54.1 years, and 47% of the study population was male. The mean body mass index was 32 kg/m^2. The most common comorbidities included hypertension (53%), hyperlipidemia (31%), and a history of coronary artery

Table 1. Demographics and comorbidities of study population

Characteristic	Overall (N = 4983)	Epidural (n = 237)	No epidural (n = 4746)	p value
Age (years)	53.1 ± 4.2	52.4 ± 3.1	53.1 ± 4.7	0.41
Male sex, no. (%)	2316 (46.5)	96 (40.5)	2220 (46.8)	0.06
Body mass index (kg/m^2), mean ± SD	31.9 ± 7.6	32.7 ± 7.6	31.9 ± 7.6	0.09
Social history, no. (%)				
Alcohol abuse	138 (2.8)	6 (2.5)	132 (2.8)	0.82
Tobacco use	1229 (24.7)	63 (26.6)	1166 (24.6)	0.48
Functional status, no. (%)				
Independent	4880 (97.9)	232 (97.9)	4648 (97.9)	
Partially dependent	71 (1.5)	5 (2.1)	69 (1.5)	
Totally dependent	29 (0.5)	0 (0.0)	29 (0.7)	0.552
Comorbidities, no. (%)				
Diabetes	977 (19.6)	71 (30.0)	906 (19.1)	< 0.01
Chronic obstructive pulmonary disease	510 (10.2)	30 (12.7)	480 (10.1)	0.21
Sleep apnea	855 (17.1)	58 (24.5)	797 (16.8)	0.01
Congestive heart failure	17 (0.3)	1 (0.4)	16 (0.3)	0.56
History of arrhythmia	375 (7.5)	20 (8.4)	355 (7.5)	0.59
Coronary artery disease	690 (13.8)	24 (10.1)	666 (14.0)	0.09
Hypertension requiring medication	2632 (52.8)	146 (61.6)	2486 (52.4)	0.01
Beta-blocker	1222 (24.5)	71 (30.0)	1151 (24.3)	0.04
Statin	1526 (30.6)	88 (37.1)	1438 (30.3)	0.03
PVD	153 (3.1)	12 (5.1)	141 (3.0)	0.07
History of deep vein thrombosis	345 (6.9)	27 (11.4)	318 (6.7)	0.01
Malignancy	19 (0.4)	1 (0.4)	18 (0.4)	0.60
ASA classification, no. (%)				
1	278 (5.6)	3 (1.3)	275 (5.8)	
2	2391 (48.0)	103 (43.5)	2288 (48.2)	
3	2160 (43.3)	124 (52.3)	2036 (42.9)	
4	151 (3.0)	7 (3.0)	144 (3.0)	0.01
Wound classification at end of surgery, no. (%)				
Clean	4406 (88.4)	164 (69.2)	4242 (89.4)	
Clean/contaminated	424 (8.5)	59 (24.9)	365 (7.7)	
Contaminated	153 (3.1)	14 (5.9)	139 (2.9)	< 0.01

ASA = American Society of Anesthesiologists; PVD = peripheral vascular disease; SD = standard deviation.

disease (14%). Nearly all (98%) of the patients were functionally independent before surgery. Case classification was clean for 88% of the operations. The 2 groups are described in Table 1. Patients who received an epidural analgesic were significantly more likely to have more comorbidities, be assigned a higher ASA score, and have a higher incidence of contaminated wound classification at the end of the surgery (see Table 1). Patients who had an epidural analgesic placed were also more likely to undergo a repair of a recurrent hernia (38% vs 20%, p < 0.01). The reported extent of the adhesions was similar between the 2 groups (moderate adhesions: 20% vs 21%, p = 0.56; severe adhesions: 11% vs 9%, p = 0.89, Table 2).

Table 3 depicts the type of pain control administered to the study population perioperatively and postoperatively. Local anesthesia was infiltrated perioperatively in 60% of the patients. Those who received epidural analgesia as an adjunct had a significantly lower incidence of use of local anesthesia during the case (27% vs 61%, p < 0.01). On postoperative day 1, 38% of the patients received intravenous narcotics, 34% received oral narcotics, and 15% received nonsteroidal anti-inflammatory drugs. The use of intravenous narcotics, patient-controlled analgesia, and nonsteroidal anti-inflammatory drugs was significantly different between the 2 groups (52% vs 38%, 22% vs 15%, and 27% vs 14%, respectively).

The use of venothromboembolic prophylaxis is summarized in Table 4. Patients who did not receive an epidural analgesic were less likely to receive heparin perioperatively; however, postoperatively, patients given an epidural were less likely to receive heparin 3 times daily (43% vs 81%, p < 0.01). After adjusting for confounding factors, the use of epidural analgesia correlated with a significant decrease in 30-day presentation to the Emergency Department (AOR= 0.53, 95% CI = 0.32-0.87, adjusted p = 0.01). The use of epidural analgesia was linked with a higher probability of developing a deep/organ space infection and needing a blood transfusion (AOR = 5.89, 95% CI = 2.00-17.34, adjusted p < 0.01; and AOR = 2.92,

Table 2. Type of surgery

Type of surgery	Overall, no. (%) (N = 4983)	Epidural, no. (%) (n = 237)	No epidural, no. (%) (n = 4746)	p value
Repair initial incisional or ventral hernia (reducible)	3751 (75.3)	148 (62.4)	3603 (75.9)	
Repair recurrent incisional or ventral hernia (reducible)	1055 (21.2)	89 (37.6)	966 (20.4)	
Repair umbilical hernia, age ≥ 5 years (reducible)	177 (3.6)	0 (0.0)	177 (3.7)	< 0.01
Concurrent component separation	206 (4.1)	53 (22.4)	153 (3.2)	< 0.01

Table 3. Type of pain control

Type of pain control	Overall, no. (%) (N = 4983)	Epidural, no. (%) (n = 237)	No epidural, no. (%) (n = 4746)	p value
Perioperatively				
Nerve block	165 (3.3)	1 (0.4)	164 (3.5)	0.01
Local anesthesia infiltrated	2940 (59.0)	63 (26.6)	2877 (60.6)	< 0.01
Postoperative day 1				
Intravenous narcotics	1909 (38.4)	124 (52.3)	1785 (37.7)	< 0.01
Oral narcotics	1686 (33.9)	88 (37.1)	1598 (33.7)	0.28
Patient-controlled anesthesia	739 (14.9)	51 (21.5)	688 (14.5)	0.01
Nonsteroidal anti-inflammatory drugs	745 (15.0)	65 (27.4)	680 (14.4)	< 0.01
Local anesthesia infiltrated	58 (1.2)	5 (2.1)	53 (1.1)	0.20

Table 4. Venothromboembolic prophylaxis

Prophylaxis	Overall, no. (%) (N = 4983)	Epidural, no. (%) (n = 237)	No epidural, no. (%) (n = 4746)	p value
Perioperatively				
Heparin	952 (19.1)	89 (37.6)	863 (18.2)	< 0.01
Low-molecular-weight heparin	63 (1.3)	3 (1.3)	60 (1.3)	1.00
Sequential compression devices	4489 (90.1)	230 (97.0)	4259 (89.7)	< 0.01
Postoperatively				
Heparin 2x/d	421 (8.5)	101 (42.6)	320 (6.8)	< 0.01
Heparin 3x/d	1061 (21.3)	102 (43.0)	3854 (81.2)	< 0.01
Low-molecular-weight heparin	430 (8.6)	14 (5.9)	416 (8.8)	0.12
Sequential compression devices	3325 (66.7)	225 (94.9)	3100 (65.3)	< 0.01

95% CI = 1.34-6.40, adjusted p < 0.01, respectively, Tables 5 and 6). The use of epidural analgesia also resulted in a significantly longer length of stay after adjusting for confounding factors: 6.5 days vs 3.8 days; mean (95% CI) = 2.42 (1.81-3.03), as shown in Table 7. When the pain score was examined on postoperative day 1, a statistical but not clinically significant difference was identified (3 vs 4, see Table 7). This difference was diminished on postoperative day 2. When the patients were stratified on the basis of ASA class, no statistically significant differences were identified between patients who received an epidural analgesic vs those who did not (Table 8).

Table 5. Outcomes

Outcome	Overall, no. (%) (N = 4983)	Epidural, no. (%) (n = 237)	No epidural, no. (%) (n = 4746)	p value
Presentation to Emergency Department within 30 d	629 (12.6)	19 (9.0)	610 (12.8)	0.03
Readmission within 30 d	516 (10.3)	33 (13.9)	483 (10.2)	< 0.01
Reoperation within 30 d	368 (7.4)	20 (8.4)	348 (7.3)	0.53
Superficial surgical site infection	97 (1.9)	11 (4.6)	86 (1.8)	0.01
Deep surgical site infection	49 (1.0)	7 (3.0)	42 (0.9)	0.01
Deep/organ space infection	22 (0.4)	7 (3.0)	15 (0.3)	0.01
Urinary tract infection	17 (0.3)	4 (1.7)	13 (0.3)	< 0.01
Myocardial infarction	15 (0.3)	3 (1.3)	12 (0.3)	0.01
Need for transfusion	63 (1.3)	10 (4.2)	53 (1.1)	< 0.01
Postoperative deep vein thrombosis	1 (0.3)	2 (0.8)	14 (0.3)	0.15
Sepsis	36 (0.7)	6 (2.5)	30 (0.6)	< 0.01
Severe sepsis	32 (0.6)	6 (2.5)	26 (0.5)	< 0.01
Unplanned intubation	39 (0.8)	6 (2.5)	33 (0.7)	< 0.01
Pulmonary embolism	15 (0.3)	3 (1.3)	12 (0.3)	0.01
Pneumonia	52 (1.0)	6 (2.5)	46 (1.0)	0.02

Table 6. Adjusted outcomes[a]

Outcome	Adjusted odds ratio (95% confidence interval)	Adjusted p value
Presentation to Emergency Department within 30 d	0.53 (0.32-0.87)	0.01
Readmission within 30 d	1.16 (0.77-1.75)	0.49
Reoperation within 30 d	1.16 (0.70-1.92)	0.58
Superficial surgical site infection	1.67 (0.82-3.37)	0.16
Deep surgical site infection	2.29 (0.92-5.74)	0.08
Deep/organ space infection	5.89 (2.00-17.34)	< 0.01
Urinary tract infection	3.13 (0.82-12.00)	0.1
Myocardial infarction	2.30 (0.53-10.00)	0.27
Need for transfusion	2.92 (1.34-6.40)	< 0.01
Postoperative deep vein thrombosis	1.34 (0.25-7.05)	0.73
Sepsis	2.40 (0.85-6.76)	0.1
Severe sepsis	1.77 (0.60-5.20)	0.3
Unplanned intubation	1.48 (0.53-4.12)	0.46
Pulmonary embolism	3.91 (0.93-16.53)	0.06
Pneumonia	1.26 (0.47-3.37)	0.65

[a] Adjusting for diabetes, sleep apnea, hypertension requiring medication, β-blocker, statin, history of deep vein thrombosis, American Society of Anesthesiologists class, wound classification at the end of the surgery, type of surgery, type of analgesia, and type of perioperative venothromboembolic prophylaxis.

DISCUSSION

The present study suggests that the use of epidural analgesia is associated with a higher incidence of postoperative complications and an increased hospital length of stay. Although the use of epidural analgesia resulted in a statistically significant decrease in the postoperative pain levels on postoperative day 1, that finding may not be clinically significant. There was no difference in the pain level between the 2 groups on postoperative day 2. Both options presumably offer appropriate patient analgesia. This is, to our knowledge, one of the largest studies to evaluate the impact of epidural analgesia in patients undergoing abdominal wall reconstruction for ventral or incisional hernias.

The beneficial effects of epidural analgesia have been extensively studied in patients undergoing other major abdominal surgeries. A large body of research suggests that there is considerable procedure variation in the results of epidural analgesia. Even though most of the studies agree that the use of epidural analgesia may result in better pain control, there is a notable variation in the impact of epidural analgesia on other postoperative measures and outcomes. Park et al[9] studied a total of 1201 patients requiring analgesia for intraabdominal aortic, gastric, biliary, or colon operations. The study randomly assigned patients to receive an epidural analgesic vs not; the authors concluded that for the subgroup of patients undergoing abdominal aortic operations, the use of epidural resulted in a lower incidence of new-onset myocardial infarctions, cerebrovascular accidents, and respiratory failure. In a subsequent Cochrane database review of patients undergoing abdominal aortic surgery, Nishimori et al[10] concluded that epidural analgesia, when used as an adjunct to traditional opioid analgesia, results in better pain relief and decreases complications associated with the postoperative period. Similar to vascular surgery, the use of epidural analgesics has been shown to have beneficial effects in other surgical specialties. Literature on colorectal surgery strongly favors the use of epidural analgesics. Carli et al[11,12] studied 64 patients undergoing elective colon resection and found that the use of epidural analgesics was associated with better pain control,

Table 7. Pain management and length of stay[a]

Parameter	Overall (N = 4983)	Epidural analgesia (n = 237)	No epidural analgesia (n = 4746)	p value	mean (95% CI)	β	Adjusted p value
Length of stay (days)	4.0 ± 4.5	6.5 ± 5.3	3.8 ± 4.4	< 0.01	2.42 (1.81 to 3.03)	0.155	< 0.01
Pain score, median (range)							
Postoperative day 1	4 (0-10)	3 (0-10)	4 (0-10)	< 0.01	-1.15 (-1.59 to -0.70)	0.228	< 0.01
Postoperative day 2	3 (0-10)	2 (0-10)	3 (0-10)	0.01	-0.35 (-0.81 to 0.10)	0.231	0.13

[a] Adjusting for diabetes, sleep apnea, hypertension requiring medication, β-blocker, statin, history of deep vein thrombosis, American Society of Anesthesiologists class, wound classification at the end of the surgery, type of surgery, type of analgesia, and type of perioperative venothromboembolic prophylaxis.
CI = confidence interval.

earlier return of bowel function, and early out-of-bed mobilization compared with their counterparts. Results of a study by Fant et al[13] similarly suggested that thoracic epidural analgesia significantly improved the postoperative pain and pulmonary function for patients undergoing radical retropubic prostatectomy.

Several studies have advocated against the use of the epidural analgesic as an adjunct. A study by Jayr et al[14] in 1993 was unable to show a decrease in the incidence of postoperative pulmonary complications or the total hospital length of stay with a concurrent increase in the incidence of episodic systemic hypotension. The literature in cardiothoracic surgery remains equivocal on this subject. A randomized controlled trial in elective cardiac surgery showed no difference in hospital length of stay, quality of recovery, or morbidity between the patients who received epidural vs those who received traditional narcotics.[15] Similarly, O'Hara et al[16] studied 31 pediatric patients undergoing spinal fusion and found no differences in the use of narcotics, postoperative pain, time to oral intake, ambulation, return of bowel function, or total hospital length of stay between patients who received epidural analgesics and their counterparts.

In a study by Fischer et al,[17] 134 cases of patients undergoing abdominal wall reconstruction were retrospectively reviewed. In that study, epidural use was associated with a lower incidence of major surgical complications (19.7% vs 36.1%, p = 0.04) and medical complications, namely acute renal failure, postoperative arrhythmias, and septicemia (26.8% vs 54.1%, p = 0.001). However, the authors failed to show improved outcomes regarding wound complications. Interestingly, the article failed to show any benefits of the use of epidural analgesics in pulmonary

Table 8. Subgroup analysis stratified by American Society of Anesthesiologists (ASA) class[a]

Class	Epidural, no. (%)	No epidural, no. (%)	AOR (95% CI)	Adjusted p value
ASA Class 1/2[b]				
Presentation in Emergency Department within 30 d	7 (6.6)	332 (13.0)	0.45 (0.19-1.02)	0.06
Readmission within 30 d	10 (9.4)	236 (9.2)	1.07 (0.51-2.24)	0.86
Reoperation within 30 d	6 (5.7)	193 (7.5)	0.94 (0.38-2.36)	0.9
Superficial site infection	7 (6.6)	32 (1.2)	2.38 (0.80-7.08)	0.12
Deep site infection	2 (1.9)	15 (0.6)	4.18 (0.73-23.92)	0.11
Deep/organ space infection	3 (2.8)	8 (0.3)	8.35 (1.24-56.42)	0.03
Urinary tract infection	1 (0.9)	9 (0.4)	1.10 (0.08-14.82)	0.94
Transfusion	2 (1.9)	14 (0.5)	1.61 (0.28-9.43)	0.6
Deep vein thrombosis	0 (0.0)	3 (0.1)	NA	NA
Sepsis	1 (0.9)	6 (0.2)	2.96 (0.20-43.96)	0.43
Severe sepsis	1 (0.9)	6 (0.2)	2.14 (0.12-38.37)	0.61
Unplanned intubation	0 (0.0)	4 (0.2)	NA	NA
Pulmonary embolism	1 (0.9)	3 (0.1)	3.27 (0.09-113.54)	0.51
Pneumonia	1 (0.9)	10 (0.4)	1.49 (0.13-17.16)	0.75
ASA Class 3/4[c]				
Presentation in Emergency Department	12 (9.2)	278 (12.7)	0.70 (0.37-1.33)	0.27
Readmission within 30 d	23 (17.6)	247 (11.3)	1.32 (0.79-2.23)	0.29
Reoperation within 30 d	14 (10.7)	155 (7.1)	1.32 (0.70-2.49)	0.39
Superficial site infection	4 (3.1)	54 (2.5)	0.71 (0.23-2.21)	0.56
Deep site infection	5 (3.8)	27 (1.2)	2.07 (0.62-6.86)	0.24
Deep/organ space infection	4 (3.1)	7 (0.3)	9.96 (2.05-48.33)	< 0.01
Urinary tract infection	2 (1.5)	8 (0.4)	2.46 (0.56-10.88)	0.24
Transfusion	8 (6.1)	39 (1.8)	3.81 (1.53-9.51)	< 0.01
Deep vein thrombosis	2 (1.5)	11 (0.5)	0.91 (0.14-5.98)	0.92
Sepsis	5 (3.8)	24 (1.1)	2.48 (0.80-7.75)	0.12
Severe sepsis	5 (3.8)	20 (0.9)	2.14 (0.63-7.29)	0.23
Unplanned intubation	6 (4.6)	29 (1.3)	1.82 (0.62-5.37)	0.28
Pulmonary embolism	2 (1.5)	9 (0.4)	3.72 (0.50-27.94)	0.2
Pneumonia	5 (3.8)	36 (1.6)	1.33 (0.44-4.01)	0.62

[a] Adjusting for diabetes, sleep apnea, hypertension requiring medication, β-blocker, statin, history of deep vein thrombosis, ASA class, wound classification at the end of the surgery, type of surgery, type of analgesia, and type of perioperative venothromboembolic prophylaxis.
[b] For ASA class 1/2, Epidural n = 106 and No epidural n = 2563.
[c] For ASA class 3/4, Epidural n = 131 and No epidural n = 2183.
AOR = adjusted odds ratio; CI = confidence interval; NA = not available.

complications or postoperative ileus. It also needs to be noted that the patients who did not receive an epidural analgesic were 4 times more likely to have an ASA score of 4 (4.9% vs 1.4%), which adds to the possibility of selection bias. Our study included a vigorous analysis of a large population while adjusting for multiple confounding factors. Subgroup analyses were performed to evaluate the impact of epidural analgesics in patients with severe comorbidities based on the ASA classification. This analysis also failed to demonstrate any benefits over traditional narcotic analgesia.

In the present study, the use of epidural analgesia was associated with a statistically significant increase in the risk of developing deep/organ space infection. One potential explanation is that epidural analgesia may induce a suppression of the postoperative inflammatory cascade. It is possible that the higher infection rate is related to the higher incidence of contaminated wound class than to the presence of an epidural analgesic. Chen et al[18] studied 53 otherwise healthy individuals (ASA 1/2) undergoing colectomy for treatment of colon cancer and found that patients who received an epidural analgesic as an analgesic adjunct had a significantly lower increase in the lymphocyte count, including T-helper type 2 and regulatory lymphocytes. Similarly, C-reactive protein levels were significantly higher postoperatively for patients who did not receive an epidural analgesic. Decreased immune system vigilance induced by the use of epidural analgesia may potentially result in blunted immune activity and subsequent increased risk of infection.

There are several limitations to this study. This is a retrospective study, making it prone to all the limitations inherent to the nature of the design. Furthermore, despite having important information regarding the operative details, the size of the abdominal wall defect was not available. It is possible that patients with larger defects were more likely to receive an epidural analgesic, potentially skewing the results. The Michigan Surgical Quality Collaborative Database contains self-reported clinical data in predetermined fields. Although it is better than purely administrative data, it does limit one's ability to query the patient information. For example, it is unknown when different institutions were measuring the severity of the pain. This lack of consistency makes it difficult to compare the outcomes of this study with those of other published reports. Finally, the percentage of patients receiving an epidural analgesic was relatively low (5%), making the study potentially underpowered.

Strengths of the study include a large population, given that the Michigan Surgical Quality Collaborative Database represents the largest regional database in the US, and a robust multivariate analysis.

CONCLUSION

The present study showed that the use of epidural analgesia in patients undergoing abdominal wall reconstruction is associated with longer hospital lengths of stay and higher incidence of complications. The findings suggest there may be no superiority in the use of epidural analgesia for abdominal wall reconstruction. ❖

Disclosure Statement

The author(s) have no conflicts of interest to disclose.

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