The American Journal of Surgery (2014) 208, 919-925

The American Journal of Surgery®

Southwestern Surgical Congress

Alvimopan reduces length of stay and costs in patients undergoing segmental colonic resections: results from multicenter national administrative database

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KEYWORDS:
Alvimopan;
Outcomes;
Database;
Sigmoidectomy;
Colon;
Resection

Abstract

BACKGROUND: Alvimopan (Entereg), a peripherally acting mu-opioid receptor antagonist, has been shown to expedite recovery of bowel function after colon resection surgery. Most data are available from industry-sponsored trials. This study aims to evaluate the clinical impact of this drug on perioperative outcomes and costs in patients undergoing segmental colonic resection for diverticular disease.

METHODS: A large administrative database maintained by the University Health System Consortium, an alliance of over 200 academic and affiliate hospitals, was queried from 2008 to 2011. International Classification of Diseases, 9th Revision, Clinical Modification codes for segmental colon resection because of diverticular disease were used to identify 2 matched cohorts of adult patients. University Health System Consortium's clinical resource manager was used to access pharmacy data and compare it with patient outcomes.

RESULTS: Five thousand two hundred ninety-nine patients met the above criteria. Four hundred thirty-eight patients received alvimopan and 4,861 did not. Regardless of laparoscopic or open approach, alvimopan significantly improved the postoperative length of stay (4.43 ± 2.02 vs 5.92 ± 3.79, $P < .0001$), cost (9,974 ± 4,077 vs 11,303 ± 6,968, $P < .0001$), and intensive care unit admission rate (1.83% vs 7.20%, $P < .05$), with no significant difference in mortality (.0% vs .19%, $P = 1.000$), morbidity (5.93% vs 8.39%, $P = .08$), or 30-day readmission rate (4.40% vs 4.63%, $P = .90$).

CONCLUSIONS: Alvimopan significantly reduced length of stay, days in the intensive care unit, and hospital cost for patients undergoing colonic segmental resections. Unlike some previously reported studies, we also observed a significant reduction in the length of stay in patients undergoing laparoscopic colectomies who received the drug. Alvimopan may reduce total healthcare costs if used as part of a best care practice model for colon resections.

The authors declare no conflicts of interest.
There were no relevant financial relationships or any sources of support in the form of grants, equipment, or drugs.
This work was supported by the Center for Advanced Surgical Technology at the University of Nebraska Medical Center.
Accepted as oral presentation at Southwestern Surgical Congress Annual Meeting, April 13–16, 2014, Scottsdale, Arizona.
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Manuscript received April 9, 2014; revised manuscript August 18, 2014

0002-9610/$ - see front matter © 2014 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.amjsurg.2014.08.011

Each year about 350,000 patients undergo colorectal or small bowel resection in the United States. The average length of stay (LOS) for these patients is 11 days in the hospital, and account for nearly 15 billion dollars in hospital costs annually.[1] After undergoing laparoscopic or open surgery on the gastrointestinal (GI) tract, the patient begins a recovery stage, which can significantly lengthen days spent at the hospital.[2–4] One of the major complications affecting the LOS is postoperative ileus—a temporary impairment of GI function.[2] The key mechanisms contributing to the development of postoperative ileus are the surgical procedure itself, providing physical stress to the intestines, changes in hormone levels and in electrolyte and fluid balances, and the production of inflammatory mediators and endogenous opioids.[5–8] The most commonly prescribed medications for pain control are the opioids.[9] Opioids bind μ-opioid receptors providing pain relief, although binding to the same receptors in the GI system aggravates the postoperative ileus.[5,7]

Because the Food and Drug Administration has approved the drug alvimopan (Entereg), a peripherally acting μ-opioid receptor antagonist for the acceleration of GI recovery, several published studies and clinical trials have indicated favorable outcomes for the use of the drug.[10–13] The goal of this analysis is to evaluate retrospective data from a large national database on patients with minor or moderate severity of illness (SOI) undergoing laparoscopic or open surgery for the diagnosis of diverticular disease.

Methods

Database description

The University Health System Consortium (UHC) is an alliance of more than 100 academic medical centers and more than 250 of their affiliated hospitals, representing 90% of the nation's nonprofit academic medical centers.[14] The UHC database is an administrative, clinical, and financial database that provides patient-level data for the purpose of comparative analysis between institutions. The UHC database contains discharge information on inpatient hospital stay including patient characteristics, LOS, 30-day readmission rate, overall and specific postoperative morbidity, risk-adjusted in-hospital mortality, and inpatient care costs.[15,16] The Refined Diagnosis-Related Group methodology is used to assign a level of severity by grouping patients based on the severity and complexity of the secondary diagnoses (comorbidities and complications). The UHC assigns a SOI to a patient based on 30 previously described comorbid conditions, such as congestive heart failure, hypertension, renal and liver failure, obesity, diabetes, and so on.[17] Depending on the number of comorbid conditions, the severity class is grouped as minor (0), moderate (1 to 2), major (3 to 4), or extreme severity (>5).[17] The UHC first classifies patients into risk pools according to Refined Diagnosis-Related Group or International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9CM) diagnosis and procedure codes to determine morbidity. They identify patients at risk for specific types of complications and are reported as percent of cases with one or more complications. Twenty-five specific complication groups exist, such as postoperative pulmonary compromise, septicemia, shock, cardiorespiratory arrest, reopening of surgical site, postoperative infections, and so on. The UHC database has no information available on death occurring after discharge, even if the death occurred within the 30 days from the date of operation. LOS was defined as the period from the index procedure to hospital discharge, and 30-day readmission was defined as readmission for any reason within 30 days of discharge after the index procedure. The UHC clinical database provides an

Table 1 Laparoscopic-only comparison: demographics of patients with diverticular disease, minor/moderate severity of illness who underwent laparoscopic sigmoidectomy, and who received or did not received alvimopan

Variable	Alvimopan (n = 324)	No alvimopan (n = 2,913)	P value
Age			
18–30	5 (1.54)	45 (1.54)	NS
31–50	104 (32.09)	975 (33.47)	NS
51–70	190 (58.64)	1,589 (54.54)	NS
>70	25 (7.71)	304 (10.43)	NS
Sex			NS
Male	163 (50.30)	1,440 (49.43)	NS
Female	161 (49.69)	1,473 (50.56)	NS
Race			
White	276 (85.18)	2,316 (79.50)	<.05*
Black	14 (4.32)	125 (4.29)	NS
Hispanic	2 (.61)	113 (3.87)	<.05*
Other	32 (9.87)	359 (12.32)	NS

NS = not statistically significant.
*Statistical significance.