Patient-Reported Outcomes Accurately Measure the Value of an Enhanced Recovery Program in Liver Surgery

Ryan W Day, MD, Charles S Cleeland, PhD, Xin S Wang, MD, MPH, Sharon Fielder, APN, John Calhoun, MS, Claudius Conrad, MD, PhD, Jean-Nicolas Vauthey, MD, FACS, Vijaya Gottumukkala, MD, Thomas A Aloia, MD, FACS

BACKGROUND: Enhanced recovery (ER) pathways have become increasingly integrated into surgical practice. Studies that compare ER and traditional pathways often focus on outcomes confined to inpatient hospitalization and rarely assess a patient's functional recovery. The aim of this study was to compare functional outcomes for patients treated on an Enhanced Recovery in Liver Surgery (ERLS) pathway vs a traditional pathway.

STUDY DESIGN: One hundred and eighteen hepatectomy patients rated symptom severity and life interference using the validated MD Anderson Symptom Inventory preoperatively and postoperatively at every outpatient visit until 31 days after surgery. The ERLS protocol included patient education, narcotic-sparing anesthesia and analgesia, diet advancement, restrictive fluid administration, early ambulation, and avoidance of drains and tubes.

RESULTS: Seventy-five ERLS pathway patients were clinically comparable with 43 patients simultaneously treated on a traditional pathway. The ERLS patients reported lower immediate postoperative pain scores and experienced fewer complications and decreased length of stay. As measured by symptom burden on life interference, ERLS patients were more likely to return to baseline functional status in a shorter time interval. The only independent predictor of faster return to baseline interference levels was treatment on an ERLS pathway ($p = 0.021$; odds ratio = 2.62). In addition, ERLS pathway patients were more likely to return to intended oncologic therapy (95% vs 87%) at a shorter time interval compared to patients on the traditional pathway (44.7 vs 60.2 days).

CONCLUSIONS: In oncologic liver surgery, enhanced recovery's primary mechanism of action is reduction in life interference by postoperative surgical symptoms, allowing patients to return sooner to normal function and adjuvant cancer therapies. (J Am Coll Surg 2015;221:1023−1030. © 2015 by the American College of Surgeons. Published by Elsevier Inc. All rights reserved)

The ultimate goal of any surgery is to return the patient to at least their baseline functional status, if not an improved functional status compared with their preoperative state, as rapidly as possible and with the least amount of intercurrent disability. Although fast-track surgical protocols have been reported for decades,[1,2] it is only recently that the enhanced recovery (ER) movement in perioperative care has significantly penetrated North American surgical practice. Multiple recently published meta-analyses have clearly demonstrated that patients are benefiting from these changes in philosophy and practice.[3-5] Most commonly, the included studies focused on outcomes confined to inpatient hospitalization using concrete primary end points, including early return of bowel function, lower complication rates, and/or shorter length of inpatient stay.[6-8]

Disclosure Information: Nothing to disclose.

Support: This research was supported in part by National Institutes of Health Grant, CA016672.

Drs Gottumukkala and Aloia contributed equally to this work.

Poster abstract presented at the 123rd Annual Western Surgical Association Meeting, Napa Valley, CA, November 2015.

Received August 10, 2015; Revised September 9, 2015; Accepted September 9, 2015.

From the Department of Surgical Oncology (Day, Fielder, Conrad, Vauthey, Aloia), Department of Symptom Research (Cleeland, Wang), Institute for Cancer Care Innovation (Calhoun), and Department of Anesthesiology (Gottumukkala), The University of Texas MD Anderson Cancer Center, Houston, TX.

Correspondence address: Thomas A Aloia, MD, FACS, Department of Surgical Oncology, The University of Texas MD Anderson Cancer Center, 1400 Herman Pressler, Unit 1484, Houston, TX 77030. email: taaloia@mdanderson.org

http://dx.doi.org/10.1016/j.jamcollsurg.2015.09.011
ISSN 1072-7515/15

Abbreviations and Acronyms

ER = enhanced recovery
ERLS = Enhanced Recovery in Liver Surgery
GI = gastrointestinal
MDASI-GI = MD Anderson Symptom Inventory, gastrointestinal version
PRO = patient-reported outcomes
RIOT = return to intended oncologic therapy

In addition, many of the published studies that have examined the impact of ER protocols on short-term outcomes have focused on patients undergoing nononcologic procedures.[9-11] When surgical oncology patients have been included, they have tended to have early-stage disease amenable to minimally invasive surgical approaches.[12,13] For the majority of oncologic operations, however, postoperative recovery carries the additional demand of returning the patient to adjuvant oncologic therapies. Failure to return to intended oncologic therapy (RIOT)[14] after cancer surgery due to complications and lingering poor performance status is strongly associated with worse oncologic outcomes, including shortened overall survival.[15,16] Therefore, the end point of length of stay does not adequately measure the oncologic value of surgical recovery to patients with cancer.

In surgical practice, and particularly in the field of surgical oncology, tools for the measurement of functional recovery are lacking.[17] To address this knowledge gap, this study was designed to assess the ability of an ER program to deliver rapid functional recovery after surgical oncology procedures. To measure the recovery process, the study used a validated patient-reported outcomes (PRO) assessment tool to compare the quality of recovery between an Enhanced Recovery in Liver Surgery (ERLS) pathway and a traditional recovery pathway.

METHODS

After study approval by the University of Texas MD Anderson Cancer Center IRB (protocol PA14-1079), hepatectomy patient data entered into a prospectively maintained hepatobiliary surgery database were assessed. The PRO tool used in this study was the gastrointestinal version of the MD Anderson Symptom Inventory (MDASI-GI).[18] The MDASI-GI is a validated instrument in cancer patients[18] composed of 24 questions that the patient evaluates on Likert scales (0 to 10) (Appendix). The tool has 3 sections, including 13 core symptom questions, which are common to all formats of the MDASI. The GI symptom-specific module comprises 5 questions unique to the patients with GI cancer (eg, constipation, diarrhea/watery stools via stoma, swallowing, change in taste, feeling bloated). Lastly, the interferences portion is composed of 6 questions that assess the impact that symptoms are having on the patient's function and well being (eg, general activity, mood, work including housework, relations with other people, walking, and enjoyment of life). A score of 0 for an item signifies that the patient was not experiencing the symptom of interest or that they were fully functional without life interference from symptoms, respectively. A score of 10 indicates that a symptom was graded as "the worst possible experience" or that interference was graded as "completely interfering" with daily functioning, respectively.

The symptom inventory was administered to patients undergoing hepatectomy for any diagnosis between September 2013 and January 2015. Initially baseline data were collected on the last preoperative visit before the operation (typically 1 to 3 days before surgery). Postoperatively, as an inpatient, the survey was administered on postoperative days 1, 3, and 5. In addition, midterm recovery was measured by collecting MDASI-GI at each postsurgical outpatient visit until 31 days had passed since the operation (typically postoperative weeks 1 and 4). All survey data were used for time to recovery and event analyses. The last survey administered within the 31-day postsurgical time period was used for quantitative binary statistical analyses. Demographic, operative, hospitalization, and complication data were obtained from the hepatobiliary surgical database and supplemented by retrospective review of the electronic medical record.

For each patient, the preoperative and postoperative MDASI-GI questionnaires were compared across several domains. First, the magnitude and direction of score change from preoperative survey to postoperative survey for the total score and for each component score of the MDASI-GI (core, GI, and interference) were calculated. Individual MDASI item, component scores, and total score were then converted to the categorical value of "returned to baseline," defined as a postoperative score that was no more than 2 points higher than the preoperative score.

Demographic and clinical information included age, sex, preoperative systemic therapy, and American Society of Anesthesiologists score. Operative data included type of operation, use of minimally invasive vs open approach, use of epidural analgesia, length of operation, magnitude of liver resection, and use of the ERLS pathway. There were 2 patients who were initially in the minimally invasive group that required conversion to an open operation due to dense adhesions; for the purpose of this analysis, these were considered open and not minimally invasive procedures. Major hepatectomy was defined as nonanatomic resection