

ORIGINAL ARTICLE

Risk factors for increased resource utilization and critical care complications in patients undergoing hepaticojejunostomy for biliary injuries

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Abstract

Background: This project aimed to study resource utilization and surgical outcomes after hepaticojejunostomy (HJ) for biliary injuries utilizing data from ACS NSQIP.

Methods: Data from the Participant Use Data File containing surgical patients submitted to the ACS NSQIP during the period of 1/1/2005–12/31/2014 were analyzed.

Results: During the study period, 320 patients underwent HJ. Mean age was 50 years, and 109 (34%) were male. Forty-four percent of patients met criteria for ASA class III–V. Forty patients (12.5%) developed one or more critical care complications (CCC). Eighty-one patients (25%) experienced morbidity with a perioperative mortality rate of 1.9%. The mean age of these patients was 52 years, and 62% were male. Age and preoperative elevated alkaline phosphatase were independent predictors of CCC ($p < 0.001$ and 0.042 , OR 1.035, OR 4.337, respectively). Patients ASA class III, age, and preoperative hypoalbuminemia were found to increase risk for prolonged LOS (OR 1.87, $p = 0.041$, OR 1.02, $p = 0.049$, OR 2.63, $p = 0.001$).

Discussion: The most significant predictors of morbidity and increased resource utilization after HJ include increasing age, ASA class III or above, and preoperative hypoalbuminemia. Age and ASA class are the strongest predictors of CCC in these patients.

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Introduction

Iatrogenic biliary duct injury (IBDI) is an important and serious complication of abdominal surgery, most commonly occurring during laparoscopic cholecystectomy (LC). LC is one of the most common surgical procedures performed in the United States with approximately 750,000 performed annually.¹ The incidence of IBDI increased to 0.9% after the introduction of LC.² Unrecognized or improperly treated IBDI can lead to further complications such as secondary biliary cirrhosis and liver dysfunction, need for further surgical intervention, or even death.³ This leads to increased healthcare costs, time off work, and decreased quality of life.^{4,5} Short and long term outcomes are generally correlated with the severity and grade of the IBDI.

The goal of operative treatment of IBDI is to reestablish bile flow into the gastrointestinal tract and prevent cholangitis, biliary sludge, biliary stones, stricture or biliary cirrhosis. Hepaticojejunostomy (HJ) is the most commonly used and recommended means of IBDI repair.^{2,6,7} HJ is the preferred treatment for many reasons including absence of intestinal reflux into bile ducts and a lower occurrence of postoperative stricture.^{2,8} However, HJ does have considerable risk of longterm complications, most notably a stricture of the HJ and need for repeat HJ.⁹

The aim of this project was to study resource utilization and short term surgical outcomes after HJ for biliary injury utilizing the data from ACS NSQIP.

Methods

A study that investigated patients undergoing hepaticojejunostomy for biliary injuries was performed. The ACS NSQIP database was used to collect pre-, intra-, and postoperative variables. The data were analyzed using the Participant Use Data File containing all surgical patients submitted to the ACS NSQIP during the study period of 1/1/2005–12/31/2014. The ACS NSQIP collects preoperative risk factors including preoperative laboratory data, intraoperative variables, and 30-day postoperative morbidity and mortality outcomes for a systematic and prospective sample of patients undergoing surgical procedures in both the inpatient and outpatient setting.

In 2011 readmitted data was added to the ACS NSQIP dataset. Therefore, readmission data between 2011 and 2014 were collected and analyzed. Readmitted patients were stratified into planned readmissions, unplanned readmissions related to the index procedure (UPRR), and unrelated readmissions. Planned readmissions were defined as those indicated at the time of the index procedure. Unrelated readmissions were defined as those in which the readmission was associated with a pathology unrelated to the initial procedure. Morbidity was defined as previously published by the presence of surgical site infection, wound dehiscence, pneumonia, unplanned intubation, extended ventilator use, sepsis or septic shock, urinary

Table 1 Major morbidity among patients undergoing biliary reconstruction for IBDI^a

Variable	All patients	No. major morbidities	At least 1 major morbidity	Significance
All patients	N = 320	n = 239	n = 81	
Age, mean (SD)	50 (18)	47 (17)	57 (17)	<0.001
Age				
<=35	88	74	11	0.001
36–45	48	43	7	
46–55	68	48	20	
56–65	52	36	17	
66+	64	38	26	
Female	211	170	42	0.003
BMI				
<18.5	23	16	7	0.158
18.5–25	80	55	24	
25–30	104	81	25	
30–35	64	50	13	
35–40	40	33	7	
40+	9	4	5	
ASA class				
I–II	179	148	31	0.001
III	131	86	45	
IV–V	10	5	5	
Diabetes mellitus	45	26	19	0.010
Congestive heart failure	3	2	1	1.000
Anticoagulation or bleeding disorder	11	7	4	0.479
Renal insufficiency or failure	1	0	1	0.253
Smoking	57	46	10	0.179
Presence of ascites	7	5	2	1.000
Dialysis	2	2	0	0.621
Albumin <3 g/dl	93	62	30	0.098
Bilirubin >1	150	110	39	0.793
Creatinine >1.2	27	14	12	0.017
Alkaline phosphatase >125	208	148	60	0.072

^a A major morbidity is defined as one of the following events: SSI (superficial, deep incisional, or organ/space), wound dehiscence, pneumonia, unplanned intubation, on ventilator >48 h, sepsis/septic shock, UTI, renal failure/insufficiency, pulmonary embolism, DVT, myocardial infarction, stroke/CVA, any readmission, or any reoperation.

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