
Is Nighttime the Right Time? Risk of Complications after Laparoscopic Cholecystectomy at Night



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- BACKGROUND:** Laparoscopic cholecystectomies can be performed at night in high-volume acute care hospitals. We hypothesized that nonelective nighttime laparoscopic cholecystectomies are associated with increased postoperative complications.
- STUDY DESIGN:** We conducted a single-center retrospective review of consecutive laparoscopic cholecystectomy patients between October 2010 and May 2011 at a safety-net hospital in Houston, Texas. Data were collected on demographics, operative time, time of incision, length of stay, 30-day postoperative complications (ie, bile leak/biloma, common bile duct injury, retained stone, superficial surgical site infection, organ space abscess, and bleeding) and death. Statistical analyses were performed using STATA software (version 12; Stata Corp).
- RESULTS:** During 8 months, 356 patients had nonelective laparoscopic cholecystectomies. A majority were female (n = 289 [81.1%]) and Hispanic (n = 299 [84%]). There were 108 (30%) nighttime operations. There were 29 complications in 18 patients; there were fewer daytime than nighttime patients who had at least 1 complication (4.0% vs 7.4%; p = 0.18). On multivariate analysis, age (odds ratio = 1.06 per year; 95% CI, 1.02–1.10; p = 0.002), case duration (odds ratio = 1.02 per minute; 95% CI, 1.01–1.02; p = 0.001), and nighttime surgery (odds ratio = 3.33; 95% CI, 1.14–9.74; p = 0.001) were associated with an increased risk of 30-day surgical complications. Length of stay was significantly longer for daytime than nighttime patients (median 3 vs 2 days; p < 0.001).
- CONCLUSIONS:** Age, case duration, and nighttime laparoscopic cholecystectomy were predictive of increased 30-day surgical complications at a high-volume safety-net hospital. The small but increased risk of complications with nighttime laparoscopic cholecystectomy must be balanced against improved efficiency at a high-volume, resource-poor hospital. (*J Am Coll Surg* 2014;219:718–724. © 2014 by the American College of Surgeons)
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In “Crossing the Quality Chasm,” the Institute of Medicine described the following aims of health care: safety, patient-centeredness, effectiveness, efficiency, timeliness, and equity.¹ To improve the timeliness and efficiency of

care for patients requiring urgent or emergent operations, several hospitals have implemented the acute care surgery model.^{2–4} By having dedicated surgical faculty, acute care surgery services have reduced time to surgical consultation, time to the operating room, length of stay, and complications among patients with cholecystitis and appendicitis.^{2–4} The structure of these models differs among hospitals in terms of whether or not an operating room is dedicated to acute care surgery during the daytime and whether operations occur 24 hours a day and 7 days a week.

The ability to operate around the clock can improve the timeliness of care. However, data on the safety of nighttime operations are conflicting. Several studies have evaluated outcomes of nighttime, nonemergent procedures using data from the NSQIP. Kelz and colleagues

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evaluated procedures both within the Veterans Affairs health system and in the private sector and demonstrated increased risk-adjusted morbidity with after-hour surgery.^{5,6} On the other hand, Turrentine and colleagues analyzed >10,000 patients at a single center and identified no differences in morbidity or mortality, although nighttime surgery was associated with more reoperations and longer length of stay.⁷ With regard to more urgent or emergent procedures, several studies have reported worsened outcomes after nighttime orthopaedic surgery for traumatic fractures, including increased rate of reoperation,⁸ need for hardware removal,⁸ blood loss,⁹ and complications.¹⁰

In the Western world, cholecystectomy is the most commonly performed major abdominal operation.¹¹ Lyndon Baines Johnson General Hospital (LBJGH), a safety-net hospital in Houston, Texas, serves a largely Hispanic population, which is at high risk for gallstone disease. Because of limited operating room time, nighttime cholecystectomies are performed commonly. The purpose of this study was to compare outcomes for nonelective nighttime vs daytime laparoscopic cholecystectomies at a safety-net hospital with a high volume of biliary disease. We hypothesized that there would be an increase in risk-adjusted complications with nighttime surgery.

METHODS

A retrospective review was conducted of all laparoscopic cholecystectomies performed at LBJGH in Houston, Texas between October 2010 and May 2011. The University of Texas Health Science Center at Houston and Harris Health System Institutional Review Boards approved this study.

Lyndon Baines Johnson General Hospital is a 328-bed acute care hospital and Level III trauma center that offers a wide range of medical services. Faculty and residents from the University of Texas Health Science Center at Houston are in house 24 hours a day, 7 days a week. A dedicated staff member is assigned to see consults and perform emergency cases. There are 8 operating rooms from 7 AM until 3 PM, 4 operating rooms from 3 PM until 7 PM, and 2 operating rooms from 7 PM until 11 PM. There is 1 operating room from 11 PM until 7 AM. Lyndon Baines Johnson General Hospital performs approximately 8,000 operative cases per year, of which >3,000 are general surgery cases. Procedures range from simple operations, such as lipoma excisions, to complex hepatobiliary operations. Emergency cases, defined as those with impending death or limb loss, are given priority. However, there is no dedicated operating room for acute care surgery cases. Nonelective laparoscopic

cholecystectomies are performed during the daytime if there is unused block time or if the patient is considered to be at high risk for anesthetic complications by the evaluating physicians. However, due to high volume and limited daytime operating room availability, nonelective laparoscopic cholecystectomies are routinely performed at nighttime and on the weekends. To compare similar groups, we restricted our analyses to those patients who received nonelective surgery.

Data were collected on patient demographics, time of surgery, case duration, conversion to open rate, surgeon experience, postoperative length of stay, 30-day complications (ie, bile leak/biloma, common bile duct injury, retained stone, organ space abscess, superficial surgical site infection, bleeding requiring reoperation, and pneumonia), readmissions related to a 30-day surgical complication, and death. Nineteen attending surgeons staffed the procedures in this analysis. Fellows included surgeons who had completed a surgical residency at our institution and who were board-eligible or board-certified. Junior surgeons included instructors and assistant professors. Senior surgeons included associate professors and full professors. Fellows took nighttime call but only performed daytime surgery during the weekends, and junior and senior surgeons took call all days and nights of the week. One senior surgeon did not take nighttime call. Weekday shifts were 12 hours but included a full day of work before call, and weekend shifts were 24 hours. Therefore, all surgeons worked the equivalent of 24-hour shifts. Based on the operating room set-up, procedures performed between 11 PM and 7 AM were coded as nighttime operations.

Severity of gallbladder disease was retrospectively coded from the operative and pathology reports based on the literature¹² and consensus opinion. Grade 1 was assigned if the operative report described normal anatomy, no technical difficulties, and no or mild inflammation. Grade 2 was assigned if the operative report included findings such as moderate inflammation, edema or a thickened wall, an impacted stone, a distended or enlarged gallbladder, hydrops, or substantial adhesions requiring lysis. Grade 3 was assigned if findings included gangrenous or emphysematous cholecystitis, pus in the gallbladder, or considerable difficulty identifying the anatomy in the triangle of Calot (ie, Mirizzi syndrome). Grade 3 was also assigned if alternative operative strategies were used suggesting increased difficulty, such as a dome-down approach, stapling across the infundibulum, conversion to open, or partial cholecystectomy where the posterior wall was left behind. Two authors (LSK and CJW) reviewed all of the reports and graded the cases; discrepancies were resolved by discussion.

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