



ARAŞTIRMA / RESEARCH

Cholecystectomy under epidural anesthesia in elderly patients with significant comorbid conditions

Önemli komorbid durumları olan yaşlı hastalarda epidural anestezi altında kolesistektomi

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Abstract

Purpose: The aim of this study was to evaluate the surgical treatment of gallstone disease with open cholecystectomy under epidural anesthesia in elderly patients with significant comorbid conditions.

Materials and Methods: We retrospectively analyzed 80 consecutive elderly patients over 65 years of age with significant comorbid conditions who underwent open cholecystectomy under epidural anesthesia for the surgical treatment of gallstone disease between January 1, 2009 and December 31, 2019, all performed by one surgeon.

Results: Mean age was found 77 ± 16 years. Fifty of the patients (62.5%) were females. Forty-seven patients (58.75%) showed an American Society of Anesthesiologist Physical Status (ASA, PS) of ≥ 3 . The most frequently associated comorbidity involved the cardiovascular system (46 patients, 57.5%). Surgical indications were acute cholecystitis (AC) in 37 patients (46.25%) and chronic cholecystitis in 32 patients (40%). Mean operation time was 55 ± 22 minutes. Hospital stay was mean 12 ± 5 days. Total complication rate was 38.75%, and pulmonary complication was the most frequently encountered (13.75%). 30-day mortality was seen in 5 patients (6.25%).

Conclusion: In older, high-risk gallstone patients, an open cholecystectomy with epidural anesthesia may be recommended. For this patient population, the mortality and morbidity rates are acceptable.

Keywords: Gallstone disease, high risk patients, comorbid conditions, epidural anesthesia, open cholecystectomy

Öz

Amaç: Bu çalışmanın amacı, önemli komorbid durumları olan yaşlı hastalarda epidural anestezi altında açık kolesistektomi ile safra taşı hastalığının cerrahi tedavisini değerlendirmektir.

Gereç ve Yöntem: 1 Ocak 2009 ile 31 Aralık 2019 tarihleri arasında safra kesesi taşı cerrahi tedavisi için epidural anestezi altında açık kolesistektomi uygulanan, önemli komorbid durumları olan 65 yaş üstü 80 ardışık yaşlı hastayı geriye dönük olarak inceledik. Hastalar tek bir cerrah tarafından ameliyat edildi.

Bulgular: Ortalama yaş 77 ± 16 yıl olarak bulundu. Hastaların 50'si (% 62.5) kadındı. Kırk yedi hastanın (% 58.75) Amerikan Anestezi Uzmanları Derneği Fiziksel Skoru >3 idi. Eşlik eden en sık komorbiditeler kardiyovasküler sistemle ilgili idi (46 hasta, % 57.5). Cerrahi endikasyonlar 37 hastada (% 46.25) akut kolesistit (AK), 32 hastada (% 40) kronik kolesistit idi. Ortalama operasyon süresi 55 ± 22 dakika idi. Ortalama hastanede kalış süresi 12 ± 5 gündü. Toplam komplikasyon oranı % 38.75 olup, en sık pulmoner komplikasyonlar (% 13.75) ile karşılaşıldı. 30 günlük mortalite 5 hastada (% 6.25) görüldü.

Sonuç: İleri yaşlı, yüksek riskli safra taşı hastalarında epidural anestezi ile açık kolesistektomi önerilebilir. Bu hasta popülasyonu için mortalite ve morbidite oranları kabul edilebilir düzeydedir.

Anahtar kelimeler: Safra taşı hastalığı, yüksek riskli hastalar, komorbid durumlar, epidural anestezi, açık kolesistektomi

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INTRODUCTION

Cholelithiasis is seen in 3-20% of the world population, and the incidence increases with age^{1,2}. By age 60, gallstone disease is seen in 30% of the population, which increases up to 80% by age 90³. With the use of ultrasonography in biliary tract diseases at the beginning of 1980, both easy and noninvasive diagnosis of gallstones was provided and researches were conducted on the natural course of biliary tract stones⁴.

Most patients with gallstones are asymptomatic and will remain so throughout their lives. Approximately 15-25% of these will become symptomatic after 10-15 years of follow-up⁵. Data from large populations have shown that 2-3% of symptomatic cases develop complications such as acute cholecystitis (AC), gallstone pancreatitis, choledocolitis with obstruction (with or without acute cholangitis), Mirizzi syndrome, gallstone ileus and gallbladder cancer, each year. Once a complication develops, the risk of additional, often more severe, complications is approximately 30 percent per year^{3,5}.

Cholecystectomy is the most common major abdominal operation in western countries. Open cholecystectomy, which Karl Langenbuch performed successfully in 1882, has been used for more than 100 years in the treatment of symptomatic gallstones⁶. This was followed by laparoscopic cholecystectomy performed by Erich M \ddot{u} he in Böblingen, Germany in 1985 and Philippe Mouret in France in 1987 developed the technique of laparoscopic cholecystectomy and played a role in its widespread use all over the world^{7,8}. Today, laparoscopic cholecystectomy is the gold standard for the treatment of symptomatic gallstones.

The absolute contraindications to laparoscopic cholecystectomy are in patients with inability to tolerate general anesthesia due to severe obstructive pulmonary disease, hemodynamic instability, congestive heart failure (e.g., cardiac ejection fraction <20%), refractory coagulopathy and gallbladder cancer⁹. Because in these cases, patients cannot tolerate pneumoperitoneum created with carbon dioxide and open cholecystectomy under epidural or spinal anesthesia is required. In addition, conditions such as AC, gallbladder gangrene and empyema, previous upper abdominal surgery, pregnancy, cirrhosis, obesity, bilio-enteric fistula and ventriculoperitoneal shunt are considered as risk

factors for difficult laparoscopic cholecystectomy and are believed to be relative contraindications^{9,10}. If anatomical structures cannot be clarified within a certain period of time during laparoscopic cholecystectomy, it is converted to open cholecystectomy. This is between 5% in elective cases and 20-30% in acute cholecystitis cases¹¹.

Cholecystectomy is usually performed under general anesthesia. With advanced age, both the incidence of gallstones and comorbid conditions increase, and general anesthesia can not be given for laparoscopic cholecystectomy. Therefore, the aim of this study was to evaluate the results of open cholecystectomy under epidural anesthesia in difficult gallbladder conditions in elderly patients with serious comorbidities.

MATERIALS AND METHODS

Sample

A total of 80 consecutive patients (aged between 65-93 years) who had cholecystectomies from January 1, 2009 until December 31, 2019 under epidural anesthesia were evaluated. The study was approved by the ethics committee of the Karadeniz Technical University Faculty of Medicine on 19.10.2020 with the decision number 2020/304. Informed consent was received from all patients for operative procedures. All cholecystectomies were performed by one experienced surgeon for gallbladder surgery (EA).

Patients were selected from the Karadeniz Technical University Farabi Hospital, Trabzon, Turkey data base between 2009-2019, using the keywords cholecystectomy, epidural anaesthesia, surgeon Etem Alhan and 65 years and older, and all patients were evaluated. Patient information was obtained from the same data system by two senior research assistants (ST, MES) unaware of each other in order to increase reliability. Electronic medical record including demographics, pre-operative data, consultations, especially anesthesia, cardiology, respiratory system, kidney and nervous system consultations, American Society of Anesthesiologist Physical Status (ASA PS), imaging data such as x-ray, ultrasonography, magnetic resonance cholangiopancreatography (MRCP), endoscopic retrograde cholangiopancreatography (ERCP), surgical details (surgical indication, operating time) and post-operative data (complications mortality and hospital stay (from operation to discharge), pathology reports were recorded and analyzed.

Clinical evaluation

The timing of cholecystectomy in patients presenting with AC was within one week after the onset of symptoms. Following admission to the hospital, conservative treatment was initiated immediately. The patients were evaluated in terms of physical examination, laboratory, x-ray, ultrasonography and organ function. Medical consultation were obtained when indicated for cardiology, respiratory, kidney, and neural systems. All patients were given second generation cephalosporins. The patients were operated in good condition in one week. Other patients were evaluated under normal circumstances as elective procedures. Informed consent for operative procedures and organ function was obtained from all patients. The severity of AC was determined by new diagnostic criteria in accordance with the revised Tokyo guideline¹².

Bilious drain with elevated bilirubin in the drain was defined as biliary leakage. Surgical site infection was defined according to surgical site infection guidelines. Intraabdominal abscess was defined as culture positive purulent collection. High-risk patients were defined as ASA PS ≥ 3 .

Statistical analysis

Data were analyzed using statistical package SPSS 13.01 for Windows (SPSS, Chicago, IL, USA, and serial number 9069728). Results were presented as the mean \pm standard deviation in quantitative variables and as frequencies and percentages in qualitative variables. Chi-square test was used for the ASA PS groups and the t-test was used to examine the difference between high-risk and non-high-risk ASA PS. $P < 0.05$ was accepted significant.

RESULTS

A total of 80 patients underwent open cholecystectomies during the research period. Mean age was 77 ± 16 years. Fifty of the patients (62.5%) were females (Table 1). ASA PS was found as follows: 33 patients (41.25%) ASA II, 28 patients (35%) ASA III, and 19 patients (23.75%) ASA IV. In forty-seven patients (58.75%), ASA PS was found to be greater than III.

Most of the underlying diseases of the patients included cardiovascular disease, hypertension, diabetes mellitus, respiratory diseases, renal diseases, and neurologic disease (Table 1). Since patient's

physical status was more important than underlying diseases, we used ASA PS to assess the fitness of the cases before surgery. ASA PS I-IV were compared by chi-square test, and there were no significant differences between the groups ($P > 0.05$). The percentage of high-risk patients (defined as ASA PS ≥ 3) was significantly different from the ASA PS II ($P < 0.043$).

Table 1. Perioperative data of the patients

Characteristic	65 yr> % (number) or mean \pm standart deviation
Age (year)	77 \pm 16
Sex	
Female	62.5 (50)
Male	37.5 (30)
ASA PS	
ASA PS II	41.25 (33)
ASA PS III	35 (28)
ASA PS IV	23.75 (19)
Comorbidity	
Cardiovascular disease	57.5 (46)
Hypertension	55 (44)
Diabetes mellitus	20 (16)
Respiratory diseases	12.5 (10)
Renal diseases	12.5 (10)
Neurologic problems	2 (2)
Radiologic investigation	
Ultrasonography	100 (80)
Magnetic resonance cholangio pancreatography	17.5 (14)
Computerized tomography	12.5 (10)
Indication for surgery	
Acute calculous cholecystitis	46.25 (37)
Grade I	11.25 (9)
Grade II	11.25 (9)
Grade III	23.75 (19)
Chronic calculous cholecystitis	40 (32)
Choledecholithiasis	8.75 (7)
Acute pancreatitis	5 (4)
ERCP	10 (8)
Operating time (min)	55 \pm 22
Time since onset of symptoms/days to the beginning of the operation	4 \pm 1.9
Postoperative stay (day)	12 \pm 5

ASA PS: American Society of Anesthesiologists Physical Status
ERCP: endoscopic retrograde cholangio-pancreatography

Preoperative ultrasound was used in 80 patients, MRCP in 14 patients (17.5%) and computerized tomography in 10 patients (12.5%) (Table 1). ERCP was performed in 7 patients (8.75%) for

choledocholithiasis and in 1 patient (1.25%) for biliary fistula.

Surgical indications were AC in 37 patients (46.25%), chronic cholecystitis in 32 patients (40%), and cholangiolithiasis in 7 patients (8.75%) and acute

pancreatitis 4 patients (5%) of patients. Grade III was most common in patients with AC according to Tokyo guidelines (Table 1)¹². There was no difference between acute and chronic cholecystitis except leukocyte count in preoperative laboratory examination of the patients (Table 2).

Table 2. Perioperative biochemical values of the patients

	Acute calculous cholecystitis	Chronic calculous cholecystitis
WBC count ($4^3 \cdot 10^3/\mu\text{L}$)	13623± 5227*	8.12± 2.66
C-reactive protein (CRP 1.3<mg/dl)	24.12±9.2†	1.3±0.72
Total bilirubin (0.1 to 1.2 mg/dL)	1.73 ± 1.38	1.33 ± 1.29
AST (8- 40 U/L)	79 ± 128	57±43
ALT (7-56 U/L)	95± 77	74± 66

WBC: white blood cell; AST: aspartate transaminase; ALT: alanine aminotransferase; *P<0.05, † P<0.01 when compared to the chronic calculous cholecystitis group.

Table 3. Postoperative complications

Postoperative complications	% (number)
Pulmonary	
Atelectesia	13.75 (11)
Pleural effusion	3.75 (3)
Pneumonia	3.75 (3)
Wound infection	7.5 (6)
Congestive heart failure	3.75 (3)
Bilary fistula	3.75(3)
Pulmonary embolism	1.25 (1)
Intraabdominal abscess	1.25(1)
Acute renal failllure	1.25(1)
Total	38.75 (34)

Table 4. Causes of 30-day mortality

	% (Number)
Sepsis	0
Pneumonia	1.25(1)
Intra abdominal abscess	1.25(1)
Pulmonary failure	2.5 (2)
Congestive heart failure	1.25 (1)
Total	6.25 (5)

Operative time was found as 55 ± 22 minutes. Thirty-four patients (38.75%) developed postoperative complications (Table 3). Pulmonary complications occurred in 17 patients (21.25%). Mortality was seen in 5 patients (6.25%) (Table 4). Mortality occurred in 2 cases of acute cholecystitis and in 3 cases due to other causes. Causes of mortality were sepsis in two cases, pulmonary failure in two cases and congestive heart failure in one case (Table 4). Postoperative hospital stay was 12 ± 5 days.

DISCUSSION

Average life expectancy will increase throughout the world in the next 30 years^{2,3,13-16}. Given the progressive aging of the population and the increased prevalence of gallbladder stones in elderly adults, this explains why cholecystectomy is still more common than cataral extraction in the elderly^{1,2,5,13-16}.

Selection of elderly patients varies in the literature as age 60, 65, and 75. The World Health Organization (WHO) accepts elderly age as that of 65 and over. In this study, we selected the age of 65 years and over as elderly^{15,16}. Although the age of onset was 65 years in our study, mean age was higher with 77 ± 16 years.

In the elderly population, comorbid conditions increase with age, leading to raised mortality and complications. Patient's physical status or surgical risk can be assessed with some score systems as ASA, P-Possum, Apache II and Charlson index^{14,16}. We chose ASA PS system in this study. Besides these score systems, some new frailty score systems such as cognition, selfhealing ability and movement disorders are used to define high-risk patients for postoperative complications in the elderly population. However, these systems have not been developed yet for bile duct diseases¹⁶.

Laparoscopic cholecystectomy is performed usually under general anesthesia by providing pneumoperitoneum. Galizia et al. have reported that significant physiologic changes due to pneumoperitoneum can occur during the laparoscopic procedure, mainly in aged patients with concomitant comorbid diseases¹⁷. On the other hand, pneumoperitoneum disrupt respiratory mechanism leads to respiratory acidosis, raises cardiac sympathetic activity, and increases the chance of fatal arrhythmias^{9,17}. In addition, general anesthesia is considered contraindicated for laparoscopic surgery in patients with limited cardiac reserve, obstructive pulmonary disease, and unstable hemodynamics¹⁷. Therefore, in this study, we applied open cholecystectomy under epidural anesthesia in order to minimize cardiopulmonary changes in elderly, high risk patients. This selection may help explain the low mortality in our study.

Laparoscopic cholecystectomy has become the gold standard for the treatment of gallbladder stones in young adults and the elderly patients. Laparoscopic cholecystectomy reduces postoperative pain, hospital stay and hospital cost. Mortality and morbidity range from 0-4% and 3-34%, respectively. There is no difference between young adults and the elderly without comorbid conditions^{1,2,15,16,18-23}. However, mortality increases up to 12% and morbidity to 60% in elderly patients with significant comorbid conditions^{15,16,18-23}. In this study, we found that mortality was 6.25% and morbidity was 38.75% in the patient group with a mean age of 77 ± 16 and ASA ≥ III 58.75%.

Age appears to be the key factor in the surgical treatment of gallstones. As age increases, so do gallstones and associated symptoms and complications such as AC^{14-16,22-27}. On the other hand, comorbidity and surgical risk increase with age²⁶⁻²⁷. Age 80 years and over seems to be the critical age for the surgical treatment of gallstone. Surgical risk increases at this age, which also rises the possibility of complications and mortality²⁶⁻²⁷. Kuy et al. have shown that patients aged ≥ 80 years are ≥ 3 times more likely to need blood transfusions and require continuous mechanical ventilation ≥ 5 times more likely to develop aspiration pneumonia²⁷. This suggests compatibility with our mortality and morbidity results.

AC is the most common complication of gallstones in the elderly^{14-16,22-25}. In our study, 46.25% of the cases had AC. How to treat patients with AC is controversial. Today, laparoscopic cholecystectomy is the accepted treatment method in patients without morbidity at first admission within the first week during working hours^{14,16,20-25}. However, elderly, high-risk patients can be treated with conservative, laparoscopic cholecystectomy or percutaneous cholecystostomy. In conservative treatment, patients re-apply due to relapse in a short time^{14-16,20,22-25}. In percutaneous cholecystostomy, mid-term mortality is higher than laparoscopic cholecystectomy^{14-16,23,28}. In the case of AC of 47,500 persons, Wiggins et al. have performed 89.7% conservative treatment, 7.5% cholecystectomy and 2.8% cholecystostomy¹⁴. They found that 30-day mortality increased in the emergency cholecystectomy group (11.6%) compared to those managed conservatively (9.9%) in the short term ($p < 0.001$). On the other hand, this was offset by the long-term benefits of cholecystectomy with a reduced 1-year mortality (20.8 vs. 27.1% for those managed conservatively) ($p < 0.001$). Management with percutaneous cholecystostomy demonstrated increased 30-day and 1-year mortality (13.4% and 35.0%, respectively)¹⁴. In our study, 6.25% mortality in elderly, high-risk patients is an acceptable mortality rate compared to this study with high number of patients of 47,500 persons.

In recent years, AC patients have been classified by Tokyo classification according to their clinical status^{12-16,20,22-25}. Grade I and Grade II patients are successfully and safely treated with early cholecystectomy^{12-16,20,22-25}. However, the treatment of Grade III patients, ie patients with organ failure,

by early cholecystectomy or percutaneous cholecystostomy is not yet apparent. The newly published CHOCOLATE trial (NTR2666) study showed that cholecystectomy was better than percutaneous cholecystostomy in AC Grade III patients similar to our study²⁹. We operated on elderly, high-risk patients with organ failure under epidural anesthesia with open cholecystectomy with acceptable mortality. Our method can be suggested as an alternative method in hospitals with technical deficiencies.

This study has some limitations. First, retrospective analysis carries the potential fortreatment selection bias and systematic error. Secondly, there is lack of randomization and control groups in the study.

In conclusion, treatment options for elderly, high-risk gallstone patients are not limited by age. In addition, the severity of the disease or poor physical condition plays an important role for the treatment of this disease. Open cholecystectomy using epidural anesthesia maybe considered for these patients with acceptable mortality as an alternative treatment method in hospitals with limited resources and expertise.

Yazar Katkıları: Çalışma konsepti/Tasarımı: ST, EA; Veri toplama: MAU, MER, MU; Veri analizi ve yorumlama: MAU, ST, MU, EA; Yazı taslağı: MAU, ST, MER, MU, EA; İçeriğin eleştirilme incelenmesi: MAU, ST, MER, MU, EA; Son onay ve sorumluluk: MAU, ST, MER, MU, EA; Teknik ve malzeme desteği: ST, MER, MU; Süpervizyon: MAU, EA; Fon sağlama (mevcut ise): yok.

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