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Predictors of Preoperative ERCP Application Before Laparoscopic Cholecystectomy: A Retrospective Analysis

Laparoskopik Kolesistektomi Öncesi ERCP Uygulamasının Prediktörleri: Retrospektif Bir Analiz

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ABSTRACT

Objectives: Laparoscopic cholecystectomy (LC) has become the gold standard for treating symptomatic gallbladder stones, yet 3–10% of patients may also harbor common bile duct (CBD) stones, complicating their management. Endoscopic retrograde cholangiopancreatography (ERCP) revolutionized CBD stone treatment in the 1970s by offering a minimally invasive alternative to open exploration. However, the optimal approach for patients with suspected choledocholithiasis undergoing LC remains controversial.

Methods: This retrospective study aimed to identify predictors for selective preoperative ERCP in 206 patients who underwent LC at SSK Okmeydani Training Hospital between June 1996 and June 1998. Clinical, biochemical, and radiological data were analyzed to determine the most significant predictors for ERCP. Key criteria included a history of cholangitis, gallstone pancreatitis, or jaundice; elevated bilirubin and alkaline phosphatase levels; and a CBD diameter ≥8 mm on ultrasonography.

Results: ERCP was performed in 24 patients (11.65%), with successful outcomes in 22 cases. Among these, 16 patients (72.8%) had a CBD diameter ≥8 mm, and 13 (81%) had positive ERCP findings. Biochemical abnormalities were present in 14 patients (63.6%), with 8 (57.1%) showing positive ERCP results. Notably, 6 of 8 patients (75%) with normal biochemical results also had positive ERCP outcomes.

Conclusion: The study highlights the importance of selective ERCP based on clinical and biochemical parameters, particularly in patients with a dilated CBD and abnormal liver function tests. These findings align with previous research advocating for risk stratification to minimize unnecessary ERCP procedures and associated complications. By refining preoperative evaluation criteria, this study supports a more targeted approach to ERCP use, optimizing patient outcomes while reducing procedural risks.

Keywords: Bile duct stones; choledocholithiasis; endoscopic sphincterotomy; ERCP; laparoscopic cholecystectomy; preoperative evaluation; risk stratification.

ÖZET

Amaç: Laparoskopik kolesistektomi (LK), semptomatik safra kesesi taşlarının tedavisinde altın standart haline gelmiştir. Ancak hastaların %3–10'unda ortak safra kanalı (OSK) taşları da bulunabilir ve bu durum tedaviyi karmaşıklaştırır. 1970'lerde endoskopik retrograd kolanjiyo-pankreatografi (ERCP), OSK taşlarının tedavisinde cerrahi eksplorasyona kıyasla minimal invaziv bir alternatif sunarak devrim yaratmıştır. Ancak LK uygulanacak ve koledokolitiazis şüphesi olan hastalarda en uygun yaklaşım hâlâ tartışmalıdır. Bu retrospektif çalışmanın amacı, Haziran 1996 ile Haziran 1998 tarihleri arasında SSK Okmeydanı Eğitim Hastanesi'nde LK uygulanan 206 hastada selektif preoperatif ERCP gerekliliğini öngören belirteçleri saptamaktır.

Yöntem: Klinik, biyokimyasal ve radyolojik veriler analiz edilerek ERCP için en anlamlı öngörücü faktörler belirlenmiştir. Temel kriterler arasında kolanjit, safra taşı pankreatiti veya sarılık öyküsü; yükselmiş bilirubin ve alkalen fosfataz düzeyleri ile ultrasonografide OSK çapının ≥8 mm olması yer almıştır.

Bulgular: ERCP, 24 hastada (%11,65) uygulanmış ve 22'sinde başarılı sonuçlar elde edilmiştir. Bu hastalardan 16'sında (%72,8) OSK çapı ≥8 mm iken, 13'ünde (%81) pozitif ERCP bulguları saptanmıştır. Biyokimyasal anormallikler 14 hastada (%63,6) görülmüş, bunların 8'inde (%57,1) pozitif ERCP sonuçları elde edilmiştir. Dikkat çekici olarak, biyokimyasal testleri normal olan 8 hastanın 6'sında (%75) da pozitif ERCP bulguları bulunmuştur.

Sonuç: Bu çalışma, özellikle genişlemiş OSK ve anormal karaciğer fonksiyon testlerine sahip hastalarda, klinik ve biyokimyasal parametrelere dayalı selektif ERCP'nin önemini vurgulamaktadır. Bulgular, gereksiz ERCP işlemlerini ve buna bağlı komplikasyonları en aza indirmeyi hedefleyen risk sınıflandırmasını savunan önceki çalışmalarla uyumludur. Preoperatif değerlendirme kriterlerinin rafine edilmesiyle, bu çalışma daha hedeflenmiş bir ERCP yaklaşımını desteklemekte ve hasta sonuçlarını iyileştirirken işlem risklerini azaltmaktadır.

Anahtar sözcükler: Endoskopik sfinkterotomi; ERCP; koledokolitiazis; laparoskopik kolesistektomi; preoperatif değerlendirme; risk sınıflandırması; safra kanalı taşları.

During the 1990s, laparoscopic cholecystectomy (LC) emerged as a groundbreaking advancement, quickly gaining universal acceptance and establishing itself as the preferred treatment for symptomatic gallbladder stones.[1,2] However, between 3% and 10% of patients with symptomatic gallstones may also harbor common bile duct (CBD) stones, complicating their clinical management.[3]

The development of endoscopic retrograde cholangiopancreatography (ERCP) and endoscopic sphincterotomy (EST) in the 1970s marked a transformative shift in the treatment of CBD stones. These techniques allowed for the successful removal of ductal stones in approximately 90% of cases, eliminating the need for invasive open bile duct exploration. While the application of EST in patients with gallbladder stones planned for open cholecystectomy sparked some debate, the controversy has only intensified in the era of laparoscopic surgery.[3,4]

Today, the optimal management strategy for patients with suspected choledocholithiasis undergoing laparoscopic cholecystectomy remains a contentious issue. The question of whether endoscopic intervention should be employed continues to be a topic of significant discussion among clinicians.

This study aims to identify the most significant predictors of preoperative ERCP in patients undergoing laparoscopic cholecystectomy at SSK Okmeydani Training Hospital.

Methods

This study was conducted in accordance with the Declaration of Helsinki and its amendments.

This retrospective study reviewed patients diagnosed with cholelithiasis who underwent laparoscopic cholecystectomy at SSK Okmeydani Training Hospital between June 1996 and June 1998. Data were extracted from surgical clinic records and archived patient files; with the primary goal of identifying key predictors for the selective use of preoperative ERCP in these cases.

Laparoscopic cholecystectomy has been a standard procedure at our institution since the early 1990s for patients presenting with gallbladder stone-related symptoms. Initially, the procedure was reserved for patients without suspected common bile duct stones. However, as surgical expertise grew and ERCP became relatively accessible, the criteria for patient selection evolved, allowing for greater flexibility. The study examined patients' clinical symptoms, laboratory results, postoperative outcomes, and lengths of hospital stay. Archived records were used to identify patients who had undergone or were scheduled for ERCP.

The following criteria guided the decision for selective ERCP:

1. History of cholangitis, gallstone pancreatitis, or jaundice.
2. Abnormal biochemical markers, including elevated liver function tests, bilirubin, and alkaline phosphatase levels.
3. Radiological evidence of a common bile duct diameter ≥8 mm on ultrasonography.

Biochemical results exceeding the normal reference ranges of our hospital's laboratory were classified as abnormal. ERCP procedures were conducted either at our hospital's gastroenterology clinic or, when necessary, at available university gastroenterology departments in Istanbul.

Patients were admitted one day prior to the procedure and transferred to the gastroenterology clinic on the day of ERCP. A positive ERCP result was defined by the presence of stones or bile crystals in the common bile duct. Post-ERCP complications were carefully documented, and patients were scheduled for laparoscopic surgery on the earliest available date.

Exclusion criteria included a history of liver disease, alcoholism, intrahepatic bile duct stones, or ultrasonographic evidence of tumors.

Statistical Analysis

Statistical analysis was performed using Fisher's exact test and Pearson's correlation test to assess significance and relationships within the data.

Results

Between June 1996 and June 1998, 206 patients underwent laparoscopic cholecystectomy. The cohort's age ranged from 22 to 73 years, with a mean age of 44.99±12.09 years. Of the 206 patients, 144 (69.9%) were female and 62 (30.1%) were male. Preoperative ERCP was performed in 24 patients (11.65%), with unsuccessful attempts in two cases. The remaining 22 patients who underwent successful ERCP and endoscopic sphincterotomy were analyzed based on clinical history, biochemical findings, and common bile duct diameter.

Among these, 16 patients (72.8%) had a common bile duct diameter ≥8 mm, while 6 patients (27.2%) had a diameter <8 mm.

In the group with dilated bile ducts (≥8 mm), 13 patients (81%) had positive ERCP results, including 11 with common bile duct stones and 2 with bile duct crystals. In contrast, among the 6 patients with bile duct diameters <8 mm, 5 (83.3%) had negative ERCP results.

Biochemical test results were elevated in 14 patients (63.6%), while 8 patients (36.4%) had normal values. Of the 14 patients with elevated results, 8 (57.1%) had positive ERCP findings and 6 (42.9%) had negative results. Interestingly, among the 8 patients with normal biochemical results, 6 (75%) still had positive ERCP outcomes.

Discussion

Laparoscopic cholecystectomy is considered the gold standard for treating symptomatic gallbladder diseases. However, the optimal preoperative evaluation method for patients at risk of choledocholithiasis remains controversial. Endoscopic retrograde cholangiopancreatography (ERCP) is frequently used for diagnosis and treatment in patients suspected of having common bile duct stones. However, unnecessary ERCP applications may increase the risk of complications for patients. This study retrospectively analyzes clinical and laboratory parameters that may help determine the necessity of ERCP.

The results of our study demonstrate that clinical and biochemical parameters play a significant role in determining the necessity of preoperative ERCP. Parameters such as a dilated common bile duct (CBD) diameter (≥8 mm), elevated bilirubin, and alkaline phosphatase levels were significantly associated with ERCP outcomes. These findings align with previous research emphasizing the importance of selective ERCP use to minimize unnecessary procedures while ensuring effective management of bile duct Stones.[5]

Several studies have explored predictors of CBD stones and established risk stratification models to refine ERCP selection. Barkun et al.[6] identified independent predictors of CBD stones, including age over 55 years, elevated bilirubin (>30 µmol/L), and positive ultrasonographic findings (a dilated CBD or the presence of stones). Their model demonstrated a 94% probability of CBD stones when all predictors were present and only an 8% probability in their absence. Similarly, Chan et al.[4] analyzed 609 laparoscopic cholecystectomy patients and found that selective preoperative ERCP, based on clinical and biochemical markers, effectively identified and removed CBD stones, reducing the need for intraoperative interventions.

Welbourn et al.[7] further supported the selective ERCP approach by demonstrating that a policy of performing ERCP only in patients with suspected CBD stones led to a 92% success rate in combined endoscopic and laparoscopic treatment, reducing the need for open surgery. This aligns with the findings of our study, suggesting that preoperative ultrasonography findings and biochemical tests can effectively guide the selective use of ERCP.

The growing consensus in the literature supports risk stratification for ERCP to optimize patient outcomes while minimizing procedural risks. Several studies have highlighted the potential complications of ERCP, such as post-ERCP pancreatitis, bleeding, and perforation, which reinforce the importance of judicious patient selection.[8,9] Moreover, laparoscopic cholangiography has been proposed as an alternative to preoperative ERCP in certain cases, particularly when the risk of CBD stones is uncertain.[10]

Also, numerous studies have explored the predictive value of various preoperative indicators for CBD stones. For example, Koo and Traverso (1996) assessed 420 laparoscopic cholecystectomy cases and found that clinical history of CBD stones had the highest positive predictive value (PPV) at 45%, followed by serum biochemistries (30%) and ultrasound findings (28%). Their findings suggest that while these indicators improve sensitivity and negative predictive value (NPV), they lack sufficient specificity to completely replace intraoperative cholangiography (IOC).[11]

Our study contributes to this ongoing discussion by reinforcing the predictive value of biochemical and imaging markers in ERCP decision-making. By refining the selection criteria for ERCP, we aim to balance the need for effective bile duct stone management with the risks associated with unnecessary procedures. Further prospective studies could enhance the predictive models for ERCP use, potentially incorporating newer imaging techniques or machine learning algorithms to improve diagnostic accuracy.

Future research should focus on refining risk stratification models, potentially integrating machine learning algorithms and advanced imaging techniques to improve predictive accuracy. Prospective randomized trials comparing selective preoperative ERCP, intraoperative cholangiography, and postoperative ERCP would provide further clarity on the optimal approach for managing suspected CBD stones.

Conclusion

This retrospective analysis offers substantial insights into the judicious application of preoperative ERCP in the context of laparoscopic cholecystectomy. The findings underscore that ERCP demonstrates enhanced diagnostic efficacy in patients exhibiting a common bile duct diameter of ≥8 mm and abnormal biochemical markers. Consequently, the integration of clinical and biochemical parameters into the decision-making process for ERCP utilization may serve as a strategic approach to minimizing superfluous procedural interventions.

Disclosures

Ethics Committee Approval: Our related article is titled "Predictors of ERCP Before Laparoscopic Cholecystectomy: A Retrospective Analysis" was prepared for submission to your journal, and since our study was a retrospective analysis, ethics committee approval was not obtained. The data used in our study were obtained from previous medical practices and only the existing data were analyzed without any intervention.

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