The American Journal of Surgery 214 (2017) 69–73

Contents lists available at ScienceDirect

The American Journal of Surgery

journal homepage: www.americanjournalofsurgery.com

Outcome and management of endoscopic retrograde cholangiopancreatography perforations: A community perspective

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ARTICLE INFO

Article history:
Received 16 September 2016
Received in revised form
20 January 2017
Accepted 29 January 2017

Keywords:
Endoscopic retrograde cholangiopancreatography
Endoscopy perforation
Choledocholithiasis
Endoscopic stent
Outcomes

ABSTRACT

Background: Endoscopic retrograde cholangiopancreatography (ERCP) carries a small but significant risk of perforation. Recent data suggest that select patients can be managed non-operatively. We sought to evaluate the management of ERCP perforations at our community medical center.
Methods: ERCPs performed from 2004 to 2015 were reviewed.
Results: Twenty-one of 2423 patients who underwent ERCP had a perforation (0.9%). ERCP procedures included balloon sweep with/without sphincterotomy and pancreatic duct stent (71%), common bile duct brushing (10%), and pancreatic duct stenting (5%). Duodenal diverticula were present in 3 (14%), and altered anatomy was present in 6 (29%). Seventeen patients were treated nonoperatively; 3 (14%) underwent percutaneous drain placement. Two patients failed nonoperative treatment and required surgery. Four patients required ICU stay, and median post-ERCP LOS was 5 days. The 30-day mortality rate was 1/21 (4.8%).
Conclusions: Perforations remain a rare, but serious, complication of ERCPs. Nonoperative management is highly successful in carefully selected patients. Early recognition with initiation of antibiotics is paramount. Our community-based practice patterns are similar to those previously published for successful nonoperative management of ERCP perforations.

1. Introduction

Endoscopic retrograde cholangiopancreatography (ERCP) is a common procedure performed worldwide. First introduced in the 1960s primarily as a diagnostic tool, its use has expanded. It is now used as a therapeutic intervention, often as an alternative to common bile duct exploration[1–4] and is frequently used in the diagnosis and treatment of biliary and pancreatic pathology. The procedure is not without risk. Complications have been reported in 0.08%–10% of patients.[3–7] The most concerning of these complications is perforation. All endoscopic procedures can cause intestinal perforation; however, use of side-viewing endoscopes and additional procedures, such as sphincterotomy, increase this risk during ERCP. Reported perforation rates for ERCP range from 0.08% to 2.0%, with an associated mortality rate of 3%–20%.[2,3,5–12] These data are primarily from international or larger university settings, and the rate within U.S. community hospitals is largely unknown.

Post-ERCP perforation was once thought to require immediate surgical intervention for control and washout of contamination.[2,3,6,13] More recent literature has shown that nonoperative management can be successful,[2,3,8,10] but which patients will benefit from a nonoperative approach and which will ultimately require surgical intervention has yet to be determined. Delay in adequate therapy can result in high rates of morbidity and mortality.[2,4,6] Best practice is still subject to debate among general surgeons.[7]

Due to the relative rarity of this complication, previous studies have had low volume and are usually retrospective. Classification schemes to describe the perforation have been proposed.[3,12,14] Some of these, including that proposed by Stapfer, Enns, and Howard, use a combination of mechanism of injury and location.[3,12,14] We have found these classification schemes difficult to apply unless the injury was noted immediately during ERCP.

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http://dx.doi.org/10.1016/j.amjsurg.2017.01.034
0002-9610/

Furthermore, the most commonly referenced of these schemes does not distinguish between patterns of injury and their management. Thus, we found this to be troublesome to use in a clinical setting, while others have reported success in managing patients using the Stapfer classification system.[15]

The objective of this study was to evaluate ERCP outcomes at our community teaching hospital and to propose a treatment algorithm based on easily obtained and interpretable clinical information.

2. Materials and methods

After Institutional Review Board approval was obtained, a retrospective review of the electronic and paper medical records of patients who underwent an ERCP from January 1, 2004, through November 30, 2015, at our integrated multispecialty group medical center was completed. All ERCPs were performed by 1 of 4 attending endoscopists at our institution over the study period. Perforation was confirmed by initial or subsequent ERCP, plain film, computed tomography (CT) scan, or upper gastrointestinal (GI) study. Decision for surgery was at surgeons' discretion.

Variables reviewed included patient demographics, length of stay (LOS), indication for ERCP, associated procedures, presence of duodenal diverticula or altered anatomy, mode of diagnosis, and clinical presentation at time of diagnosis of perforation. Primary endpoints were failure of nonoperative management and 30-day mortality. Secondary endpoints evaluated were intensive care unit (ICU) LOS and overall hospital LOS. Based on our data, we developed a practice-oriented classification system to guide care for ERCP perforations.

Categorical variables were compared by χ^2 and Fisher exact tests. Continuous variables were evaluated with Wilcoxon rank sum tests. Statistical analysis was completed with SAS 9.3. A P value of <0.05 was defined as significant.

3. Results

We identified 1786 patients who underwent 2423 ERCPs during our study period. Twenty-one patients were identified as having a perforation secondary to the procedure (0.9%). The demographics of patients who experienced a perforation were similar to those without perforation (Table 1).

Among patients with an ERCP perforation, ERCP was frequently performed not only for diagnostics but also for treatment of disease. Multiple imaging modalities were used alone and in combination to confirm post-ERCP perforation (Table 2). The ERCPs of 5 (24%) of the 21 patients with perforation were performed as outpatient procedures. Eighteen (86%) patients were hemodynamically stable at the time of perforation diagnosis, and none of them had peritonitis on initial examination. All patients received broad spectrum antibiotics with gram-negative and anaerobic flora coverage. One-third of patients also received antifungal coverage. Ten patients (48%) had antibiotics started immediately at time of diagnosis during ERCP or were already on antibiotics. Another 6 (28.5%) had antibiotics initiated within 4 h of ERCP, 2 (9.5%) within 12 h, and 1 (5%) within 24 h. One patient (5%) had antibiotics initiated 2 days after ERCP. This patient's perforation was not detected until 48 h after ERCP, at which point she underwent urgent surgical intervention and ultimately died from sepsis. Data for timing of antibiotic administration were unavailable for 1 patient. Based on a combination of timing and findings during ERCP, as well as on findings on subsequent imaging, we propose a 4-category classification system (Fig. 1). This system places importance on early recognition of the injury and its severity. The categories include retroperitoneal contrast identified during initial ERCP (class I), retroperitoneal air on subsequent imaging (class II), retroperitoneal fluid on subsequent imaging (class III), and intraperitoneal air or fluid (class IV). Treatment for patients stratified by this classification system is provided in Fig. 2. Ultimately, 4 patients underwent surgical treatment via laparotomy (19%). Overall surgical intervention after ERCP was 0.2%. Table 3 provides demographic and clinical characteristics and the outcomes of the 4 surgical patients.

One patient in the perforation group (4.8%) and 83 (3.4%) in the non-perforation group died within 30 days after the ERCP. Patients in the perforation group had significantly longer hospital stays, as well as higher 30-day mortality, though this was not statistically significant (Table 4).

Four patients required readmission. Two patients were discharged without recognition of ERCP perforation and were readmitted for management of their perforation. Two additional patients were discharged after diagnosis of ERCP perforation and inpatient observation; both were readmitted with percutaneous drains placed.

Table 1
Pre-procedure demographic and comorbidity data for patients undergoing ERCP who had a perforation versus no ERCP perforation.

Variable	ERCP perforation n = 21	No ERCP perforation n = 2402	*P* value
Mean age ±SD, years	69.7 ± 17.6	64.9 ± 18.9	0.20
Sex, n (%)			0.85
Female	11 (52)	1309 (55)	
Male	10 (48)	1093 (46)	
Comorbidities, n (%)			
Type II diabetes mellitus	2 (10)	457 (19)	0.27
Coronary artery disease	3 (14)	426 (18)	0.99
Chronic kidney disease	2 (10)	293 (12)	0.99
Malignancy	6 (29)	352 (15)	0.11
Liver disease	1 (5)	191 (8)	0.99

ERCP: endoscopic retrograde cholangiopancreatography; SD: standard deviation.

4. Discussion

ERCP has revolutionized the care of the patient with suspected common bile duct pathology. Perforations are a rare but serious complication of ERCP. Nonoperative management is successful in some patients, but predicting which patients can be treated successfully nonoperatively remains a challenge. Early suspicion and recognition of perforation is important. Free intra-abdominal perforation with free air or peritonitis should still be considered an indication for urgent surgical intervention. For the non-peritonitic abdomen, we propose a step-up approach to management of perforation that uses timing, location, and findings during ERCP and on subsequent imaging to classify the injury (Fig. 1). This 4-category classification system is based on classification definitions previously published by Stapfer, Enns, Howard, and others, and places importance on early recognition of the injury and its severity.[3,12–14]

First, treatment starts with broad spectrum antibiotics, nil per os (NPO), and serial abdominal examination for all perforation patients. If the clinical condition progresses and a fluid collection develops, we recommend progressing to percutaneous drainage, and for those failing percutaneous drainage, surgery with antibiotic treatment. Surgical discretion is paramount in this treatment algorithm.

We believe that class I and II patients will have a high success rate with antibiotic therapy in combination with NPO status. Ninety-one percent of class I and all class II patients in our series were treated successfully nonoperatively (Fig. 2). There was a single class III patient who was ultimately treated with laparotomy after