

Does age influence complications of endoscopic retrograde cholangiopancreatography (ERCP)?

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Abstract

Introduction. As living conditions improve average ages increase daily. For this reason we see more and more older patients who have a greater incidence of hepatobiliary pathologies, and who need ERCP (Endoscopic retrograde cholangiopancreatography). The main question is that, if this age-group has a greater frequency of complications, it makes their access to this important examination more difficult. **Methods.** A five year long prospective study of ERCP cases and controls was performed from 2004 to 2009. Procedures were performed at the 'El Tunal' Hospital in Bogotá, Colombia. They were done by specialists who perform more than 500 procedures every year. Age greater or less than 80 years old was the predictor variable used, and ERCP complications were outcome variables. These included pancreatitis, perforation, hemorrhaging and respiratory depression. **Results.** During the 5 year period 71 ERCPs (33.8%) were performed on patients who were over the age of 80. They were randomly paired with 139 patients (66.2%), who were under the age of 80 (control group). There were no significant differences in mortality rates between the two groups. Three patients died in the study group and two in the control group. Although there were no globally significant differences between the two groups for other complications related to the procedure, the more elderly patients showed more perforations than did the rest of patients. **Conclusion.** Patients over the age of 80 year have similar rates of complications as do younger patients. They may be prepared for ERCP, even though there is a risk from higher levels of comorbidities such as high blood pressure.

Keywords

ERCP, complications, elders, common bile duct stones.

When it was first described in 1968 Endoscopic Retrograde Cholangiopancreatography (ERCP) (1) was conceived as a diagnostic tool for evaluating the biliary tract. Nevertheless, as equipment and accessories were developed, the therapeutic exam evolved increasingly toward effective treatment and management of difficult diseases such as choledocholithiasis and biliary tumors. (2) As different techniques for cannulation, sphincterotomies and extraction of calculi were described (3), the ERCP became an essential procedure for management of biliary pathologies (4-7). The events that advanced the therapeutic development of this technique most were the description of

biliary sphincterotomy in the mid-1970's (8-10) followed by the introduction of biliary stents 5 years later. (11-12)

To improve the overall quality of the practice and performance of ERCP (13), other procedures with lower rates of morbidity, such as magnetic resonance cholangiopancreatography (MRCP) (31) and endoscopic ultrasound, can be used to complement or replace ERCP. ERCP should be used only as a therapeutic procedure, since complications such as pancreatitis, perforation, bleeding and cholangitis can occur in up to 10% of patients who undergo this procedure, and because mortality rates have reached 1% in some series. Morbidity and mortality rates can be higher in

patients who have normal exams or if ERCP is performed as a diagnostic procedure.

On the other hand we must consider that life expectancy at birth is increasing for both the world population and the population of Colombia (18, 17). Average life expectancy in 1970 was 61, is now 74, and is expected to be 76 by 2015. Hence, as each day passes physicians face increasingly older populations with higher prevalences of chronic pathologies such as hypertension, diabetes mellitus and chronic obstructive pulmonary disease (COPD) as well as biliary lithiasis and tumors of the biliary tract. Consequently probability that ERCP procedures will be performed is higher. If we also consider age as an important marker in the development of many adverse events in various medical procedures, we should ask the question if ERCP is connected to this phenomenon (14).

Some studies have been carried out in different parts of the world (14-16) to ascertain the rate of complications for ERCP in older adults. They have evaluated socio-demographic variables, the use of prophylactic antibiotics, ERCP indications, etc. Nevertheless, most of the studies are descriptive, retrospective rather than controlled studies. In addition, in Latin America there have been no studies evaluating this important population group. This motivated us to carry out this work to evaluate whether there is a higher frequency of complications among older adults who undergo ERCP than there is among younger people who undergo the same procedure.

MATERIALS AND METHODS

This is a prospective study of cases and controls who had undergone ERCP during the 5 years from 2004 to 2009. The interventions were carried out in the Hospital 'El Tunal' in Bogotá, Colombia by specialists in endoscopy who perform more than 500 procedures per year.

Whether patients were over or under 80 years of age was taken as the prediction variable and development of pancreatitis, perforations, hemorrhaging or respiratory depression following ERCP were taken as outcome variables.

All patients were evaluated prior to receiving anesthesia. Assessments were normally preformed days before the procedure, but in emergency cases they were done just before the procedure. These assessments allowed us to classify the risks of anesthesia according to the ASA (American Society of Anesthesiologists) system. Before performing ERCP we completed forms indicating the main epidemiological variables and indications for the examination.

All the ERCP were conducted after consent forms had been signed by both the patient and a relative. The procedures were conducted in the radiology room with sedation administered by the anesthesiologist. In all cases patients

received 1 to 2 mgs/Kg propofol bolus and 4-6 mgs/kg/h of continuously infused propofol. Heart rate, oxygen saturation and blood pressure were monitored throughout the procedures. We used Olympus 150 series diagnostic and therapeutic duodenoscopy machines. Cannulations of the papilla of Vater, sphincterotomies, dilations, insertions of prostheses and other ERCP procedures were performed according to the prescribed techniques (19-21). All the patients were evaluated before the procedure to determine their condition and they were constantly monitored over the next 30 days identify any complications. These were graded according to the consensus published in 1996 (22-29).

Data related to technique and corresponding complications were selected prospectively. Each case (patient aged 80 or over) was randomly assigned to two control cases (patients under 80 years of age).

Complications were defined as any event related to ERCP procedure that required more than one night's hospital stay. The severity of complications was standardized according to duration of hospital stay and the degree of intervention. Minor complications required 2 to 3 days of hospital stay, moderate complications required 4 to 10 days in the hospital. Serious complications needed more than 10 days of hospital stay, surgical management, invasive radiological intervention, or complications which were the direct causes of death. Pancreatitis induced by ERCP was defined as a combination of new abdominal pain or a pain that worsened after the procedure and a high amylase concentration in serum. This concentration had to be two or more times higher than the upper limit which results in one or more nights of hospitalization.

Hemorrhaging was only considered to be significant if clinical obtained data by means other than endoscopy suggested bleeding such as in cases of melena or hematemesis. Significant hemorrhaging was associated with a decrease of at least 2g/dl in the hemoglobin concentration or the necessity of a red blood cell transfusion, secondary to the hemorrhaging caused by the procedure and excluding other causes of bleeding.

Perforation was defined as an interruption of intestinal continuity secondary to the procedure and diagnosed with retroperitoneal radiological images or images obtained through the intestinal tract using any radiological technique.

Respiratory depression was defined as the sustained low levels of blood oxygen saturation and requirement of support with positive oxygen pressure. This was documented by the anesthesiologist in the operating room.

Statistical calculations were performed with the SPSS rv 10 program. The comparison of qualitative variables was tested with the Chi square test or Fisher's exact test. For averages the T Student test was used, with $p < 0.05$ considered for significant differences.

RESULTS

During the 5 years of this study, 71 patients aged 80 and over (33.8%) underwent ERCP. They were randomly paired with 139 patients (66.2%), who were aged 79 or under (control group) who underwent ERCP in the same period. Table 1 is a comparison between the groups and their principal features.

Table 1. Comparison between groups and their principal features.

	Patients aged 80 and over	Patients aged under 80	Statistical significance
Number	71	139	
Men/women	25 / 46	57/82	NS
Abdominal pain	60 (84%)	109 (78,4%)	NS
Jaundice	38 (53,5%)	82 (59%)	NS
Hypertension	48 (67,6%)	54 (38,8%)	p < 0,05
Diabetes type 2	22 (31%)	47 (33,8%)	NS
Cholelithiasis	32 (45,1%)	76 (54,7%)	NS
Cholangitis	10 (14,1%)	7 (5%)	p < 0,05
Papillary carcinoma	4 (5,6%)	7 (5%)	NS
Cholangiocarcinoma	12 (16,9%)	14 (10,1%)	NS
Pancreatic cancer	4 (5,6%)	7 (5%)	NS
Asa IV*	4 (5,6%)	2 (1,4%)	NS
Asa I*	0	24 (17,3%)	p < 0,05
Complications	9 (12,6%)	9 (6,4%)	NS
Mortality	3 (4,2%)	2 (1,4%)	NS

* American Society of Anesthesiology patient classification status.

We observe that the groups are very homogenous, with no significant difference between genders and ERCP indications which makes them comparable. What calls our attention is that the 80 year and older group of patients presented cholangitis most frequently than did the control group (14.1 vs. 5%).

Statistically significant differences were present for certain conditions. 67.6% of patients aged 80 and over and 38.8% of younger patients showed hypertension. There were no differences for biliary drainage (98.5% vs. 98.6%). Mortality showed no significant difference between the two groups (Table 1). Three patients died in the study group, and two died in the control group. None of the deaths were directly related to ERCP. All occurred at least a week after the procedure.

Differences in rates of complications related to the procedure had no overall statistical significance. Table 2 details the complications which occurred. Only perforations presented a statistically significant difference.

Table 2. Complications from ercp in both groups.

	Patients aged 80 and over	Patients aged under 80	Statistical significance
Minor pancreatitis	3 (4,21%)	6 (4,3%)	NS
Severe perforations	2 (2,8%)	0	p < 0,05
Minor bleeding	1 (1,4%)	0	NS
Hypoventilation	3 (4,21%)	3 (2,2%)	NS

In the control group there were no events of bleeding. In the 80 and over group, 1 event of bleeding occurred (1.4%). This was considered to be a minor event because the patient did not require endoscopic transfusion but instead only required hemostasis. There were no perforations in the control group (0%), while two patients over 80 (2.8%) suffered perforations caused by ERCP. Both patients required surgical management. These perforations were considered to be severe events. One of the perforations was associated with a periampullary diverticulum.

There were no statistically significant differences in occurrences of pancreatitis and hypoventilation between the two groups. However, as expected, there were a smaller number of patients over 80 with ASA I.

We must emphasize that ERCP findings of choledocholithiasis and biliopancreatic tumors did not show statistically significant differences between the groups. Papillary carcinomas appeared in 5.6% of both groups, and there were also no significant differences between the two groups in terms of patients with cholangiocarcinomas and pancreatic cancer.

DISCUSSION

From the first descriptions the ERCP has evolved in an extraordinary way. The first sphincterotomy was published in 1974 (8-9), followed by development of ERCP as a therapeutic procedure as it is now used (24). It is a fundamental technique not only for treatment of choledocholithiasis which occurs in between 8% and 18% of the patients with symptoms of kidney stone (35), but it is also used to alleviate pancreatic, biliary tract or papillary masses.

More than this, it is the procedure of choice for management of biliary tract lesions. Nevertheless, with the ample knowledge acquired thanks to this procedure we also must face the complications which are caused by ERCP. This is a procedure which should be used only for specific cases, given the consequences of a greater 10% rate of complications and a 1% mortality rate. The indications must be clear, sustained and well-based on the evidence. The present study attempts to partially define the real risks attributable to age at a time in life when more complications are likely during the procedure.

In our study, a bleeding event occurred after the sphincterotomy. This complication can occur with different degrees of severity (23). Some publications describe it when the patient's hemoglobin level has decreased (25). In our work, blood transfusions and endoscopic hemostasia had to be performed prior to each procedure so that hemoglobin levels could be controlled in less than 24 hours and patients could be discharged on the third day.

On the other hand, perforation is a complication that caused a statistically significant difference in our study, occurring more frequently in patients aged 80 and over. This complication has a low frequency, but represents a very important cause of mortality related to this procedure in the different published studies (26). Perforations of the esophagus and stomach related to this procedure require surgery more often than do other complications. Perforations related to the use of guide wires and sphincterotomies rarely require surgery (27). Risk factors have been identified to present this complication; some of them are advanced age, duration of the procedure, and choledochal dilatation (32). In our study, only the two perforations which required surgical management were considered to be severe complications. We identified intradiverticular papilla in one of these patients. This represents an important feature which should be considered in patients aged 80 and over who undergo ERCP. The other case was also a retroduodenal perforation of the papilla that required surgical management.

Cholangitis was a statistically significant indicator for ERCP in the group of patients over age 80. This indicates to us that, for elderly patients, biliary pathology and its most acute complications like cholangitis represent an important cause of morbidity and mortality. Probably these patients would benefit from early ERCP intervention to decompress the biliary tract. This is reflected in mortality rates for both groups evaluated (28, 33, 34).

In this work we also paid close attention to make sure that doses of propofol for elderly patients were safely adjusted for each patient so that incidences of respiratory depression could be avoided. Our findings were consistent with those of consensus prospective studies regarding the use of propofol for elderly patients (30).

Post ERCP pancreatitis is the most frequent and severe complication of ERCP. Incidences ranging from 1.3% to 8% have been reported. The main risk factors are female gender, young age and prior medical history of post ERCP pancreatitis (14). In our work, no statistically significant differences were found. Frequency of cases was similar to that described in the literature.

There were no statistically significant differences between the overall mortality rates of the groups studied. One

patient with cholangitis died in spite of successful drainage of the biliary tract. Another patient who suffered death had metastatic pancreatic cancer. The other three cases of mortality had metastatic cholangiocarcinomas. None of the five deaths were directly related to the procedure.

To conclude, we can indicate that patients over 80 years old have similar rates of complications to those of younger patients when ERCP is performed, even though elderly patients do have comorbidities such as hypertension more other than do younger patients. Although the rate of occurrence of perforations is higher among elderly patients, we must consider that they have a higher prevalence of peripapillary diverticula which should be a warning signal to physicians performing ERCP on elderly patients. In addition, the ERCP with sedation is safe for this group. For this reason the procedure should not be delayed when patients have a real need for it. ERCP is a safe and effective treatment for biliopancreatic pathologies. In other words, the variable of old age by itself should not be a contraindication for use of this procedure among Colombian patients.

Conflicts of interest

None.

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