Endoscopic Retrograde Cholangiopancreatography: A therapeutic modality in children and adolescents
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Abstract

Objective: To evaluate the indications, clinical features, complications, and effect on patient management of Endoscopic retrograde cholangiopancreatography (ERCP) in paediatric patients of varying age.

Methods: A prospective, descriptive cross sectional study was conducted at the endoscopy suite, Surgical Unit 4, Civil Hospital Karachi; from January 2007 to August 2010. All ERCPs performed during a 3-year period in patients aged 18 years or less were prospectively analyzed. Success was defined as having authentic diagnostic information or a successful endoscopic therapy.

Results: A total of 40 children and adolescents (18 Males, 22 Females; mean age 13.6±3.37 years, range 3 to 18 years) underwent 52 ERCP procedures. Indications were biliary pathology in 21, and pancreatic pathology in 19. The ERCP findings were choledocholithiasis in 12 patients, choledochal cysts in 5, chronic pancreatitis in 8, pancreatic pseudocyst in 5, recurrent pancreatitis in 5, biliary ascariasis in 2, pancreatic divisum in 1, postoperative bile leak in 1, and benign biliary stricture in 1. ERCP was successful in 51 of 52 procedures. Single procedure was performed in 36 patients, where as two patients required 2 procedures and it was repeated 4 and 6 times in the remaining two patients. Endoscopic therapy was performed in 92% of the procedures. The complication rate was 1.9% (1/52 procedures) which included mild pancreatitis, whereas asymptomatic hyperamylasaemia was seen in 11% (6/52 procedures). No mortality related to ERCP occurred. ERCP affected management in 94% (49/52 patients).

Conclusion: ERCP is an effectual and safe therapeutic procedure in children and adolescents of different ages with a variety of pancreatobiliary disorders.

Keywords: ERCP, Paediatrics, Pancreatitis, Pancreatobiliary disease (JPMA 62: 98; 2012).

Introduction

Since the advent of Endoscopic retrograde cholangiopancreatography (ERCP) in adults in 1968 and in children in 1976, it has become a benchmark therapeutic modality in pancreatobiliary disorders both in adults as well as in children. Initially it was restricted to the few centers in the west, now it has become more pervasive all over the world. Its standard use in children, however, has been limited by technical difficulties, low incidence of pancreatobiliary disease, and lack of knowledge of ERCP by paediatric surgeons and paediatricians. However, in a country like Pakistan, its use is further hampered by the low rate of clinical suspicion, dearth of expertise in this technique, and fear of complications. Through the years, the use of ERCP has changed from a mainly diagnostic tool to a procedure with a diverse range of therapeutic interventions. To date and to the best of our knowledge, there is not a single report of diagnostic or therapeutic paediatric ERCP from Pakistan. This study was undertaken with an aim to describe our experience of ERCP in paediatric population in relation to its safety and success rate. Further evaluation was done for indications, clinical features, complications, and effect on patient management.

Patients and Methods

This prospective cross sectional study was conducted at the Endoscopic suite of Surgical Unit IV, Civil Hospital, Karachi. All the children referred to the unit for ERCP due to various biliopancreatic problems between January 2007 to August 2010, were included. All procedures were performed by an expert endoscopist, performing ERCPs for the last 20 years. Informed consent was obtained from the parents of the children. Most of the procedures were performed under propofol, while general anaesthesia and conscious sedation was used in the remaining patients, all under the supervision of a senior anaesthetist. Antibiotic
prophylaxis with an intravenous cephalosporin was
prerequisite for the procedure. ERCP was performed
by employing the standard technique, using adult
therapeutic duodenoscope (TJF 180: Olympus America
Inc.). The ionic contrast medium Urograffin (A mixture
of salts of diatrizoic acid) was used to opacify the bile
and the pancreatic duct. All patients were kept under
observation in the ward for minimum of 4 hours. In case
of an immediate complication, patients were admitted to
the ward, under the care of a gastroenterologist or
consultant surgeon. Complications were diagnosed and
their severity graded according to the Cottons
classification.

Indications, findings, therapies, safety, technical
success, effect on management and complications were
assessed. Indications were classified into 2 broad
categories: biliary and pancreatic pathology.

Technical success of the procedure was defined as
achieving the diagnostic information or succeeding with
endoscopic therapy. The endoscopic and fluoroscopic
findings, the therapeutic measures performed, and
complications were recorded for each patient. ERCP was
defined as directly affecting the patient management if a)
therapeutic endoscopic intervention was performed based
on diagnostic ERCP findings; b) ERCP led to the initiation
of medical treatment or provided a diagnosis that allowed
the patient to avoid potential surgery/invasive therapy; c)
ERCP diagnosis led directly to surgery and aided in the
planning of surgical intervention.

Statistical analysis included descriptive statistics and
frequency analysis. Data was analyzed using SPSS version
15 (SPSS Inc., Chicago, IL, USA).

Results

A total of 40 children and adolescents (18 males,
22 females; mean age 13.6±3.37 years, range 3 to 18
years; median age 15 years) underwent 52 ERCP
procedures. Three (5.7%) ERCPs were performed under
general anaesthesia. Forty nine (94.2%) were performed
under sedation using variable doses of intravenous
nalbuphine and/or midazolam for conscious sedation, or
propofol for deep sedation. Indications were biliary
pathology in 21 (52.5%), and benign biliary stricture in 1 (2.5%)
patient. Single procedure was performed in 36 patients,
whereas two patients required 2 procedures and it was
repeated 4 and 6 times in the remaining two patients.
ERCP was successful in 51 of 52 (98%) procedures.
Endoscopic therapy was performed in 92% of the
procedures. Some patients had different interventions
during one procedure which included biliary
sphincterotomy in 19 (36%) patients, pancreatic
sphincterotomy in 14 (26.4%), pancreatic stenting in 9
(16.9%), CBD stent exchange in 6 (11.3%), precut
sphincterotomy in 5 (9.4%), cystogastrostomy in 4
(7.5%), pancreatic stent removal in 3 (5%), CBD stent
insertion in 3 (5.6%), balloon sphincteroplasty in 2
(3.7%), and minor papilla sphincterotomy in 1 (1.8%)
patient. The success rate of ERCP in our study was 98%
(51/52 procedures). The complication rate was 1.9% (1
of 52 procedures) for all ERCPs performed and 2.5% (1
of 40) per patient who underwent ERCP. One patient had
a mild post-ERCP pancreatitis. Asymptomatic
hyperamylasemia occurred in 11.5% (6 of 52 cases).
There was no procedure-related mortality in our
patients. ERCP affected management in 94% (49/52
procedures).

In this series 12 patients were suspected of having
choledocholithiasis on the basis of radiologic imaging
studies, including ultrasound, laboratory results, or
clinical information. ERCP was normal in one and five
had a dilated CBD and gallstones and showed signs of
recent stone passage (red, inflamed, oedematous papilla).
Six patients had dilated CBD with stones which were
removed. Biliary sphincterotomy was done in nine cases
while two patients had biliary sphincteroplasty in addition.

Of the five patients with choledochal cyst (CC), also
known as congenital biliary dilatation, two patients had type
Ia while three patients had type Ib CC. Three of these
patients also had CBD stones; biliary sphincterotomy was

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<td>Presentation (n)</td>
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Table: Patient’s characteristics.
chronic pancreatitis, observed in eight patients. Other pancreatic indicated included acute recurrent pancreatitis (5 patients), pancreatic mass (5 patients), and pancreatic divisum (1 patient). In patients with chronic pancreatitis (5 patients), pancreatic mass (5 patients), and pancreatic strictures seen in two patients, pancreatic sphincterotomy was done in all and pancreatic stenting performed in five.

Of the five patients with acute recurrent pancreatitis, pancreatic sphincterotomy was done in all and pancreatic stenting in three with dilated pancreatic duct.

Five patients had pancreatic pseudocyst, successful cystogastrostomy was done in four along with pancreatic sphincterotomy in three. One patient out of these had a normal ERCP.

One patient had divisum with recurrent pancreatitis and underwent endoscopic minor papilla sphincterotomy with stenting.

Discussion

ERCP has become a contemporary therapeutic modality in children with pancreaticobiliary disorders. ERCP is done with the same technique as in adults, and is not a difficult task altogether in experienced hands. Although our number of patients was low as compared to the recent studies, but the therapeutic procedures performed were significantly high. More than two thirds of the (48/52) paediatric patients in this study underwent therapeutic interventions, with a technical success rate of 98% (51 of 52 procedures). All the procedures were performed with a standard adult therapeutic duodenoscope. Even in the youngest child, a three year old boy, same duodenoscope was used to perform a successful therapeutic procedure, emphasizing that there is no need for a special paediatric endoscope except in patients younger than 12 months of age. The rate of successful cannulation of the desired duct in children is as good as in adults. ERCP success rates in children are reported to be between 89.5% and 100%, results that are comparable to ours. No difference has been described between procedures performed in older or younger children. In our study most of the procedures were performed under deep sedation, using propofol or short acting opioids and specific narcotic and benzodiazepine medications, an alternative to general anaesthesia. General anaesthesia was still used for patients under twelve years of age, assuring an anticipated intolerance and the higher complexity of the procedure in patients with a smaller anatomy.

In our study, the most common indication was choledocholithiasis, as compared to the other indications in different Asian countries. For example, the most common indication in Japan, Korea and India was choledochal cyst (CC), where as the most frequent indication in Saudi Arabia was also choledocholithiasis. The indications for ERCP in Western children are mostly choledocholithiasis and pancreatitis. Such patients were treated by endoscopic sphincterotomy, balloon sphincteroplasty and stone removal with basket/balloon. ERCP is considered the procedure of choice in children with CBD stones. All the patients with gallstones or sludge subsequently underwent laparoscopic cholecystectomy.

Choledochal cyst (CC) was the second most frequent biliary indication for ERCP in our study population. Most patients (75%) with CC are diagnosed during the first decade of life, with only 20% remaining undiagnosed until adulthood. ERCP can provide adequate visualization of the biliary tree, which is necessary before the operation. In our series, five (12.5%) patients were found to have choledochal cysts, all these patients were referred for surgery.

In the present study, ERCP was helpful in deciding the management in all eight (20%) cases of chronic pancreatitis. It also provided a roadmap for surgical approach. Our endoscopic therapy rate was comparable to the other series.

The results of the present study reinforce the conclusions of the prior studies; ERCP has great influence on the care and management of the paediatric patients with pancreaticobiliary disorders. In 85% of the cases, ERCP directly affected patient management which is comparable with that of other series.
Conclusion

ERCP has proven to be a safe procedure for children of all age groups. In our study, the complication rate was 1.9%.

Limitation

The sample size calculation was a limitation of the study. The results have been presented of the data collected over three years. Due to non-availability of national data, accurate sample size could not be determined. Previously published international studies on the subject were consulted and the sample size of 40 was calculated. This study was considered as a hypothesis generating study.

References