INTRODUCTION

Endoscopic Retrograde Cholangiopancreatography (ERCP) is a gold standard procedure for a variety of pancreatobiliary disorders. Pancreas Divisum (PD) is a congenital abnormality in which the dorsal and ventral pancreatic glands drain separately into the duodenum. It is divided into complete and incomplete types. Complete PD is defined as a totally separate pancreatic system. Incomplete PD is an anatomic variation that has an inadequate communication, usually an extremely small branch, between the ventral and dorsal pancreatic ducts. Pancreas divisum is the most common congenital variant of pancreatic ductal anatomy with an occurrence of approximately 4 - 10% in the Caucasians and 1 - 2% in Asian populations. Clinical implications of PD have been greatly debated in the literature, there is an association with Acute Recurrent Pancreatitis (ARP), Chronic Pancreatitis (CP) and chronic abdominal pain. It has been hypothesized that due to a small minor papilla opening, there is an increased intraductal pressure leading to pancreatitis. This has led to development of endoscopic and surgical therapies, which involve methods to decrease intraductal pressure and resumption of pancreatic ductal flow. Until now, multiple studies have proven the efficacy and adequacy of endoscopic therapy in patients with PD and ARP. There is paucity of data on the efficacy of endotherapy in pancreatic pathologies from this part of the world. We present our endoscopic experience of endoscopic management of pancreas divisum. The purpose of this study is to evaluate the complications, technical successes, and different endoscopic management options in patients with pancreas divisum.

METHODOLOGY

Between January 2007 to December 2013, a total of 4500 ERCPs, for a variety of indications, were performed at the Endoscopic Suite of Surgical Unit IV, Civil Hospital, Karachi, Pakistan. The results of all the procedures were analyzed retrospectively and the prevalence of pancreas divisum evaluated. Medical records of all the patients having ARP or CP with Pancreas Divisum were further scrutinized retrospectively.
The diagnosis of ARP and CP was based on the clinical features, biochemical profiles and radiological investigations. Clinical records were evaluated for age, gender, signs and symptoms, co-morbid conditions, previous surgery, laboratory tests and imaging modalities used, indication for ERCP, mode of endotherapy, and complications. Pancreas divisum was diagnosed on ERCP, when the main pancreatic duct was opacified through the minor papilla.

All procedures were performed by an expert endoscopist, performing ERCPs for the last 20 years. Written and informed consent was obtained from all the patients. Procedures were performed under conscious sedation by the combination of nalbuphine and midazolam, all under the supervision of a senior anaesthetist. Antibiotic prophylaxis with an intravenous cephalosporin was a pre-requisite for the procedure.

ERCP was performed by employing the standard technique, using adult therapeutic duodenoscope (TJF 180: Olympus America Inc.). Ionic contrast medium was used to opacify the bile and the pancreatic duct. Endoscopic appearance of minor papilla was assessed according to the classification by Christopher et al. Chronic pancreatitis was graded according to the Cambridge classification. Cannulation of the minor papilla was performed by wire-guided (WGC) technique with tapered tip catheters and 0.018''-0.021'' inch guide wires without using methylene blue or secretin. Endoscopic minor papillotomy was performed with either pull-type papillotome or needle-knife. Endoprosthesis (5 or 7 Fr) was used in case of any ductal strictures after dilatation with balloon dilator, if required. All the patients were kept under observation in the ward for minimum 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 Camots classification. Technical success of the procedure was defined as achieving the diagnostic information or succeeding with endoscopic therapy. The indications, endoscopic and fluoroscopic findings, therapeutic measures performed, safety, technical success and complications were recorded for each patient. Patients were followed-up as outpatients or via telephone. Statistical analysis included descriptive statistics and frequency analysis using SPSS version 17.

**RESULTS**

From January 2007 to December 2013, 3600 patients underwent 4500 ERCP procedures. Pancreas divisum was found in 17 patients (0.47%); 7 ERCPs (41.2%) were performed for diagnostic and 10 (58.8%) for therapeutic purposes. Complete PD was found in 16 (94.1%) and incomplete PD in 1 (5.9%). Male and Female ratio was 1:1.83 with a mean age of 26.3 years, ranging from 10 to 45 years. A total number of hospital admissions of all the patients was 60 and median symptom duration was 11 months. History of alcohol consumption was positive in 1 (5.9%) patient. The mean Body Mass Index (BMI) of the patients was 20.06 ±2.7 kg/m².

Minor papilla bulge was flat in 5 (29.4%), slightly prominent in 5 (29.4%), moderately prominent in 6 (35.3%) and markedly prominent in 1 (5.9%). Minor papilla orifice was not visible in 5 (29.4%), intermittently visible in 7 (41.2%) and patulous in 5 (29.4%). Mucosal appearance was normal in 13 (76.5%) and abnormal (erythematous or ulcerated) in 4 (23.5%).

A total of 23 procedures were performed in 17 patients where 2 patients underwent ERCP thrice and 2 had procedures done twice. Chronic pancreatitis was seen in 6 (35.3%), ARP in 7 (41.2%) and 4 had acute pancreatitis. All patients underwent dorsal duct cannulation by wire guided technique. Difficulty in cannulation was encountered in 9 patients (52.9%). Complete opacification of the pancreatic duct could be achieved in only 15 (88.2%). The pancreatogram revealed moderate changes in 4 (66.6%) and severe changes in 2 (33.3%) patients of chronic pancreatitis; ductal calculi and stricture were found in 3 (50%) and 2 (33.3%) patients, respectively. In patients of ARP, total number of attacks of pancreatitis were 24. Pancreatic pseudocyst was found in 4 (23.5%) and pancreatic necrosis was found in 1 (5.9%). Pancreatic pseudocyst was drained by cystogastrostomy in 3 (17.6%); in one patient, the bulge could not be appreciated in the stomach and was followed up; the cyst regressed in due course of time.

Endoscopic minor papillotomy (EMP) was performed in all the cases with needle knife in 4 (23.5%) and with pull-type papillotome in 13 (76.5%) cases. Pancreatic stents were placed in 15 (76.5%) patients with 3 straight and 12 single pig tail stents. Biliary sphincterotomy was performed in three patients with pull-type sphincterotome, due to associated lower common bile duct strictures.

Of the 17 patients in which therapeutic procedures were performed and completed, 15 (88.2%) achieved short-term improvement with a technical success rate of 100%. Two patients with severe chronic pancreatitis were referred for surgery. There were no major complications during or following the procedures except asymptomatic hyperamylasemia in 2 patients. There was no procedure-related mortality in all patients. Technical success was 88.2% (15/17 procedures).

**DISCUSSION**

ERCP is considered to be the standard procedure for pancreatobiliary disorders, especially pancreas divisum.
Endoscopic therapy for the pancreas is usually performed through the major papilla and the technical success dependents upon experience of the operator. In Pancreas Divisum (PD), the ductal system is accessed through the minor ampulla, which is more proximally placed than the major papilla. Cannulation may be quite challenging and needs an expert endoscopist for a successful access to the ampulla, thus minimizing the complications. Another reason to have an expert endoscopist is the lesser number of such cases even at large institutions and a steep learning curve for proficiency and aptness. The data regarding pancreatic ERCP is still lacking from our country, with only one case report from this part of the world by Zahid et al. of PD; the patient did not have an ERCP and was surgically treated.

Patients with pancreas divisum are at a greater risk to develop ARP, CP, or chronic abdominal pain. Studies have demonstrated that decreasing the pressure in the dorsal duct by minor papillotomy or stenting, results in resolution of the symptoms. Endotherapy in ARP patients, which is the most common clinical presentation, has the most convincing results. Already depicted in the above mentioned studies as well as in this study, short-term success rate approaching almost 100% in ARP. When the access to the main PD through major ampulla is difficult, minor ampulla can become the main conduit for a successful endoscopic therapy.

Minor papilla cannulation is supposed to be difficult, mainly due to its proximal position, variations in the papilla, dependence on the expertise of the endoscopist as well as assistant and a much longer learning curve. Wire Guided Cannulation (WGC) technique was used for cannulation in this, with almost 100% success rate, corresponding with the previous studies. WGC technique is considered to be a safe and effective technique because of the potential advantages of an increase in successful cannulation and a decrease in the incidence of post-ERCP pancreatitis (PEP).

There is no difference in the clinical implications whether the patient has complete or an incomplete PD. Here, there were 16 complete and 1 incomplete PD patients. Ertan et al. depicted the same results, reporting the same clinical presentation and a similar prevalence. Complication rate in this study group was quite low, mainly due to the expertise of the endoscopist and his assistant. Endoscopic intervention through the minor ampulla have a reported low overall complication rate. Complication rate of post-ERCP pancreatitis is 10 - 14%; ERCP in PD is more risky than the other ERCP interventions, thus an utmost care and attention is required to keep the complications low. Minor papillotomy was performed with either pull-type sphincterotome or a needle-knife; both the techniques are equally safe and effective. Non-flanged single pig-tail plastic stents were used in most of the cases. Initially, in one of the patients, a straight stent was migrated into the PD, creating a difficult management problem. Stent is usually required to protect against early scarring and PEP.

This study results are limited by its retrospective design. It also lacks quality-of-life based instrument to measure outcomes. The number of patients in this study is low as compared to the other of much larger centers. However, this is the first study of its kind from Pakistan.

**CONCLUSION**

Endoscopic therapy for pancreas divisum is safe, effective and feasible when performed by an expert endoscopist. The complication rate and technical success in this study group were at par with that of international literature.

**REFERENCES**

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