

Impaction of bile duct stone at duodenal papilla as a risk factor in pancreatobiliary disease

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Abstract

An impacted bile duct stone at duodenal papilla or impacted papillary stone (IPS) is an infrequent presentation of choledocholithiasis. It is unknown if the IPS is a risk factor for acute cholangitis (AC) or acute pancreatitis (AP). We performed a retrospective case-control study comparing patients with IPS and patients with choledocholithiasis during endoscopic retrograde cholangiopancreatography (ERCP). We included 363 patients with choledocholithiasis during ERCP. Thirty-one patients presented IPS during the ERCP. The mean age was 46 years (range 14-89 years), six patients had cholecystectomy background, and 24 cases were female. AC was observed in 15 cases and AP was diagnosed in nine patients. The association between IPS was significant on the AC group odds ratio 4.14, $p < 0.01$, but not significant on the AP group. IPS is a risk factor to develop AC. Endoscopic stone removal should be performed.

Key words: Impacted bile duct stone. Choledocholithiasis. Acute cholangitis. Acute pancreatitis.

Lito impactado en la papila duodenal como factor de riesgo en enfermedad pancreatobiliar

Resumen

Un lito del conducto biliar impactado en la papila duodenal o un lito papilar impactado es una presentación infrecuente de coledocolitiasis. Se desconoce si el lito impactado es un factor de riesgo para desarrollar colangitis aguda o pancreatitis aguda. Realizamos un estudio retrospectivo de casos y controles que comparó pacientes diagnosticados con lito papilar impactado y pacientes diagnosticados de coledocolitiasis durante la colangiopancreatografía retrógrada endoscópica (CPRE). Se incluyeron 363 pacientes con coledocolitiasis durante la CPRE. Treinta y un pacientes presentaron lito papilar impactado durante la CPRE. La edad media de estos pacientes fue de 46 años (rango 14-89 años), 6 pacientes tenían antecedentes de colecistectomía y 24 casos eran mujeres. Se observó colangitis aguda en 15 casos y pancreatitis aguda se diagnosticó en 9 pacientes. La asociación entre lito papilar impactado fue significativa en el grupo con colangitis aguda OR 4.14, $p < 0.01$, pero no significativa en el grupo con pancreatitis aguda. El lito papilar impactado es un factor de riesgo para desarrollar colangitis aguda. Se debe realizar la extracción endoscópica de cálculos.

Palabras clave: Lito impactado en conducto biliar. Coledocolitiasis. Colangitis aguda. Pancreatitis aguda.

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Introduction

An impacted bile duct stone at duodenal papilla or impacted papillary stone (IPS) is an infrequent presentation of choledocholithiasis and it is usually related to acute cholangitis (AC) or acute pancreatitis (AP) due to an almost complete obstruction in the common bile duct. To determine the presence of IPS, an imaging study does not always locate a stone in the common bile duct and the papilla. Thus, an endoscopic retrograde cholangiopancreatography (ERCP) is needed. Pull-type papillotomy and endoscopic needle-knife pre-cut papillotomy are effective treatment choices for IPS¹⁻⁵. On this situation, it is unknown if the IPS is a risk factor to develop AC or AP. In this a retrospective study, we give more information about this uncommon presentation of choledocholithiasis.

Patients and methods

This retrospective case-control study compares patients diagnosed with IPS and patients diagnosed with choledocholithiasis during the ERCP. Between March 2014 and January 2019, 394 patients underwent ERCP in Hospital “Dr. Jose Eleuterio Gonzalez.” They all showed the presence of choledocholithiasis; nonetheless, IPS was found in 31 patients.

The following patient data were noted before the ERCP: age, gender, and cholecystectomy background. AC diagnosis was based on the Tokyo Guidelines 2018 diagnostic criteria⁶.

The diagnosis of AP required at least two of the following: characteristic abdominal pain, amylase or lipase elevated > 3 times upper limit of normal, and evidence of pancreatitis on radiological studies⁷. AC and AP were studied separately to find how frequent each complication can be presented. During duodenoscopy, the presence of peripapillary diverticulum and peripapillary fistula was recorded. Peripapillary diverticulum was defined as the presence of a diverticulum within 2 cm radius from the papilla, it is known that duodenal diverticulum is associated with choledocholithiasis and cholangitis^{8,9}. Peripapillary fistula is a common complication of common bile duct stones and it is related to cholangitis¹⁰. Patients were divided into two groups: (1) evidence of choledocholithiasis during the ERCP and (2) IPS present as a bulging and edematous papillae with a stone at the papillary orifice which leads to a more difficult procedure¹¹. The exclusion criteria were the following: (1) the absence of bile duct stones during the ERCP; (2) the presence of neoplasm at that

anatomic region; (3) gastric surgery background; and (4) abnormal coagulopathy.

Every patient underwent duodenoscopic treatment, under conscious sedation with intravenously administered midazolam, nalbuphine, and propofol. Duodenal motility was suppressed with an intravenous injection of scopolamine butylbromide. Endoscopic papillotomy was performed using a pull-type or needle-knife papillotome. Needle-knife papillotomy was considered when it was difficult to insert conventional pull-type papillotome into the bile duct because of the impacted stone at the papilla. Balloons or retrieval baskets were used when the IPS migrated into the bile duct during deep cannulation and did not pass out into the duodenum even after papillotomy.

Due to the design of a retrospective exploratory pilot study, the sample size was not calculated. Categorical comparisons were analyzed using the Chi-square method, and contingency analysis was performed with Fisher's exact test. Results are presented as odds ratios (OR). Numeric variables were compared using Mann-Whitney U-test. Data were analyzed using the SPSS software, version 24.0 (IBM Corp., Armonk, New York, USA).

Results

We included 363 control patients that showed choledocholithiasis during the ERCP. Thirty-one patients presented IPS during the ERCP. The mean age of these patients was 46 years (range 14-89 years), six patients had cholecystectomy background, and 24 cases were female (Table 1). AC was observed in 15 cases and AP was diagnosed in nine patients. The association between IPS was significant on the AC group: OR 4.14, p <0.01, Fisher's test <0.01, but not significant on the AP group (Table 2). Peripapillary fistula was found in two patients, both of them associated with AC; peripapillary diverticulum was found in two cases, one of them was associated with AP. Endoscopic treatment was successful in almost all patients (96.8%). One patient in the AC group required a biliary prosthesis due to a difficult procedure (stone moved to biliary tract during cannulation) and a second ERCP was needed to remove the stone, endoscopic biliary decompression with a plastic stent has been an effective treatment for patients with cholangitis¹². In 22 patients, bile duct cannulation using pull-type papillotomy was successful; in eight patients, cannulation was difficult and needle-knife pre-cut papillotomy was performed with 100% success. However, bleeding was the only ERCP-induced complication

Table 1. Characteristic of 31 patients with impacted bile duct stone at duodenal papilla

Age, mean (range)	46.03 (14-89)
Gender (M/F)	7/24
AC	15 (48.4)
Pancreatitis	9 (29)
Cholecystectomy background	6 (19.4)
Peripapillary fistula	2 (6.4)
Peripapillary diverticulum	2 (6.4)
Pull-type papillotomy	22 (70.9)
Needle knife papillotomy (precut)	8 (25.8)
Precut complication (bleeding)	2 (6.4)
Biliary duct prosthesis	1 (3.2)

AC: acute cholangitis

Table 2. General characteristics and associations between cases and controls

Variable	IPS	Choledocholithiasis (no IPS)	OR	p-value
	n = 31 (100%)	n = 363 (100%)		
Age (range)	46.03 (14-89)	46.9 (13-96)	-	0.79
Female	24 (72.7)	266 (73.3)	0.97	1.0
AC	15 (48.4)	67 (18.5)	4.14	< 0.01
Pancreatitis	9 (29)	62 (17.1)	1.98	0.14

IPS: impacted papillary stone; AC: acute cholangitis; OR: odds ratio

in two cases by needle-knife precut papillotomy, both patients were not related to AC or AP. They were controlled by an epinephrine injection, which is an effective and safe tool to control sphincterotomy-induced bleeding¹³.

Discussion

An IPS has been considered as a unique presentation of choledocholithiasis that can lead to either cholangitis or pancreatitis due to almost complete obstruction of the biliopancreatic outflow¹⁴. Endoscopic treatment should be performed immediately to remove the IPS and prevent these two complications¹⁵. In this study, AC was significant and showed that it is 4.14 times

more common in the IPS group than patients diagnosed with choledocholithiasis without IPS.

This result shows how important the early endoscopic treatment is in this particular case because AC can develop rapidly into septic shock and multiple organ failure with such a high mortality, especially for elderly patients¹⁵. However, radiological studies do not always locate a stone in the bile duct or the papilla⁴. Therapeutic decisions should be complemented with clinical findings. Both therapeutic options were viable because of the lack of post-ERCP complications in the AC and AP groups. Patients who had bleeding after needle-knife precut papillotomy were related to control group.

AP was almost significant ($p = 0.14$), but it showed that it is almost 2 times (1.98) more common in the IPS group than patients diagnosed with choledocholithiasis without IPS. Other radiological findings may be useful for AP; contrast-enhanced CT can show an obstructive stone in a dilated common bile duct associated with an edematous pancreas with peripancreatic inflammation and fluid¹⁶. This was a pilot case-control study and required sample was not calculated, which is the main limitation. There is a possibility that AP can be significant with more IPS patients in further studies. Another limitation was the measure of the IPS during the procedure, it was believed that stone size might be a factor to develop AC or AP. Endoscopic papillotomy was performed to get a complete cholangiography, therefore, the stone within the papilla was expelled into the duodenum making the measurement impossible in most cases.

Conclusion

IPS is a risk factor to develop AC. Therapeutic decisions in choledocholithiasis should be based on clinical and radiological findings. IPS should be considered if there is AC involved, especially if there is evidence of a stone in the common bile duct. Endoscopic stone removal should be performed in these patients. More cases are needed to determine if IPS is a significant risk factor to develop AP.

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Conflicts of interest

The authors declare no conflicts of interest for this research.

Ethical disclosures

Protection of people and animals. The authors declare that no human or animal experiments have been performed for this research.

Confidentiality of the data. The authors declare that they have followed the protocols of their workplace regarding the publication of patient data.

Right to privacy and informed consent. The authors have obtained the informed consent of the patients and/or subjects referred in the article. This document is in the possession of the corresponding author.

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