ECRONICON OPEN ACCESS

EC GASTROENTEROLOGY AND DIGESTIVE SYSTEM

Research Article

The Endoscopic Management of Sphincter of Oddi Dysfunction

Sara Ghani*, Mohamed Acharki, Asmae Sarhani, Mouna Salihoun and Nawal Kabbaj

EFD-Hepatogastroenterology Unit, Ibn Sina Hospital, Mohammed V University of Rabat, Morocco

***Corresponding Author**: Sara Ghani, EFD-Hepatogastroenterology Unit, Ibn Sina Hospital, Mohammed V University of Rabat, Morocco.

Received: February 03, 2020; **Published:** February 14, 2020

Abstract

Background and Aims: Sphincter of Oddi dysfunction (SOD) is a syndrome of chronic biliary pain or recurrent pancreatitis due to functional obstruction of pancreaticobiliary flow at the level of the sphincter of Oddi. This study aim is to review the management of SOD without performing sphincter of Oddi manometry or scintigraphy, as well to study the interest of ERCP for SOD diagnosis and treatment.

Methods: Ten patients (7,57%) with suspicion of SOD were analyzed; out of 132 ERCP performed between December 2017 to June 2019. Patients with malignant biliary obstruction or lithiasis biliary disease were excluded. We used the modified Milwaukee classification for all patients. All patients had an ERCP and the procedure's success was defined by the resolution of symptoms and/or normalization of the liver function.

Results: According to the modified Milwaukee classification: the biliary SOD was classified as Type 1 in 10% (n = 1) of the cases, type 2 in 70% (n = 7) of the cases, type 3 in 20% (n = 2) of the cases. The cholangiopancreatography objectified dilatation of the common bile duct upstream a regular stenosis in 50% (n = 5) of cases with delayed contrast drainage (10 - 12 minutes) in 100% of the cases. All patients were treated using endoscopic sphincterotomy. The success of the procedure was 90% (n = 9) with 10% (n = 1) of complications.

Conclusion: Our preliminary results suggested that we can propose ERCP in diagnosing and treating patients with SOD type I and II without performing sphincter of Oddi manometry. However, other studies with a larger sample seem necessary to confirm these results.

Keywords: *Sphincter of Oddi; Dysfunction; Biliary Pain; Endoscopic Sphincterotomy*

Background

Sphincter of Oddi (SOD) is an anatomical entity that plays an important functional role; it controls the flow of biliary and pancreatic secretions through the ampulla of Vater into the duodenum and prevents the reflux of duodenal contents into the bile and pancreatic ducts [1]. Ever since the sphincter of Oddi was first described by Ruggero Oddi in 1887 and further elaborated by Edward A. Boyden in 1957, more than 3000 articles have been published in the English literature on this topic to date, including 778 articles on sphincter of Oddi dysfunction (SOD). It is defined based on typical biliary pain, according to the modified Milwaukee classification system [2]. Sphincter of Oddi

manometry (SOM) is considered the gold standard for diagnosis of SOD; however, the interventions of SOD (EPISOD) trial published in 2014 heralded the end of Sphincter of Oddi manometry for SOD type III [3]. This article will focus on the management of SOD without performing sphincter of Oddi manometry or scintigraphy and to study the interest of ERCP for diagnosis and treatment of SOD type I and II.

Methods

We retrospectively analyzed ten patients (n = 10) with suspicion of SOD out of 132 ERCP procedures (4%) performed between December 2017 to June 2019. 60% (n = 6) were men and 40% (n = 4) were women. The average age was 52,1 years. Patients with malignant biliary obstruction or lithiasis biliary disease were excluded. 30% (n = 3) of the patients had a cholecystectomy. We used the modified Milwaukee classification for all patients. The success of the procedure was defined by the resolution of symptoms and/or normalization of the liver function.

Results

According to the modified Milwaukee classification: the SOD of biliary origin was classified as type 1 in 10% (n = 1) of the cases, type 2 in 70% (n = 7) of the cases, type 3 in 20% (n = 2) of the cases. Biliary MRI was done for patients with unexplained cytolysis and/or cholestasis in 30% of cases (n = 3) and it showed dilatation of the common bile duct (> 10 mm). Endoscopic catheterization of duodenal papilla was difficult in all cases. The cholangiopancreatography showed only dilatation (> 12 mm) of the common bile duct (n = 5) of the cases, and dilation upstream a regular stenosis in 50% (n = 5) of the cases, with delayed contrast drainage (10 - 12 minutes) in all patients. All cases were treated using an endoscopic sphincterotomy. The success of the procedure was 90% (n = 9) with 10% (n = 1) of complication: severe pancreatitis in a patient with SOD type III. No case of relapse was noted (Figure 1 and Table 1).

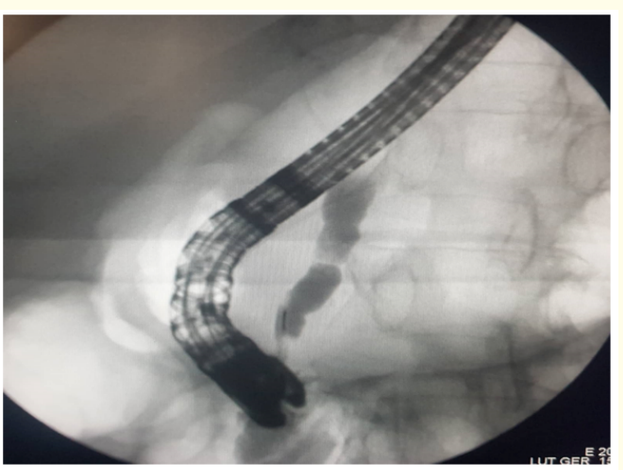

Figure 1: *ERCP picture showing dilatation of the common bile upstream stenosis with delayed contrast drainage.*

Table 1: *Patients characteristics and the result of endoscopic treatment.*

Patients (n = 10)	Sex	Age	SOD type	Pancreatic IMR	Cholangiopancreatography Delayed contrast drainage > 10 - 12 min	Endoscopic treatment	Evolution
01	W	47	Type II	Not done	Dilation on CBD > 12 mm	Sphincterotomy	Good response
02	M	60	Type II	Dilatation of the CBD > 10 mm	Dilation on CBD > 12 mm	Sphincterotomy	Good response
02	M	53	Type I	Dilatation of the CBD > 10 mm	Dilation on CBD > 12 mm	Sphincterotomy	Good response
04	M	56	Type II	Not done	Dilation on CBD > 12 mm	Sphincterotomy	Good response
05	M	45	Type III	Not done	Dilation on CBD > 13 mm	Sphincterotomy	Good response
06	W	59	Type II	Not done	Dilation on CBD > 12 mm	Sphincterotomy	Good response
07	M	52	Type II	Not done	Dilation on CBD > 13 mm	Sphincterotomy	Good response
08	W	61	Type II	Not done	Dilation on CBD > 12 mm	Sphincterotomy	Good response
09	M	56	Type II	Not done	Dilation on CBD > 14 mm	Sphincterotomy	Good response
10	W	32	Type III	Dilatation of the CBD > 10 mm	Dilation on CBD > 12 mm	Sphincterotomy	Pancreatitis

Discussion

Definition

Sphincter of Oddi dysfunction is a clinical syndrome caused by SO dyskinesia (functional) or anatomic (mechanical) obstruction associated with abdominal pain and elevation of liver or pancreatic enzymes, common biliary duct or pancreatic duct dilation, or pancreatitis [4]. Its prevalence in the general population is 1.5% [1].

Classification

The modified Milwaukee classification (Gong and colleagues): has been widely accepted as the classification system for SOD (Hogan-Geenen classification system). Patients with typical biliary pain are divided into three types: type I; elevated liver enzymes, duct dilatation and delayed drainage of contrast are present; type II, either elevated liver enzymes, duct dilatation or delayed drainage of contrast are present, and type III, where only biliary pain is present [2]. This classification was adopted by many clinicians to guide them by properly categorizing and offering appropriate management to those suffering from suspected SOD [2] (Table 2).

Table 2: *Modified Milwaukee classification for biliary SOD [2].*

Type *1*	Biliary pain associated with all three of the following: *Serum aminotransferases that are > 2 x ULN on ≥ occasions AND *CBD dilation ≥ 10 mm on US or 12 mm on ERCP AND *Delayed drainage (> 45 min) of contrast from the CBD on ERCP
Type 2	Biliary pain associated with one or two of the following: *Serum aminotransferases that are > 2 x ULN on ≥ occasions OR *CBD dilation ≥ 10 mm on US or 12 mm on ERCP OR *Delayed drainage (> 45 min) of contrast from the CBD on ERCP
Type 3	Biliary pain only

Diagnosis

Sphincter of Oddi manometry (SOM); is still used as the gold standard for diagnosing SOD. However, it is an invasive procedure and the rate of complications is high. The main criterion retained is that of a rise in basal pressure of oddi sphincter above 35 mmHg [5]. The SOM is not available in practice.

Functional MRI with Gadoxetate Disodium; is a gadolinium based magnetic resonance Imaging (MRI) contrast agent that is taken up by normal hepatocytes and partially excreted in the biliary system [6]. Corwin and colleagues conducted a study over three years to test the hypothesis that delayed emptying in the duodenum indicated a disease state, by determining whether a biliary excreted contrast agent (similar to scintigraphy, but with higher resolution) is consistently visualized in the gallbladder and duodenum after a 30-min delay, using gadoxetate disodium enhanced T1-weighted hepatobiliary phase MRI images, on 22 patients without evidence of liver or biliary disease. The patients with previous cholecystectomy were excluded [2].

Biliary scintigraphy is a safety method, which was developed due to the difficulty of performing manometry and particularly, the significant risk of post-manometry acute pancreatitis [5]. Biliary scintigraphy requires the intra-venous injection of a derivative of di-imino acetic acid or one of its analogues marked with Tc99 with recording by gamma camera for 60 minutes [7,8]. It is now a well-standardized examination with international recommendations [8]. The most reliable criterion is the measurement of the isotopic transit time between the hile and the duodenum (TTHD) which should not exceed 10 minutes [7]. The procedure is not available in practice.

Diagnosis in practice

In practice, patients with a history of cholecystectomy and suspicion of SOD; should be classified by modified Milwaukee classification. For SOD type I and II, we can propose ERCP to confirm the dilation of common bile duct without stones and delayed contrast drainage between 10 - 12 minutes, then proceeding to sphincterotomy. There is a consensus that SOD type I and III don't need manometry before therapy [5]. For SOD type III, which is actually called functional biliary pain, we suggest treating it medically, considering the risk of Sphincter of Oddi manometry or the risk of ERCP with sphincterotomy.

Treatment

Medical therapy: The medical treatment of SOD is disappointing, although in some publications, the nitrates or calcium channel blockers may have shown a decrease in basal pressure of oddi sphincter [9]. Nitrates could replace the activity of NO donor neurons of the non-axis non-cholinergic adrenergic. Clinical trials evaluating the effect of nifedipine on abdominal pain have been published. The improvement of pain is observed in 75% of the cases in two studies including one controlled [10]. Trimebutine and Erythromycin appears to change motor skills, but their clinical efficacy has not yet been demonstrated [11]. Intravenous Somatostatin also modifies basal pressure of oddi sphincter but increase the frequency of phasic contractions [12]. Injection of Botulinum toxin (Botox) resulted in a 50% reduction in basal sphincter pressure is only reported in SOD Type III, demonstrating that it could predict those patients likely to gain improvement of symptoms in 92% of the patients ($n = 12$, $p < 0.01$). No complications from the use of Botox have been reported [13]. In our series no patient has been medically treated.

Endoscopic treatment

Endoscopic measures to treat sphincter dyskinesia or stenosis have been a mainstay of therapy. The first available evidence on the therapeutic benefit of ERCP sphincterotomy for biliary SOD was reported in 1989.Since then, several other clinical trials have demonstrated similar efficacy of endoscopic sphincterotomy in patients with high basal pressure in manometry.

Outcome of 18 studies reporting efficacy of endoscopic sphincterotomy for SOD type I and II (Figure 2) [13].

Author	Year	Design	*n*	Milwaukee type	Intervention	F/U	Outcome (% improved)	Complications
Farup et al.	1989	Prospective	5	I and II	N/S	>3 m	100 %	60 % (*n*=3); x1 perf, x1 haem, x1 AP
Cicala et al.	2002	Prospective	14	I and II	N/S	10–13 m	93 % (*n*=13)	N/S
Neoptolemus et al.	1988	Prospective	30	N/S	B-ES	Median 46 m (10–88)	63.3 % (*n*=19)	27 % (*n*=8); ×3 haem, ×4 AP, ×2 perf, ×1 AC
Botoman et al.	1994	Retrospective	43	II (21) and III (2), all man +	N/S	Mean 3.1 years	Type II 68 %; Type III 56 %	Type II 16 % (AP); Type III 15 % (AP)
Bozkurt et al.	1996	Prospective	23	II and III, all man +	N/S	Mean 19 m (8–62)	83 %	22 % (*n*=5); ×1 haem, ×4 AP
Fullarton et al.	1992	Prospective	10	II, all man +	B-ES	Median 24 m (12–48)	80 % (*n*=8)	N/S
Geenen et al.	1989	Prospective	47 (24 sham)	II	B-ES	12 m	65 % (15); man+91 %; man −42 %	4 % (*n*=2), AP
Kalaitzakis et al.	2010	Prospective	23	I, II and III. No man performed	B-ES	15 m (6–35)	61 % (*n*=14); ecurrence in 64 %	18 % (*n*=9); ×8 AP, ×1 perf
Lin et al.	1998	Retrospective	24	II, no man performed	B-ES	18 m	79 % (*n*=19)	8 % (*n*=2); ×2 AP
Rolny et al.	1993	Prospective	17	I, normal manometry in 35 %	N/S	28 m (3–46)	100 %	20 % (*n*=3); ×2 haem, ×1 AP
Sugawa et al.	2001	Retrospective	8	I, no man performed	N/S	Mean 26 m	100 %	0 %
Toouli et al.	2000	Prospective	37 (42 sham)	I (9) and II (72)	B-ES	24 m	85 % (*n*=11) man +; 50 % (*n*=12) man −	9 % (*n*=7) AP
Vittan et al.	2007	Prospective	14	I (4), II (9), III (1)	B-ES, D-ES	12 m	86 % (*n*=12)	14 % (*n*=2) AP
Wehrman et al.	1996	Prospective	37	II (22), III (15), all man +	D-ES	30 m (6–59)	Type II 60 % (*n*=13); Type III 8 % (*n*=1)	15 % AP; haem ×4
Freeman et al.	2007	Prospective	121	I (15 %), II (44 %), III (41 %), all man +	B-ES	26 m (6–46)	Type I 83.3 %; Type II 69.8 %; Type III 62 %	18.5 % (*n*=22); ×1 perf, ×18 AP
Wehrmann	2011	Prospective	37	I and II	B-ES, P-ES, D-ES	2 years	86 % (32/37)	N/S
Heeton et al.	2011	Retrospective	72	I, II and III. No man performed	B-ES	18 m	Type I 90.5 %; Type II 75 %; Type III 50 %	None reported
Gong et al.	2011	Retrospective	237	I, II and III	B-ES, P-ES, D-ES	0.5–7 years	Biliary type 94.8 % (202/213); pancreatic type 76.9 % (10/13); double duct type 63.6 % (7/11)	N/S

Man + manometry positive, *man* − manometry negative, *N/S* not specified, *B-ES* biliary endoscopic sphincterotomy, *P-ES* pancreatic endoscopic sphincterotomy, *D-ES* dual endoscopic sphincterotomy, *perf* perforation, *haem* haemorrhage, *AP* acute pancreatitis, *AC* acute cholangitis

Figure 2: *Outcomes of endoscopic sphincterotomy [13].*

In our study, SOD type II was the most frequent and we noticed a delayed contrast on cholangiopancreatography > 12 minutes in all cases. We concluded that we can propose ERCP with sphincterotomy for SOD type I and type II; first, to confirm the diagnosis and second, for sphincterotomy. In our study, the rate of success of endoscopic sphincterotomy was 90% in all cases). Complications reported in literature were: pancreatitis, haemorrhage and iatrogenic visceral perforation [13]. In our study, the rate of complications doesn't exceed 10%; presented by acute pancreatitis (probably because of a small sample).

Conclusion

Our preliminary results suggest that we can propose ERCP for diagnosis and treatment of the patients with SOD type I and II without performing Sphincter of Oddi manometry. However, SOD type III as a diagnosis should now be called functional abdominal pain and treated medically. Further research with a larger sample is needed to establish effective management and to confirm these results.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements

We would like to acknowledge the technical support of Souhail yamani, team of Ibn Sina Hospital.

Bibliography

1. Watson R., *et al*. "Wide disparities in attitudes and practices regarding Type II sphincter of Oddi dysfunction: a survey of expert U.S. endoscopists". *Endoscopy International Open* 4.9 (2016): E941-E946.

2. Yaghoobi M and Romagnuolo J. "Sphincter of Oddi Dysfunction: Updates from the Recent Literature". *Current Gastroenterology Reports* 17.8 (2015): 31.

3. Cotton PB., *et al*. "Effect of Endoscopic Sphincterotomy for Suspected Sphincter of Oddi Dysfunction on Pain-Related Disability Following Cholecystectomy: The EPISOD Randomized Clinical Trial". *Journal of the American Medical Association* 311.20 (2014): 2101.

4. Corwin MT., *et al*. "Functional MR cholangiography of the cystic duct and sphincter of Oddi using gadoxetate disodium: Is a 30-minute delay long enough?" *Journal of Magnetic Resonance Imaging* 37.4 (2013): 993-998.

5. Hyun JJ and Kozarek RA. "Sphincter of Oddi dysfunction: sphincter of Oddi dysfunction or discordance? What is the state of the art in 2018?" *Current Opinion in Gastroenterology* 34.5 (2018): 282-287.

6. Afghani E., *et al*. "Sphincter of Oddi Function and Risk Factors for Dysfunction". *Frontiers in Nutrition* 30.4 (2017): 1.

7. Fullarton GM., *et al*. "Quantitative 99mTc-DISIDA scanning and endoscopic biliary manometry in sphincter of Oddi dysfunction". *Gut* 29.10 (1988): 1397-1401.

8. Tulchinsky M., *et al*. "SNM Practice Guideline for Hepatobiliary Scintigraphy 4.0". *Journal of Nuclear Medicine Technology* 38.4 (2010): 210-218.

9. Bar-Meir S., *et al*. "Nitrate therapy in a patient with papillary dysfunction". *American Journal of Gastroenterology* 78.2 (1983): 94-95.

10. Khuroo M., *et al*. "Efficacy of nifedipine therapy in patients with sphincter of Oddi dysfunction: a prospective, double-blind, randomized, placebo- controlled, cross over trial". *British Journal of Clinical Pharmacology* 33.5 (1992): 477-485.

11. Barthet Bouvier., *et al*. "Effects of trimebutine on sphincter of Oddi motility in patients with post-cholecystectomy pain". *Alimentary Pharmacology and Therapeutics* 12.7 (1998): 647-652.

12. Di Francesco V., *et al*. "Effect of octreotide on sphincter of oddi motility in patients with acute recurrent pancreatitis: A manometric study". *Digestive Diseases and Sciences* 41.12 (1996): 2392-2396.

13. Hall TC., *et al*. "The diagnosis and management of Sphincter of Oddi dysfunction: a systematic review". *Langenbeck's Archives of Surgery* 397.6 (2012): 889-898.

Volume 7 Issue 3 March 2020