

Endoscopic biliary sphincterotomy dilation

The year 2013 will mark the 40th anniversary of the introduction of endoscopic biliary sphincterotomy (EBS) in the therapeutic armamentarium for the treatment of common bile duct obstruction. Early EBS procedures were performed for the removal of common bile duct stones, which still is a primary indication. EBS was the first therapeutic step for endoscopic retrograde cholangio-pancreatography (ERCP), which was first carried out for diagnostic purposes 1968.

On August 19, 1974 Professor Kawai, one of the pioneers of EBS, reported his initial experience at *Centro Médico Nacional de México* during the 3rd International Congress of Gastrointestinal Endoscopy. The innovation was welcomed as an extraordinary achievement and all attendants applauded what was deemed to become a major milestone for therapeutic digestive endoscopy (1). The sphincterotome likely represents the device with the best cost-benefit ratio for the endoscopic treatment of digestive diseases.

Initially, following EBS, stones were usually left within the common bile duct to allow for their spontaneous expulsion. Complications such as cholangitis led to the use of Fogarty-type balloon catheters and Dormia baskets for their extraction during ERCP.

It was soon observed that 100% of common bile duct stones could not be removed with a single ERCP-EBS procedure using only these balloons and baskets (Table I). Failure was usually associated with disparity between stone size and sphincterotomy size, which commonly cannot exceed 15 mm. Various factors may influence a sphincterotomy's smaller size, including a juxtadiverticular papilla of Vater and coagulation disorders.

Retained choledocholithiasis following a first ERCP imply new endoscopy sessions, various lithotripsy procedures (both intra- and extra-cholechochal), patient referral for surgery, or a palliative strategy such as biliary stent (13).

In 2003 Ersoz (16) first reported on biliary sphincterotomy dilation (EBSD) using big-sized hydrostatic balloons (12-20 mm in diameter) as a technique to remove challenging common bile duct stones.

Staritz, in 1982 (17), had previously published his experience with papilla of Vater dilation using an 8-mm balloon. This dilation was carried out with no prior section of the sphincter of Oddi, and was proposed as an alternative to common bile duct stones extraction with EBS. The procedure became widespread during the 1990's. The primary idea was to preserve sphincter function, particularly in younger patients. However, several deaths from serious pancreatitis secondary to papillary dilation in the absence of sphincterotomy were reported (18). We had a similar case ourselves (19).

The results of sphincteroplasty without prior EBS differ between eastern and western countries. For poorly understood reasons, series reported in countries such as Japan and Korea have a very low rate of pancreatitis following papillary dilation without EBS. While this type of sphincteroplasty is uncommon in Europe and the USA, a

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Table I. Some series on first-attempt common bile duct stone removal usually with only balloon extractors and Dormia baskets

Author reference	Year of study publication	Common bile duct stones removed total attempts	Percentage of removals at first attempt
Leese (2)	1985	271/319	85
Davidson (3)	1988	60/105	57
Cairns (4)	1989	497/624	80
Vaira (5)	1990	611/797	77
Peters (6)	1992	106/146	73
Lauri (7)	1993	51/82	62
Moreira (8)	1993	91/108	84
Maxton (9)	1995	198/283	70
Wojtun (10)	1997	281/324	87
Welsh (11)	1998	136/192	71
Sackmann (12)	2001	1274/1587	80
García-Cano (13)	2002	73/100	73
Mutignani (14)	2002	747/863	87
Sharma (15)	2003	85/102	83

recent paper by Chan et al. (20), where the papilla was dilated using large-diameter balloons (over 10 mm) during not only 1 but rather up to 6 minutes, highlights that pancreatitis rates may be lower because such forcible, prolonged dilation disrupts sphincter of Oddi fibers similarly to EBS but with fewer complications.

Anyway, EBSD is seemingly a procedure unlike papillary dilation with no prior incision. As the biliary and pancreatic orifices are moved apart by EBS, the expansive force exerted by the inflated balloon might act on the choledochus rather than the duct of Wirsung, which would render the incidence and severity of acute pancreatitis a seemingly non-significant complication following EBSD.

The use of EBSD has become rapidly widespread, and numerous series have been reported on its efficacy and safety (Table II). Its impact is such that it may be considered a new milestone similarly to EBS or biliary drainage prostheses.

This issue of *Revista Española de Enfermedades Digestivas* includes a paper by Martín Arranz et al. (28) that again highlights the fact that EBSD offers an excellent success rate in the removal of challenging common bile duct stones with a reduced index of complications. The study was performed at Hospital La Paz, Madrid, one of the big pioneering centers within the Spanish National Health system. With a high number of patients (109) who underwent 120 EBSD procedures, the rate of complete common bile duct clearance following a first ERCP-EBS-EBSD was 91%, and 96.7% after a second ERCP-EBSD. Bleeding was the commonest complication. This paper confirms that, overall, EBSD is the easiest, safest way of treating challenging common bile stones in the choledochus.

The low rate of pancreatitis after papillary dilation with diameters (e.g., 20 mm) that at times may engender some distrust when used in other anatomical locations, such as the esophagus, was surprising from the very start. However, as with other therapy techniques, complications increase with procedure numbers. Hemorrhage, occasionally severe, seems to be most common (29,30).

Complications seem to be similar when EBSD is performed during the first ERCP-EBS and when initial sphincterotomy is allowed time to heal and dilation takes place in a second session.

Dilation balloon diameter must be adjusted to that of the suprapapillary distal choledochus. Excessive dilation may cause perforation (31). Dilation to 15 mm is most com-

*Editorial***Table II. Some initial series on the use of biliary sphincterotomy dilation for common bile duct stone removal**

<i>Author reference</i>	<i>Year of publication</i>	<i>Balloon diameter</i>	<i>Removal success</i>	<i>Complications</i>
Ersoz (16)	2003	12-18	51/58 (83%)	15%
Bang (21)	2006	10-15	16/22 (73%)	0
Minami (22)	2007	20	87/88 (99%)	1%
Maydeo (23)	2007	12-15	57/60 (95%)	8.5%
Heo (24)	2007	12-20	97/100 (97%)	5%
Espinel (25)	2008	12-20	93/93 (100%)	2.1%
Attasaranya (26)	2008	12-18	102/103 (95%)	5.4%
Misra (27)	2008	15-20	50/50 (100%)	14%
García-Cano (28)	2009	10-18	29/30 (97%)	6.7%

mon and is maybe the safest approach if in doubt. The distal choledochus may also be dilated during the first ERCP using plastic prostheses or, in selected patients, removable metallic ones (32), only to attempt EBSD and stone removal again after a few weeks.

The guidewire on which the dilator balloon slides must be properly lodged within the intrahepatic bile ducts to ensure it is away from the cystic duct, which may become perforated during dilation.

Many endoscopists use short guidewires (about 260 cm) for ERCP. To maintain biliary cannulation following dilation longer guidewires (about 460 cm) are usually needed. These products' manufacturers are expected to condition dilation balloons for shorter guidewires, for instance by placing an orifice near the balloon through which the guidewire may be slid, as in other instruments allowing exchange with shorter guides.

The dilation balloon must be theoretically placed with its middle portion within the papilla. Upon inflation it may fully slide towards the choledochus or fall out into the duodenum. Initial inflation to half the pressure required for a given diameter, followed by full inflation once the balloon is properly placed, usually ensures success.

The present study by Martín Arranz et al. (28) adds to the increasing scientific understanding that EBSD is an excellent technique for the extraction of big or multiple common bile duct stones in the presence of anatomical challenges (juxtadiverticular papilla, tapering distal choledochus,...), coagulation disorders, or prior surgery (Bill-roth II gastrectomy). In addition, it is a safe technique that will not increase ERCP-EBS-related complications.

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