Endoscopic treatment of chronic pancreatitis: European Society of Gastrointestinal Endoscopy (ESGE) Clinical Guideline

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Background and aims: Clarification of the position of the European Society of Gastrointestinal Endoscopy (ESGE) regarding the interventional options available for treating patients with chronic pancreatitis.

Methods: Systematic literature search to answer explicit key questions with levels of evidence serving to determine recommendation grades. The ESGE funded development of the Guideline.

Summary of selected recommendations

For treating painful uncomplicated chronic pancreatitis, the ESGE recommends extracorporeal shockwave lithotripsy/endoscopic retrograde cholangiopancreatography as the first-line interventional option. The clinical response should be evaluated at 6–8 weeks; if it appears unsatisfactory, the patient's case should be discussed again in a multidisciplinary team. Surgical options should be considered, in particular in patients with a predicted poor outcome following endoscopic therapy (Recommendation grade B). For treating chronic pancreatitis associated with radiopaque stones ≥ 5 mm that obstruct the main pancreatic duct, the ESGE recommends extracorporeal shockwave lithotripsy as a first step, combined or not with endoscopic extraction of stone fragments depending on the expertise of the center (Recommendation grade B).

For treating chronic pancreatitis associated with a dominant stricture of the main pancreatic duct, the ESGE recommends inserting a single 10-Fr plastic stent, with stent exchange planned within 1 year (Recommendation grade C). In patients with ductal strictures persisting after 12 months of single plastic stenting, the ESGE recommends that available options (e.g., endoscopic placement of multiple pancreatic stents, surgery) be discussed in a multidisciplinary team (Recommendation grade D).

For treating uncomplicated chronic pancreatic pseudocysts that are within endoscopic reach, the ESGE recommends endoscopic drainage as a first-line therapy (Recommendation grade A).

For treating chronic pancreatitis-related biliary strictures, the choice between endoscopic and surgical therapy should rely on local expertise, patient co-morbidities and expected patient compliance with repeat endoscopic procedures (Recommendation grade D). If endoscopy is elected, the ESGE recommends temporary placement of multiple, side-by-side, plastic biliary stents (Recommendation grade A).

1. Introduction

Endoscopic therapy of chronic pancreatitis aims at relieving pain. Pain is generally considered to be multifactorial, caused by pancreatic neural remodeling and neuropathy, increased intraductal and parenchymal pressure, pancreatic ischemia and acute inflammation during an acute relapse. Complications such as pseudocysts, strictures of the common bile duct (CBD) and pancreatic cancer may also cause pancreatic-type pain. Most nonsurgical interventions for pain in patients with chronic pancreatitis who do not present these complications (with "uncomplicated chronic pancreatitis") aim at relieving outflow obstruction of the main pancreatic duct (MPD). In a large multicenter study of endoscopic therapy in chronic pancreatitis, MPD obstruction was caused by strictures (47%), stones (18%) or a combination of both (32%) [1]. Drainage of pseudocysts and treatment of CBD strictures were performed in 17% and 23% of patients, respectively.

This Guideline on endoscopic treatment in chronic pancreatitis has been endorsed by the European Society for Gastrointestinal Endoscopy (ESGE). A quick reference guide summarizing its recommendations is available online (**Appendix e1**).

2. Methods

The European Society of Gastrointestinal Endoscopy (ESGE) commissioned and funded this Guideline. The methodology, including assessment of evidence levels and recommendation grades, was similar to that used for other ESGE Guidelines [2]. Briefly, subgroups were formed, each charged with a series of clearly defined key questions (see **Appendix e2,** available online). The committee chair worked with subgroup leaders to identify pertinent search terms that always included "chronic pancreatitis" and words pertinent to specific key questions. Evidence tables were generated for each key question based on the best available evidence (see **Appendix e3,** available online). Subgroups agreed by online communication on draft proposals that were presented to the entire group for general discussion during a meeting held in Brussels in May 2011. The results of that discussion were incorporated into the subsequent Guideline draft version and again discussed using online communication until unanimous agreement was reached. Searches were re-run in June 2011 (this date should be taken into account for future updates). All members of the Guideline development group approved the final draft; it was peer-reviewed and, after modifications, sent to all individual ESGE members in February 2012 for their comments. The final guideline was endorsed by the ESGE Governing Board.

Evidence statements and recommendations are shown in italics for easier reference; key evidence statements and recommendations are in bold. This Guideline will be considered for revision in 2015, or sooner if important new evidence becomes available (any interim updates will be noted on the ESGE website: http://www.esge.com/esge-guidelines.html).

3. Initial work-up and choice of treatment

Computed tomography (CT) scanning is the most sensitive and accurate noninvasive method to identify pancreatic calcifications (Evidence level 2+). Magnetic resonance with cholangiopancreatography (MRCP) is the best noninvasive technique to assess the anatomy of the biliary tree (Evidence level 2++), of the pancreatic ducts, and of post-necrotic pancreatic fluid collections (Evidence level 2+).

The ESGE recommends performing CT scanning to plan treatment of chronic pancreatitis (Recommendation C). A combination of other imaging modalities (e.g., MRCP or endoscopic ultrasonography [EUS] plus CT scanning or abdominal X-ray) may be preferable in specific circumstances (e.g., suspected anatomical variants of the pancreatic ducts, CBD strictures, or drainage of post-necrotic pancreatic fluid collections) (Evidence level B).

CT scanning allows detection of pancreatic calcifications and broad assessment of the pancreatic parenchyma. The anatomy of pancreatic ducts, including MPD strictures and anatomical variants (e.g., pancreas divisum), is best assessed using MRCP [3,4], including intravenous injection of secretin in selected cases [5].

For the work-up of pancreatic fluid collections, a prospective comparative study concluded that magnetic resonance imaging (MRI) was superior to CT scanning because it depicts solid necrotic debris that may impede effective drainage [6]. EUS provides similar information. These imaging modalities have not been compared for the detection of pseudoaneurysms close to pseudocysts, which is another potentially important consideration when planning treatment.

Chronic pancreatitis is associated with an increased risk of pancreatic cancer. The differential diagnosis of chronic pancreatitis vs. pancreatic cancer may be challenging (Evidence level 1+). In patients with a pancreatic mass or an MPD or CBD stricture in the context of chronic pancreatitis, an adequate work-up should be performed to reasonably rule out a pancreatic cancer (Recommendation grade A).

Special attention to the possibility of concurrent pancreatic cancer should be paid in patients >50 years, of female gender, of white race, presenting with jaundice, in the absence of pancreatic calcifications, or in the presence of exocrine insufficiency, as well as in patients with hereditary pancreatitis [7–9]. The accuracy of standard CT scanning for the detection of pancreatic cancer is limited in the context of chronic pancreatitis [10,11]. Triple-phase CT scanning with time-attenuation curves has yielded 90% accuracy for differentiating chronic pancreatitis from pancreatic cancer; this examination has been recommended as a first-choice procedure in an evidence-based algorithm for the work-up of mass lesions in chronic pancreatitis, followed by MRCP, EUS-FNA and positron emission tomography (PET)-CT [12,13]. With EUS, the differentiation between pancreatic cancer and focal pancreatitis is difficult (accuracy <75%) [14,15]; adding EUS-guided sampling to EUS significantly improved the diagnostic yield in one retrospective study [14]. Interestingly, in three retrospective studies involving 1131 patients in total, the negative predictive value of EUS-guided sampling for pancreatic cancer was higher in the presence vs. in the absence of chronic pancreatitis (89–94% vs. 45–93%) [8,16,17]. If EUS-guided sampling is inconclusive, repeat EUS-guided sampling with rapid on-site cytopathological examination, PET-CT, or surgical resection are recommended [13,18]. If a CBD stricture is treated by ERCP in the context of chronic pancreatitis, adequate biliary sampling should be obtained before stent insertion [19,20].

Other diseases that may be difficult to differentiate from chronic pancreatitis include autoimmune pancreatitis and intraductal papillary mucinous neoplasm. For the diagnosis of these diseases, the reader is referred to recent guidelines [18,21,22]. In this regard, demographic data may also prove helpful because, compared with patients with chronic pancreatitis, those with intraductal papillary mucinous neoplasm are significantly more often females, are older, drink less alcohol, and smoke fewer cigarettes [23].

The choice between surgical and endoscopic therapy in patients with painful uncomplicated chronic pancreatitis may be influenced by the following considerations: (i) two randomized controlled trials (RCTs) have shown better pain control following surgery compared with endoscopic therapy; (ii) endoscopic therapy does not preclude surgical treatment of chronic pancreatitis and it is safer; (iii) predictors of satisfactory outcome following endoscopic therapy have been identified (Evidence level 1+).

The ESGE recommends endoscopic therapy as the first-line therapy for painful uncomplicated chronic pancreatitis. The clinical response should be evaluated at 6–8 weeks; if it appears unsatisfactory, the patient's case should be discussed again in a multidisciplinary team with endoscopists, surgeons, and radiologists and surgical options should be considered, in particular in patients with a predicted poor outcome following endoscopic therapy (Recommendation grade B).

The RCTs that have compared interventions for the treatment of painful uncomplicated chronic pancreatitis are summarized in ▶ **Table 1**. In the first RCT comparing endoscopic therapy vs. surgery [24], pain was absent after 5 years of follow-up in 15% vs. 34% of endoscopic therapy vs. surgery patients, respectively, showing that neither of these options is entirely satisfactory. In

Table 1 Randomized controlled trials of interventions for pain in uncomplicated chronic pancreatitis (excluding celiac plexus block and surgery-only trials).

	Dite et al., 2003 [24] (Follow-up, 5 years)		Cahen et al., 2007 [25, 26] (Follow-up, 6 years)		Dumonceau et al., 2007 [34] (Follow-up, 4 years)	
	ERCP	Surgery	ESWL + ERCP	Surgical pancreatico-jejunostomy	ESWL	ESWL + ERCP
n	36	36	19	20	26	29
Pain relief, %						
Complete	15	34[1]	16	40[1]	58	55
Partial	46	52	16	35	n.d.	n.d.

ERCP, endoscopic retrograde cholangiopancreatography; ESWL, extracorporeal shockwave lithotripsy; n.d., no data.
[1] $P<0.05$.

Table 2 Long-term outcome after endoscopic treatment of chronic pancreatitis.

First author, year	n	Follow-up, months	Surgery	Ongoing endoscopic treatment	No further intervention
Binmoeller, 1995 [68]	93	58	26%	13%	61%
Rösch, 2002 [1]	1018	58	24%	16%	60%
Delhaye, 2004 [36]	56	173	21%	18%	61%
Tadenuma, 2005 [38]	70	75	1%	20%	79%
Inui, 2005 [45]	555	44	4%	–	–
Farnbacher, 2006 [37]	98	46	23%	18%	59%

this RCT, endoscopic therapy was not optimal (extracorporeal shockwave lithotripsy [ESWL] and cumulative stenting were not used, endoscopic therapy was not repeated in the case of recurring symptoms). In the second RCT of endoscopic therapy vs. surgery [25, 26], the initial stenting period was relatively short as stents were removed when the stricture had disappeared on the pancreatogram, but resumed in the case of pain and stricture recurrence. This is in contrast to most other studies in which stenting is continued for 1 to 2 years. Moreover, this RCT included only patients with advanced chronic pancreatitis (most of them were opioid-dependent; 79% had strictures and stones). For these reasons, the results cannot be extrapolated to all patients with chronic pancreatitis.

Independent series from different parts of the world have reported the long-term outcome after endoscopic therapy in a total of 1890 patients with chronic pancreatitis; no pancreatic surgery was performed in 83% of them (**Table 2**). The reluctance of some gastroenterologists to consider surgery for the treatment of chronic pancreatitis (in particular as a first interventional procedure) may be explained by the relatively high morbidity and mortality associated with pancreatic surgery in the setting of chronic pancreatitis (18–53% and 0–5%, respectively, for resections [27], and 0–4% mortality for MPD drainage [28]). In contrast, morbidity and mortality rates for endoscopic therapy for chronic pancreatitis are in the ranges 3–9% and 0–0.5%, respectively (chronic pancreatitis is likely a protective factor against the most frequent complication of ERCP, i.e., pancreatitis) [1, 29–31]. In painful chronic pancreatitis with mild changes at pancreatography according to the Cambridge classification [32], pancreatic sphincterotomy as a single therapeutic maneuver has been proposed but this has not been well studied. For example, mild chronic pancreatitis was recorded in 14/40 and 26/398 patients included in two series of endoscopic therapy for chronic pancreatitis but the outcome has not been reported for this particular subgroup of patients [30, 33]. Therefore, our recommendation of endoscopic therapy as the first-line therapy for painful uncomplicated chronic pancreatitis applies only to patients with moderate or marked changes of chronic pancreatitis at pancreatography according to the Cambridge classification.

Factors independently associated with long-term (≥2 years) pain relief following endoscopic therapy of chronic pancreatitis include the location of obstructive calcifications in the head of the pancreas (most robust predictor of good outcome, identified in an RCT) [34], a short disease duration and a low frequency of pain attacks before endoscopic therapy, complete MPD stone clearance and absence of MPD stricture at initial endoscopic therapy, as well as discontinuation of alcohol and tobacco during follow-up [35–38]. Although MPD stones and strictures located in the tail of the pancreas are accessible to endoscopic therapy, this is more challenging compared with endoscopic therapy of similar lesions located in the head of the pancreas and clinical success is less certain. For that reason, when stones/dominant strictures are located in the pancreatic tail exclusively and are deemed responsible for pain, pancreatic tail resection is a possible first-intent option to be discussed with the patient and surgical team.

4. Management of pancreatic stones

4.1. Definitions

Different classifications of pancreatic stones have been proposed, based on radiopacity (radiolucent vs. radiopaque stones) or location (head, body, or tail; in the MPD, secondary ducts, or intraparenchymal) [39]. Successful stone fragmentation following ESWL has been defined as stones broken into fragments ≤2 or 3 mm [29, 34,40], or by the demonstration of a decreased stone density at X-ray, an increased stone surface and an heterogeneity of the stone which may fill the MPD and adjacent side branches [41]. The Guideline group prefers the latter definition.

4.2. Methods and results

4.2.1. ESWL combined or not with ERCP

Endoscopic attempts at MPD stone extraction without prior stone fragmentation are plagued with low success and relatively high morbidity rates; complications may be severe and may be observed even with pancreatic stones < 10 mm in diameter (Evidence level 2+). ESWL consistently provides stone fragmentation in 90% of patients (Evidence level 1+); it facilitates endoscopic extraction of MPD stones (Evidence level 2+). Spontaneous elimination of stone fragments resulting from ESWL occurs in approximately 80% of patients. ESWL alone is more cost-effective than ESWL systematically combined with ERCP (Evidence level 1+).

For treating patients with uncomplicated painful chronic pancreatitis and radiopaque stones ≥ 5 mm obstructing the MPD, the ESGE recommends ESWL as a first step, immediately followed by endoscopic extraction of stone fragments. In centers with considerable experience with ESWL, ESWL alone should be preferred over ESWL systematically combined with ERCP (Recommendation grade B). Endoscopic attempts to extract radiopaque MPD stones without prior stone fragmentation should be considered only for stones < 5 mm, preferably low in number, and located in the head or body of the pancreas. Intraductal lithotripsy should be attempted only after failure of ESWL (Recommendation grade D).

Nonsurgical clearance of stones obstructing the MPD can be achieved by ESWL alone, by ERCP alone (always including pancreatic sphincterotomy), or by a combination of these techniques. However, endoscopic attempts at MPD stone extraction using Dormia baskets without prior stone fragmentation have yielded unsatisfactory results: (i) a success rate of 9% was reported in a retrospective series of 125 patients [42]; (ii) in another retrospective multicenter series of 712 mechanical lithotripsies, the complication rate was three times higher for pancreatic compared with biliary stones [43].

ESWL is highly effective at fragmenting radiopaque pancreatic stones: in a systematic review of 11 series involving 1149 patients in total, the success of stone fragmentation by ESWL was 89% [44]. More recently, a large prospective single-center series achieved stone fragmentation in 935 (93%) of 1006 patients [29]. Lower fragmentation rates have been reported, particularly in low case-volume centers; this may be due to technical factors and skill [45]. Performance of ESWL prior to endoscopic attempt at stone removal was independently associated with the success of MPD stone clearance in a retrospective study [35]. A meta-analysis of 17 studies (total of 491 patients) showed that ESWL is useful for clearing MPD stones and for decreasing pain [46].

In the majority of series, stones targeted by ESWL were mostly obstructive radiopaque MPD stones with a minimal diameter in the range of 2 – 5 mm [29, 34, 35, 40, 42, 45, 47, 48]. Factors significantly associated with the success of MPD stone clearance after ESWL included the presence of a single stone [35, 47], and confinement of calculi to the head of the pancreas [35]. These associations were found only in univariate analysis and in a minority of studies.

The use of ESWL alone for painful chronic pancreatitis was reported in two uncontrolled series and an RCT. The uncontrolled series included 350 patients followed up for 44 months; spontaneous MPD stone clearance was reported in 70 – 88% of patients and long-term pain relief in 78% of patients [45, 49]. The RCT compared ESWL alone vs. ESWL followed by ERCP in 55 patients [34]. The only significant differences between groups were a longer hospital stay and a higher treatment cost in the ESWL plus ERCP group.

Morbidity related to ESWL alone or combined with ERCP was reviewed based on four large (> 100 patients) series: significant complications were reported in 104 of 1801 patients, including one death (morbidity and mortality rates, 5.8% and 0.05%, respectively) [29, 38, 41, 45]. Complications related to the treatment of chronic pancreatitis by ESWL alone were reported in three series that involved 165 patients; the morbidity rate was 6.0% [34, 38, 49]. For both ESWL alone or ESWL plus ERCP, complications consisted of pancreatitis in the majority of cases.

Contraindications to ESWL include coagulation disorders, pregnancy, implanted cardiac pacemakers or defibrillators, and presence in the shockwave path of bone, calcified aneurysms, or lung tissue [50]. Of note, implanted cardiac pacemakers are not universally recognized as a contraindication to ESWL [51].

4.2.2. Other methods

Intraductal laser or electrohydraulic lithotripsy have provided discordant success rates for stone fragmentation (47 – 83%) in small case series, after failure of ESWL to fragment stones [52, 53]. These techniques require nonstandard equipment and materials and are technically demanding; they are considered to be second-line interventions after failed ESWL.

Dissolution of pancreatic stones using various substances has been anecdotally reported [54, 55]. The efficacy of such treatments has never been tested in comparative trials, and side effects may be significant. Therefore, stone dissolution therapy may have a role only in patients in whom all other, more conventional, methods have failed and who are not surgical candidates.

5. Management of main pancreatic duct strictures

5.1. Definitions

In chronic pancreatitis, MPD strictures may be single or multiple and classified as dominant or nondominant. Dominant MPD strictures are defined by the presence of at least one of the following characteristics: upstream MPD dilatation ≥ 6 mm in diameter, prevention of contrast medium outflow alongside a 6-Fr catheter inserted upstream from the stricture or abdominal pain during continuous infusion of a nasopancreatic catheter inserted upstream from the stricture with 1 L saline for 12 – 24 h [56]. Treatment of a dominant MPD stricture is defined as technically successful if at least one stent is inserted across the stricture (treatment by dilation alone has been abandoned). With regard to clinical success, many definitions have been used, ranging from doctor's opinion to validated pain scores. The ESGE recommends that future studies should use validated pain scores for both short-term and long-term evaluation of clinical success. For long-term evaluation, absence of pain (relapse) at 1 year post stent retrieval seems a reasonable and workable definition.

5.2. Methods and results

The reader is referred to a recent ESGE publication for an overview of the principles and technique of stricture treatment by continued dilation using temporary stent placement [57]. Points relevant to pancreatic stenting only are briefly discussed below:

- Pancreatic sphincterotomy (at the level of the major or minor papilla) has consistently been performed prior to MPD stenting in all large studies [37, 58 – 65], in contrast to what has been reported for biliary stenting.
- Biliary sphincterotomy should be combined with pancreatic sphincterotomy only in selected cases according to an RCT, i. e.

Table 3 Selected series of treatment with plastic stents for main pancreatic duct (MPD) strictures in chronic pancreatitis.

First author, year	n	Stent sizes, Fr	Follow-up, months	Early pain relief, %	Sustained pain relief, %	Patients undergoing operation, %
Cremer, 1991 [58]	75	10	37	94	n.a.	15
Ponchon, 1995 [59]	23	10	14	74	52	15
Smits, 1995 [60]	49	10	34	82	82	6
Binmoeller, 1995 [68]	93	5 – 7 – 10	58	74	65	26
Morgan, 2003 [69]	25	5 – 7 – 8.5	n.a.	65	n.a.	n.a.
Vitale, 2004 [61]	89	5 – 7 – 10	43	83	68	12
Eleftheriadis, 2005 [62]	100	8.5 – 10	69	70	62	4
Ishiara, 2006 [63]	20	10	21	95	90	n.a.
Weber, 2007 [64]	17	7 – 8.5 – 10 – 11.5	24	89	83	n.a.

n.a., not available.

in patients with cholangitis, jaundice (bilirubin ≥ 3 mg/dL), a dilated CBD (≥ 12 mm) associated with elevated alkaline phosphatases (> 2 upper limit of normal values), or in case of difficult access to the MPD [66].

- Stricture dilation is performed prior to stenting in most cases because chronic pancreatitis-related MPD strictures may be very tight and resilient. If bougies or balloons cannot pass the stricture, the Soehendra stent retriever may serve as a rescue option [67].

Pancreatic stenting is technically successful in 85 – 98 % of attempted cases [58 – 60, 64]; it is immediately followed by pain relief in 65 – 95 % of patients [58 – 61, 63 – 65, 68]; during follow-up (14 – 58 months), pain relief has been reported in 32 % – 68 % of patients [25, 37, 59 – 61, 63, 64, 68].

5.2.1. Plastic stents

Polyethylene 10-Fr pancreatic stents tailored to the shape of the MPD and length of the stricture are most commonly used. Occlusion of MPD stents usually occurs within 2 – 3 months (Evidence level 2 –) while symptoms of chronic pancreatitis usually recur between 6 and 12 months (Evidence level 2 +). Thinner MPD stents (≤ 8.5 Fr) are associated with more frequent hospitalizations for abdominal pain than 10-Fr stents. Placement of a single pancreatic plastic stent achieves MPD stricture resolution in nearly 60 % of cases (Evidence level 2 +) while simultaneous placement of multiple pancreatic stents was reported to be of additional benefit in a single study (Evidence level 2 –). Complications related to MPD stenting are usually mild and managed conservatively (Evidence level 2 +).

The ESGE recommends treating dominant MPD stricture by inserting a single 10-Fr plastic stent, with stent exchange planned within 1 year even in asymptomatic patients to prevent complications related to long-standing pancreatic stent occlusion (Recommendation grade C). Simultaneous placement of multiple, side-by-side, pancreatic stents could be applied more extensively, particularly in patients with MPD strictures persisting after 12 months of single plastic stenting. At this time point, the ESGE recommends that available options (e. g., endoscopic placement of multiple simultaneous MPD stents, surgery) be discussed by a multidisciplinary team (Recommendation grade D).

Table 3 summarizes selected studies of MPD stenting. Because MPD stenting for a short predefined (6-month) duration has been shown to be poorly effective [59], MPD stenting is performed for longer periods. Criteria used for terminating MPD stenting are as follows: (i) adequate pancreaticoduodenal outflow of contrast medium 1 – 2 minutes after ductal filling upstream from the stricture location, and (ii) easy passage of a 6-Fr catheter through the stricture location [60, 62, 68]. After prolonged MPD stenting, relapsing pain was observed in 36 – 48 % of patients after "definitive" stent removal, re-stenting was indicated in 22 – 30 % of patients, and 4 – 26 % of patients had pancreatic surgery. A pancreas divisum anatomy might require longer/multiple stenting because it is associated with more frequent relapse of MPD stricture and of pain after stent removal compared with MPD stenting in patients with a fused pancreas [62].

Stent occlusion is the most frequent complication of MPD stenting; it is treated by stent exchange that may be performed either at regular intervals (e. g., 3 months) [61], or "on-demand," i. e., when symptoms develop [62, 68]. The aim of an "on-demand" stent exchange schedule is to reduce the number of ERCP sessions; it is based on the fact that pain relapse most frequently occurs a long time after stent occlusion [69]. Drawbacks of the "on-demand" stent exchange schedule include rare occurrence of pancreatic abscesses and sepsis [58, 68], and failure to decrease the number of ERCP sessions (four to five in large studies) [62, 68].

Stents measuring 8.5 Fr or 10 Fr in diameter are used in most studies. In a retrospective study of 163 patients, those who had received thin stents (≤ 8.5 Fr) were 3.2 times more likely to be hospitalized for abdominal pain than those who had received 10-Fr stents [70].

The role of multiple pancreatic stents was investigated in a single study that involved 19 patients [71]. The stricture was located in the head of the pancreas and it persisted after at least two placements of a single stent. A median of three simultaneous stents were inserted for a mean period of 7 months; persistent pain relief was noted in 84 % of the patients after 38 months of follow-up.

The morbidity of pancreatic stenting is in the range of 6 – 39 % [37, 58 – 62, 64, 65, 68]. It most frequently consists of mild pancreatitis; proximal or distal stent migration as well as pancreatic abscesses requiring surgery have rarely been reported.

5.2.2. Self-expandable metallic stents (SEMSs)

Patency of pancreatic SEMSs is short with regard to the life expectancy of patients with chronic pancreatitis (Evidence level 2 –). Preliminary studies suggest that temporary placement of fully covered SEMS is safe and allows resolution of MPD strictures plus pain relief in a majority of patients but no follow-up longer than 1 year is available (Evidence level 2 +).

Uncovered SEMSs should not be inserted in MPD strictures (Recommendation grade D); temporary placement of fully covered SEMSs holds promise but it should be performed only in the setting of trials

with approval of the institutional review board (Recommendation grade C).

Historical series have shown that the patency duration of SEMSs left in place in the MPD was limited to approximately 1 year [72]. Therefore, SEMS insertion without scheduled removal is not performed anymore, as is the case for benign biliary strictures [19].

More recently, two centers have reported three prospective series that used temporary placement of fully covered SEMSs to treat chronic pancreatitis-related MPD strictures. Three different types of SEMS were inserted and left in place for 2 – 3 months in 51 patients [73 – 75]. Stent removal was successful in all of 46 attempted cases. No pain relapse was noted in 43 of 50 patients (86 %) during mean follow-up periods of 5 months following SEMS removal. Complications included SEMS migration in a single study (31 % of 13 patients) and de novo focal MPD strictures (16 % of 32 patients) [73, 75].

5.2.3. Endosonography-guided access and drainage (ESGAD) of the MPD

Experience with ESGAD of the MPD is limited to a small number of reported cases with short follow-up. ESGAD was effective in obtaining MPD drainage and pain relief in selected patients with chronic pancreatitis, with morbidity usually being mild and no reported mortality (Evidence level 3). ESGAD of the MPD is indicated in carefully selected patients; patients considered for ESGAD should be referred to tertiary centers with appropriate equipment and expertise (Recommendation grade D).

Potential indications for ESGAD of the MPD include patients with a symptomatic MPD obstruction and failed conventional transpapillary MPD drainage. Briefly, the technique consists of puncturing the MPD through the gastric or duodenal wall, obtaining a pancreatogram and advancing a guide wire into the MPD to proceed with transpapillary (rendezvous technique) or transmural drainage [44].

Approximately 75 cases of ESGAD of the MPD have been reported [76 – 81]; follow-up for individual cases ranges from a few weeks up to 55 months (median, 1 year). Immediate pain relief after successful ESGAD of the MPD has been reported in a majority of patients with painful obstructive chronic pancreatitis (range, 50 % – 100 %). In the largest series to date (n = 36), complete or major pain relief was achieved in 69 % of patients but the probability of remaining free of pain sharply dropped with time, to 20 % after 450 days [79]. A malignant etiology for complete MPD obstruction should always be sought as 5 patients out of 36 in this series had a diagnosis of cancer within a year of the procedure [79].

The morbidity rate of ESGAD of the MPD varies between 0 and 44 %; it mostly consists of relatively mild post-procedure pain, but severe pancreatitis, perforation, bleeding, and hematoma have been reported [76 – 81]. No procedure-related mortality has been reported. Migration and occlusion of stents frequently occur (20 % to 55 % of patients), necessitating endoscopic re-intervention. ESGAD is a technically challenging procedure [79].

6. Endoscopic ultrasound-guided celiac plexus block

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EUS-guided celiac plexus block (CPB) provides temporary pain relief in approximately half of patients with chronic pancreatitis. EUS-guided CPB is superior to percutaneous CT-guided CPB in terms of pain control and of patient preference (Evidence level 1 –).

The ESGE recommends considering CPB only as a second-line treatment for pain in chronic pancreatitis; EUS-guided CPB should be preferred over percutaneous CPB (Recommendation grade C).

During CPB, a mixture of corticoids with a local anesthetic is injected into celiac plexus nerves to disrupt the signaling of painful stimuli through pancreatic afferent nerves (celiac plexus neurolysis, it should be noted, uses alcohol and is reserved to patients with cancer-related pain) [82].

Meta-analyses have reported that EUS-guided CPB provides pain relief in 51 % – 59 % of patients with painful chronic pancreatitis [83, 84]; however, pain relief is transient [84]. For example, in a prospective series of 90 patients, the proportion of patients with pain relief decreased from 55 % immediately after EUS-guided CPB to 10 % at 24 weeks [85]. Because no RCT has included a sham group, a placebo effect cannot be excluded. A recent RCT has assessed the benefit of adding triamcinolone to bupivacaine for patients with painful chronic pancreatitis [86]; only 15 % of the patients had a significant pain decrease at 1 month with addition of triamcinolone showing no difference.

In two RCTs, EUS was superior to CT guidance for CPB in terms of duration of pain relief and of patient preference [87, 88]. Another theoretical advantage of the EUS-guided route is the absence of reported severe complications such as paraplegia and aortic pseudoaneurysms [89, 90]. The most common complications of EUS-guided CPB include transient diarrhea, hypotension, and pain exacerbation, with an incidence of up to 33 % [84].

7. Pancreatic pseudocysts

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7.1. Definitions

Pancreatic pseudocysts (PPC) develop during the course of chronic pancreatitis in 20 – 40 % of patients [91]. The Atlanta classification defines a PPC as a collection of pancreatic juice enclosed by a wall of fibrous granulation tissue, which arises as a consequence of acute pancreatitis, pancreatic trauma, or chronic pancreatitis [92]. It further distinguishes acute PPC (associated with acute pancreatitis more than 4 weeks previously) and chronic PPC (arising in patients with chronic pancreatitis and no antecedent acute pancreatitis). Endoscopic therapy of PPC consists of inserting a drain from the digestive lumen into the PPC, through the digestive wall ("transmural drainage"), through the papilla ("transpapillary drainage"), or a combination of these routes. Transpapillary PPC drainage is feasible only in the case of direct communication between the PPC and the MPD, which occurs in 40 – 66 % of all PPCs [93 – 95]. Technical success is usually defined as the ability to insert at least one stent from the PPC to the digestive lumen [96, 97], or resolution of the fluid collection but not necessarily of symptoms [98]. Short-term clinical success is usually defined as complete relief of the initial symptoms with a decrease in PPC diameter of at least 30 – 50 % at 1 month [99].

7.2. Indications for treatment

Universally accepted indications for PPC treatment include the presence of symptoms (abdominal pain, gastric outlet obstruction, early satiety, weight loss, or jaundice) and infected or enlarging PPC. Compared with surgery, endoscopic drainage of uncomplicated PPC provides similar long-term results at a lower cost, with shorter hospital stay, and better quality of life during the first months following treatment. Procedure-related mortality is slightly lower with the endoscopic method (Evidence level 1 +).

The ESGE recommends endoscopic therapy as the first-line therapy for uncomplicated chronic PPCs for which treatment is indicated and that are within endoscopic reach (Recommendation grade A).

Besides the universally accepted indications for PPC treatment that are listed above [100], treatment for prophylaxis of potential PPC-related complications in asymptomatic patients has been advocated by some authors (although such complications occur in < 10% of patients during follow-up) [101,102]. Suggested indications for prophylactic treatment include compression of major vessels, intracystic hemorrhage, pancreaticopleural fistula, PPC > 5 cm without any regression after > 6 weeks, cyst wall > 5 mm, and PPC in the setting of chronic pancreatitis with advanced MPD changes or pancreaticolithiasis [103]. Treatment of asymptomatic PPC in chronic pancreatitis is supported by the low (0 – 9%) rate of spontaneous PPC resolution in patients with established chronic pancreatitis in most series [104]. A single series reported a higher (26%) resolution rate, which was observed after a long follow-up (median time to resolution, 29 weeks) [105].

In an RCT that compared endoscopic (EUS-guided) drainage vs. surgery for uncomplicated PPC, endoscopic drainage was significantly better than surgery in terms of cost, length of hospital stay, and quality of life up to 3 months post-procedure [106]. At a median follow-up of 18 months, clinical outcomes and quality of life were similar for both allocation groups. A large review of noncomparative historical series of endoscopic and surgical treatments that included 787 patients showed similar morbidity (13.3% vs. 16.0%, respectively) and long-term pseudocyst recurrence (10.7% vs. 9.8%, respectively) but lower mortality with the endoscopic method (0.2% vs. 2.5%, respectively) [107].

7.3. Methods and results

In the absence of luminal bulging, transmural drainage of PPC is feasible under EUS guidance only, with complication and success rates similar to those of conventional transmural drainage (Evidence level 1+). Compared with transmural drainage, transpapillary drainage provides similar long-term success and is associated with fewer complications but it has been performed for relatively small collections only (generally ≤ 50 mm). Compared with cystogastrostomy, cystoduodenostomy may provide better long-term success (Evidence level 2 –). After transmural PPC drainage, early (2-month) stent removal is associated with a high likelihood of PPC recurrence (Evidence level 1 –). Single transmural stents do not yield long-term success as frequently as multiple stents; straight transmural stents are associated with relatively frequent and severe complications (Evidence level 2 –). Mortality associated with hemorrhage from pseudoaneurysms close to PPCs is high (Evidence level 1+).

If transmural pseudocyst drainage is indicated in the absence of luminal bulging, it should be performed under EUS guidance (Recommendation grade A). For small collections communicating with the MPD in the head or body of the pancreas, the ESGE recommends attempting transpapillary drainage first. Cystoduodenostomy should be preferred over cystogastrostomy if both routes are deemed equally feasible. For transmural PPC drainage, the ESGE recommends inserting at least two double-pigtail plastic stents (Recommendation grade D); these should not be retrieved before cyst resolution as determined by cross-sectional imaging and not before at least 2 months of stenting (Recommendation grade B). In the case of portal hypertension, transmural drainage should be performed under EUS guidance. If arterial pseudoaneurysms are detected in the vicinity of the PPC, arterial embolization should be considered prior to PPC drainage (Recommendation grade D).

Transpapillary and transmural PPC drainages were compared in three nonrandomized studies that included 173 patients (chronic pancreatitis was diagnosed in 40 – 92% of them) [95, 98,108]. Transpapillary drainage was used for smaller PPCs than transmural drainage. We calculated that transpapillary drainage was associated with lower morbidity (1/56 [1.8%] vs. 18/117 [15.4%] patients; $P = 0.008$) and similar long-term success (53/56 [94.6%] vs. 105/117 [89.7%] patients; $P = 0.391$) than transmural drainage.

For transmural PPC drainage, technical success was higher with EUS compared with conventional guidance in two RCTs [97, 109]. All patients with failed conventional drainage had a successful EUS-guided drainage. Per-protocol analysis showed no difference between groups in terms of morbidity and clinical outcome. Failures of conventional drainage were related to the absence of intraluminal bulging, which is observed in approximately half of PPCs [95].

In a review of seven historical series that reported results separately for 121 patients treated by either cystoduodenostomy or cystogastrostomy, cystoduodenostomy more frequently yielded long-term success (59/71 [83.1%] vs. 32/50 [64.0%]; $P = 0.019$), with identical morbidity (10%) [110]. This could be related to a longer patency of cystoduodenal compared with cystogastric fistulas [110 – 112].

After transmural PPC drainage and PPC resolution, early stent removal was associated with more PPC recurrences compared with stent maintenance in an RCT of 28 patients (15 had chronic pancreatitis) [113]. In a retrospective study of 92 patients, PPC drainage with a single stent and a stenting duration ≤ 6 weeks were independently associated with failure of endoscopic treatment (defined as severe procedure-related complication or need for another treatment modality) [96]. In this series, straight stents were used and they were associated with frequent bleeding (7% of patients, with surgery required in two thirds of them) and stent migration. The authors advocated using double-pigtail stents.

Pseudoaneurysms may be detected in the setting of chronic pancreatitis, particularly where there is complication with a PPC [114]. In the largest review of hemorrhages associated with a PPC (126 episodes), overall mortality was 19% [114]. Therefore, some authors recommend embolization of arterial pseudoaneurysms before attempting drainage of PPCs close to pseudoaneurysms [115]. Finally, extrahepatic portal hypertension develops during the course of chronic pancreatitis in ≥ 15% of patients [116]. Some authors recommend EUS-guided PPC drainage in cases of portal hypertension, to decrease the risk of bleeding [117]; this strategy has not been compared with conventional transmural drainage but it has been reported to be safe in a small series of patients [118].

7.4. Particular case: complete MPD rupture

PPC resolution in the case of a complete MPD rupture is achieved less frequently compared with clinical situations without complete MPD rupture; the risk of PPC relapse may also be higher. A stent bridging the MPD rupture (which may allow MPD healing) and a long stenting duration are associated with better long-term success (Evidence level 2 –).

The ESGE recommends, besides transmural PPC drainage, attempting transpapillary bridging of MPD ruptures with a plastic stent. If the MPD rupture cannot be bridged, transmural stents should be left in place for as long as the disconnected pancreatic tail secretes pancreatic juice (typically, for years) (Recommendation grade D).

In the case of complete MPD rupture without effective drainage, the disconnection of the pancreatic tail may lead to fluid accumulation. Initial PPC resolution after endoscopic treatment has been reported in 61% of 97 patients with a complete MPD rupture (with or without chronic pancreatitis) [119–122]. Bridging of complete MPD ruptures is possible in some cases [121,122]. A combination of transmural PPC drainage and a transpapillary stent bridging the MPD rupture may improve success [123]. In a retrospective study of 97 patients with partial or complete MPD rupture treated transpapillarily, factors associated with a successful outcome included a partial MPD rupture, a stent bridging the rupture and a long stenting duration [120]. In a series in which transmural stents were removed once PPC had resolved, half of the PPCs recurred [119]. In contrast, persisting long-term success was reported in 11 of 12 patients who had prolonged stenting [121].

7.5. Complications

Morbidity and mortality of endoscopic PPC drainage are approximately 13% and 0.3%, respectively. Secondary PPC infection may complicate PPC drainage (Evidence level 1+); no data on the efficacy of antibiotic prophylaxis in this setting are available.

The ESGE recommends antibiotic prophylaxis for endoscopic PPC drainage (Recommendation grade D).

Figures stated above were reported in a recent review of 24 studies involving a total of 1126 patients with wide variations in morbidity between studies (3%–34%) [44, 103]. Major complications included hemorrhage, perforation, and infection; most of these were managed by nonoperative means, including local coagulation or arterial embolization for bleeding, repeat endoscopic drainage for secondary infection, and antibiotics for retroperitoneal perforation [99, 124,125]. Antibiotic administration immediately before transmural or transpapillary PPC drainage is recommended in recent guidelines based on expert opinion [126]. The decision about antibiotics continuation after the procedure should be guided by the adequacy of PPC drainage and the presence or absence of necrosis [100].

8. Chronic pancreatitis-related biliary strictures

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8.1. Definitions

Biliary obstruction complicates the course of chronic pancreatitis in 3%–23% of patients [127]. Different cholangiographic types of chronic pancreatitis-related biliary strictures have been described, the type being suggestive of the etiology of biliary obstruction (fibrosis, compression by a pseudocyst or cancer) [128].

8.2. Indications for treatment

The ESGE recommends treating chronic pancreatitis-related biliary strictures in the case of symptoms, secondary biliary cirrhosis, biliary stones, progression of biliary stricture, or asymptomatic elevation of serum alkaline phosphatase (>2 or 3 times the upper limit of normal values) and/or of serum bilirubin for longer than 1 month (Recommendation grade A).

The abovementioned indications are generally accepted [129].

8.3. Methods and results

Temporary placement of simultaneous multiple plastic stents is technically feasible in >90% of patients with benign CBD strictures; it is the endoscopic technique that provides the highest long-term biliary patency rate in chronic pancreatitis-related biliary strictures (65%); complete therapy requires approximately four ERCPs over a 12-month period. Possible stricture relapses after stenting are usually successfully re-treated by ERCP. Temporary placement of single plastic stents provides poorer patency rates; treatment with uncovered SEMSs is plagued with a high long-term morbidity; temporary placement of covered SEMSs is an investigational option (Evidence level 1+). Some series of patients treated with plastic stents for CBD strictures related to alcoholic chronic pancreatitis have been reported to have a relatively high incidence of cholangitis, including fatal cases, due to poor patient compliance with scheduled stent exchanges. Comparative studies of surgical and endoscopic treatments in patients with benign biliary strictures related to a trauma have reported similar long-term results; no comparative data are available for chronic pancreatitis-related biliary strictures (Evidence level 2–).

The choice between endoscopic and surgical treatment should rely on local expertise, local or systemic patient co-morbidities (e.g., portal cavernoma, cirrhosis) and expected patient compliance with repeat endoscopic procedures (Recommendation grade D). If endoscopic therapy is elected, the ESGE recommends temporary (1-year) placement of multiple, side-by-side, plastic biliary stents (Recommendation grade A). *Because of the risk of fatal septic complications, a recall system should be set up to care for patients who do not present for scheduled stent exchanges. In cases of relapsing stricture after stent removal at 1 year, the options available, including surgical biliary drainage, should be evaluated by a multidisciplinary team (Recommendation grade D).*

A malignant etiology of the stricture should always be sought, at least by biliary brushing, as patients treated for supposedly benign chronic pancreatitis-related biliary stricture may have a final diagnosis of malignancy [20,130]. The principle of endoscopic treatment for biliary strictures consists of temporary stricture dilation using plastic stents (single or multiple side-by-side) or covered SEMSs. Definitive SEMS insertion has also been reported. In patients treated with plastic stents, various criteria have been used to decide on when to remove stents, including cholangiogram and a minimum stenting duration of 1 year [131]. Amongst benign biliary strictures, those related to chronic pancreatitis are the most difficult to treat by temporary biliary stenting: strictures less frequently resolve at the time of stent removal and they relapse more frequently during follow-up [130,132]. The presence of pancreatic calcifications has been associated with long-term failure of single plastic biliary stenting [133], but this factor may be less relevant if simultaneous multiple plastic stents are used [134].

Short-term (1-month) results for biliary stenting are similar for plastic stents and SEMSs in all respects, including success rates and complication rates (approximately 5%). For the selection of particular models of stents, the reader is referred to other recent ESGE Guidelines [19,57].

Long-term results of temporary biliary stenting for chronic pancreatitis-related biliary strictures are summarized in ● **Table 4**. Successful treatment was reported in 31% of 350 patients with single plastic stents and 62% of 50 patients with simultaneous multiple plastic stents. A single nonrandomized series has compared long-term results after temporary treatment with single vs. multiple simultaneous plastic stents; it showed overall clinical success in 24% vs. 92% patients, respectively ($P<0.01$), after similar follow-up durations [134].

In series that used simultaneous multiple plastic stents, stent exchanges were scheduled at 3-month intervals and the mean observed stenting duration was 12–21 months (mean number of

Table 4 Selected series of temporary stenting for common bile duct (CBD) strictures in chronic pancreatitis.

First author, year	n	Long-term success, %	Stenting duration, months	Stent dysfunction of any cause per patient, %	Follow-up post stent removal, months	Patients who underwent surgical drainage, %
Single plastic stent						
Deviere, 1990 [155]	25	12	n.a.	72	14	24
Barthet, 1994 [156]	19	10	10	NA	18	21
Smits, 1996 [157]	58	28	10	64	49	28
Vitale, 2000 [158]	25	80[1]	13	20	32	8
Farnbacher, 2000 [159]	31	32	10	52	28	6
Eickoff, 2001 [160]	39	31	9	43	58	28
Kahl, 2003 [133]	61	26	12	34	40	49
Catalano, 2004 [134]	34	24	21	41	50	41
Cahen, 2005 [161]	58	38	9	48	45	28
Multiple plastic stents						
Draganov, 2002 [136]	9	44	14	n.a.	48	n.a.
Pozsar, 2004 [135]	29	60	21	n.a.[2]	12	13
Catalano, 2004 [134]	12	92	14	8	47	8
Covered SEMS						
Cahen, 2008[3] [140]	6	50	5	33	28	17
Behm, 2009[4] [144]	20	80	5	5	22	0
Mahajan, 2009[5] [132]	19	n.a.	3	11	4	n.a.

SEMS, self-expandable metal stent; n.a., not available

[1] The unusually high success rate reported by Vitale et al. was related, according to the authors, to a low prevalence of calcifying chronic pancreatitis in their series (23 % vs. 60 – 70 % in other series).

[2] 20 episodes of cholangitis were reported.

[3] Fully covered Hanaro stent (Hanaro, M.I.Tech Co., Ltd., Seoul, South Korea).

[4] Partially covered Wallstent (Boston Scientific, Natick, Massachusetts, USA).

[5] Fully covered Viabil stent (Conmed, Utica, New York, USA).

ERCPs, 4.0 – 4.7) [134 – 136]. According to a recent retrospective study, the interval between stent exchanges could be extended [137]. However, in patients with alcoholic chronic pancreatitis, compliance with stent exchange may be problematic: in a retrospective series of 14 patients, only two (14.3 %) patients presented for elective stent exchanges although written instructions were given to the patients and primary care physicians for doing so [138]. Another retrospective series reported an observed mean interval between stent exchanges of 6.4 months although these were scheduled at 3-month intervals; there were at least 20 episodes of cholangitis in a total of 29 patients, of which two were fatal [135]. Of note, in the latter series, stents were exchanged at ERCP only if they were clogged. Protocols aiming at lowering stenting duration and/or the number of ERCPs are being explored:

- In patients with biliary strictures complicating orthotopic liver transplantation, plastic stents were exchanged with a higher number of stents every 2 weeks until complete waist disappearance at the level of the anastomosis, and were then left in place for 3 months [139].
- In patients with chronic pancreatitis, temporary treatment with partially or fully covered SEMSs has been reported in small series of patients using different SEMS models and with different results. Limitations include failure to remove stents and short follow-up after covered SEMS removal in currently available studies [140].
- Definitive insertion of uncovered or partially covered SEMS has been abandoned because of disappointing long-term results in benign biliary strictures [141 – 143].

No comparison of various stenting durations has been reported in the literature (scheduled stenting duration with multiple plastic stents and covered SEMSs has generally been for 1 year and for 3 – 6 months, respectively) [132, 134 – 136, 140, 144]. Stent dysfunction has been reported in 8 – 69 % and 5 – 33 % of patients treated with temporary insertion of multiple plastic stents and of covered SEMSs, respectively [132, 134 – 136, 140, 144]. The costs of these two methods have not been compared.

No study has compared endoscopic biliary stenting vs. surgical biliodigestive anastomosis for chronic pancreatitis-related biliary stricture. Two nonrandomized studies have compared endoscopy vs. surgery for the treatment of benign biliary strictures related to trauma (cholecystectomy in most cases). One of these studies reported similar morbidity (35 % vs. 26 %) and absence of stricture relapse (17 % in both groups) during follow-up in 101 patients [145]. The other study found that endoscopic treatment was associated with a higher morbidity rate (45 % vs. 9 %; $P=0.01$), shorter total hospital stay (6 vs. 11 days; $P=0.001$), and similar success at ≥ 5 years (80 % vs. 77 %) in 42 patients [146].

9. Treatment of chronic pancreatitis in children

The main indication for endoscopic therapy of chronic pancreatitis in children is pain. (Evidence level 2 +). After endoscopic therapy for chronic pancreatitis the majority of children have lesser symptoms and less hospital admission during long-term follow-up. The main complication of endoscopic therapy for chronic pancreatitis in children is acute pancreatitis, which is usually mild or moderate. (Evidence level 2 –).

The ESGE recommends endoscopic therapy as a first-line therapy for chronic pancreatitis in children starting at 8 years in the same conditions as in adults (Recommendation grade C).

A recent, retrospective, large Danish study of chronic pancreatitis in young adults (< 30 years old) showed that the standardized prevalence ratio of chronic pancreatitis increased between 1980 – 1984 and 2000 – 2004 [147]. The most frequent etiologies

are idiopathic and genetic; a retrospective case series from Germany found genetic mutations in 30% of 146 patients with chronic pancreatitis younger than 18 years [148]. The disease usually presents as episodes of moderate abdominal pain [149]; a retrospective study showed that, compared with adults, pediatric patients had less severe chronic pancreatitis stages, and a lower prevalence of pseudocysts, of calcifications, and of chronic pancreatitis-related CBD biliary strictures [150].

Three retrospective case series evaluated endoscopic therapy for pain in children with chronic pancreatitis [151–153]. In two studies [151,153], the majority of patients had a subjective improvement of their disease and a decrease in hospital admissions following endoscopic therapy. In the third study, recurrence of a flare of chronic pancreatitis was more frequent after endoscopic as compared with surgical treatment (75% of 12 patients vs. 39% of 25 patients, respectively). Regarding treatment-related complications, mild and moderate acute pancreatitis was encountered in 17% and 6% of cases, respectively [151,153].

10. Use of the Guideline

The disclaimer regarding ESGE guidelines applies to this Guideline [154].

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