Endoscopic treatment of chronic pancreatitis

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SUMMARY

Objectives — Endoscopy offers an alternative to surgery for the treatment of ductal complications in patients with chronic pancreatitis. The aim of this study was to evaluate the efficacy of endoscopic treatment on pain, cholestasis and pseudocysts in these patients.

Patients and methods — Thirty-nine patients (37 M, 2 F, mean age 44), were included in the study. All patients had at least one of the following criteria demonstrated by imaging tests: dilatation of the main pancreatic duct (MPD) with or without stricture (N = 13), bile duct stricture (N = 12), or pancreatic pseudocyst (N = 14) with pancreatic duct stricture (N = 11) or biliary stricture (N = 3). Pancreatic or biliary sphincterotomy, insertion of pancreatic or biliary stent, pseudocyst drainage with stent placement were performed according to ductal abnormalities. Patients were evaluated early and followed up during the stenting period, and after stent removal.

Results — Patients underwent a median of 3.5 endoscopic procedures with an interval of 2.2 months between 2 stenting sessions. A pancreatic or biliary stent was inserted in 25 patients with ductal abnormalities and in 11 patients with pseudocysts. Endoscopic pseudocyst drainage was performed in 6 cases. The mean stenting time was 6 months (range: 3-21). Mean follow-up after stent removal was 9.7 (2-48) months. Complications of endoscopic treatment were encountered in 7% of patients with no deaths. Pain relief was achieved after the first endoscopic procedure and during the overall stenting period in all patients. Recurrence of pain was observed after stent removal in 5/11 patients, requiring surgery in 4. Cholestasis decreased and biochemical values normalized within one month after biliary stenting. Recurrence of cholestasis was observed early after stent removal in 4/9 patients who required complementary surgical treatment. No recurrence of pancreatic pseudocyst was observed after endoscopic drainage and stent removal during the follow-up period.

Conclusions — Endoscopic treatment of pain from pancreatic pseudocysts or ductal strictures is effective in the short-term and in the period of ductal stenting. However, the optimal duration of the latter remains to be determined.
**Introduction**

Chronic pancreatitis (CP) is generally related to excessive chronic consumption of alcoholic beverages and is predominantly observed in young men. Mean age at diagnosis varies from 36 to 55 years in most studies from western countries [1, 2]. After a disease course of 5 to 10 years [3, 4], the main complications of the pancreatic disease include: pain, acute pancreatitis, pancreatic pseudocysts (PPC) with or without ductal rupture, ductal stricture and/or gastrointestinal or vascular compression, and stricture of the main bile duct (MBD) in its intrapancreatic portion. In CP, chronic inflammatory lesions with fibrosis and destruction of the exocrine parenchyma co-exist with dilatation of the pancreatic ducts distal to the obstacle [5, 6]. Pancreatic or biliary bypass procedures were the mainstay of treatment for pancreatic or biliary duct lesions in CP. Current interventional endoscopy offers other alternatives such as: 1) pancreatic sphincterotomy with or without stent insertion for main pancreatic duct (MPD) stricture to relieve pain, 2) transpapillary and/or transgastric or duodenal treatment of symptomatic PPC, 3) dilatation then calibration of the stricture using biliary stents to treat cholestasis resulting from stricture of the MBD. The purpose of this retrospective study was to evaluate the feasibility, efficacy and treatment morbidity of endoscopic treatment in these three indications.

**Material and methods**

Thirty-nine hospitalized patients (37 men and 2 women), mean age 44 years (range: 21-73), who underwent endoscopic treatment for CP between 1995 and 2001 were reviewed retrospectively. The diagnosis of CP was based on the presence of calcifications in the pancreatic region demonstrated by plain abdominal x-ray, ultrasonography, computed tomography (CT) or endoscopic ultrasonography (EUS). In the absence of calcifications at imaging a diagnosis of CP was based on duct lesions seen at endoscopic retrograde cholangiopancreatography (ERCP). The main etiology was excessive alcohol consumption in 37/39 patients (94.9%), associated with pancreas divisum in one patient and annular pancreas in two others. In one patient, CP was related to hypercalcemia in a context of hyperparathyroidism and in another no cause could be identified. Mean time between symptom onset and treatment was 43.6 months (range: 0-288).

All 39 patients (100%) complained of pain which was isolated in 13 (33.3%), and associated with cholestasis in 12 (30.8%) and PPC in 14 (35.9%), including 3 with cholestasis (figure 1).

Morphological explorations with CT or magnetic resonance imaging (MRI) demonstrated the presence of lesions accessible to therapeutic endoscopy (patients with stricture of the distal portion of the MPD were excluded from therapeutic endoscopy). Patients with PPC underwent EUS to determine the distance between the PPC and the digestive tract wall and to assess vascularization of the wall. ERCP (JF 1T10 or FJ 1T20 Olympus®) was performed under general anesthesia. ERCP confirmed lesions of the biliary or pancreatic ducts and enabled therapeutic endoscopy in patients with pancreatic duct dilatation with or without ductal stricture, stricture of the MBD with distal dilatation, or communicating PPC.

Therapeutic endoscopy procedures include: pancreatic or biliary sphincterotomy, bougie or balloon dilatation of MPD or MBD, extraction of stones associated or not with intracorporeal lithotripsy using a Dormia basket, insertion of a pancreatic or biliary stent. Biliary sphincterotomy was performed in all procedures which involved the main pancreatic duct. Before insertion of a pancreatic or biliary stent, the stricture was dilated with a bougie (maximal diameter 9 F) for the pancreatic duct or a balloon (maximal diameter 10 mm) for the biliary duct. Plastic multiperforated 7 F to 9 F stents were inserted in the MBD and 10 F stents in the MBD (Microvasive®). The length of the stent was adapted to the length of the stricture to calibrate. Two plastic stents were inserted for MBD strictures. Ofoxacin (200 mg b.i.d.) was given on the day of the examination and during the two days following endoscopy to all patients. It was planned to leave the pancreatic or biliary stents in place for 12 months but could be it removed earlier if the stricture regressed. Early in the study, stents were replaced every 2 or 3 months, but then only in the event of symptom relapse (pain for pancreatic stents and cholestasis for biliary stents). For non-communicating PPC, cystogastrectomy or cystoduodenostomy was performed, associated or not with insertion of a double pigtail stent. Double pigtail stents were left in place for 1 or 2 months then withdrawn by upper gastrointestinal endoscopy after several ultrasound examinations demonstrating involution of the PPC.

Early efficacy of therapeutic endoscopy was assessed on the basis of results obtained early after the first endoscopic procedure and long-term efficacy on the basis of results assessed monthly during the stenting period and after removal of the stent. Efficacy criteria were: total or partial pain relief, biochemistry markers of cholestasis less than twice the upper limit of normal, and total involution of PPC. Pain was assessed using three levels of intensity: severe, requiring major analgesics or hospitalization; moderate, relieved by usual analgesics, and mild or absent, when no treatment was required. For patients who did not attend follow-up consultations, the primary care physician was contacted to collect follow-up information. A patient was considered to be lost to follow-up if no follow-up information could be obtained.

**Results**

The study cohort included 39 patients (figure 2). Twenty-five patients presented with isolated pancreatic and/or bile duct lesions. Fourteen patients had PPC, which was communicating (N = 8) or not (N = 6). All patients with communicating PPC had stricture and/or dilatation of the MBD, associated in three patients with stricture of the main bile duct. Three of the six patients with non-communicating PPC had stricture and/or dilatation of the MPD (figure 3).

Endoductal therapeutic endoscopy was performed in 25 patients with isolated MBD and/or MBD lesions and in 8 of patients with communicating PPC (with cystogastrectomy in one). Three of the 6 patients with a non-communicating PPC underwent transpapillary therapeutic endoscopy associated in one patient with cystogastrectomy and cystoduodenostomy and pigtail stenting in one other. For the three other patients, cystoduodenostomy alone (N = 1) and cystogastrectomy with double pigtail stenting (N = 2) were performed.

Therapeutic endoscopy was considered incomplete in three patients. In one patient with a communicating PPC, endoductal treatment of the MBD stricture was successful but the pancreatic duct could not be catheterized. In two patients with pancreatic and biliary strictures, transpapillary treatment of the pancreatic stricture was successful but the MBD could not be catheterized. Two patients were excluded from analysis 1 and 4 months after treatment because of suspected pancreatic neoplasm. Seven patients were still under treatment at the end of the study and five patients were lost to follow-up (figure 2).
Endoscopic treatment of chronic pancreatitis

On average, each patient had 3.5 ERCP procedures with a mean interval of 2.2 months between two procedures. Mean stenting duration was 6 months (range: 1-21). Mean follow-up after removal of the stents was 9.7 months (range: 1-48).

Pancreatic sphincterotomy was successful in 37/38 attempts (2.6% failure) and biliary sphincterotomy was successful in 15/17 (11.8% failure). All six cystoenterotomies attempted were successful. Pancreatic or biliary stents were inserted during all successful sphincterotomy procedures.

Treatment of pain

Pain resolved within 4 days following the endoscopic procedure in the 24 patients who underwent therapeutic endoscopy for their pancreatic lesion (not including PPC).

Long-term results (Table I) showed that episodes of recurrent pain were controlled in all cases by changing the stent, performed in 11 patients treated with pancreatic stenting. Stenting or repeated dilatations provided successful pain relief for a mean duration of 8.2 months (range: 3-21) in the 11 patients with MPD stricture. Pain recurred after removal of the pancreatic stent or interruption of the dilatation sessions in 5 of 11 patients (45.5%) who required complementary surgical treatment with a double bypass (N = 3) or a pancreatic duct-jejunum bypass (N = 1). Long-term improvement was not achieved in the fifth patient who declined surgical treatment. At the end of the study, pain was well controlled with major analgesics in this patient. Complete long-term pain relief was effective after therapeutic endoscopy for pancreatic lesions in 9/14 patients (64.3%). Therapeutic endoscopy appeared to be more effective in patients with isolated pancreatic lesions than in those with pancreatic and biliary lesions (83.3% versus 50%).

Table I – Efficacy of endoscopic treatment on pain (pseudocysts excluded).

<table>
<thead>
<tr>
<th>Number of patients</th>
<th>Number of treatments</th>
<th>Long-term efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pancreatic lesions alone</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Pancreatic and biliary lesions</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>14</td>
</tr>
</tbody>
</table>

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Cholestasis regressed in less than one month in the 13 patients who underwent endobiliary prosthesis.

Long-term efficacy of endoductal therapeutic endoscopy for bile duct lesions was assessed in 9 patients (table II). Eight had a MPD stricture and/or dilatation, plus a communicating PPC in two, and one had an isolated stricture of the MBD. Biliary sphincterotomy with insertion of a biliary stent was performed in 9 patients, associated with a pancreatic stent in 7 and pancreatic sphincterotomy in 1. Mean duration of biliary stenting was 8.4 months (range: 3-21). All episodes of recurrent cholestasis were controlled by changing the biliary stent. Mean follow-up after removal of the stents was 16 months (range: 4-48). After removing the stents, cholestasis recurred in 4/9 patients (44.5%) with an associated pancreatic duct stricture. These four patients underwent secondary biloenteral bypass surgery.

### Treatment of pancreatic pseudocysts

Among the 14 patients with PPC, therapeutic endoscopy was performed in one with a communicating PPC. This patient also underwent endoscopic treatment of an associated bile duct stricture and surgical cystogastrostomy. In the other 13 patients, therapeutic endoscopy successfully relieved pain and the cyst disappeared.

Long-term efficacy was assessed in 9 patients. Among the 5 patients with a non-communicating PPC, two underwent cystogastrostomy with double pigtail stenting, one had cystoduodenostomy alone, and two had pancreatic sphincterotomy plus dilatation of a pancreatic duct stricture, associated with pancreatic stenting in one. The double pigtail stents were left in place for on average 2 months. There were no cases of recurrent PPC at mean of 5 months follow-up (range: 1-12). Pain returned in one patient who continued alcohol consumption after pancreatic stenting. There were no cases of recurrent Pain or PPC at a mean of 7.6 months follow-up (range: 3-12). Overall, therapeutic endoscopy for PPC was successful in relieving pain in 8/9 patients (88.9%) and in preventing recurrent PPC in 9/9 (100%).

### Secondary surgery

Secondary surgery (one panceatico-enteric bypass, four entero-biliary bypasses, one double bypass, and one cystogastrostomy) was required after failure of therapeutic endoscopy in 9/25 patients with long-term evaluation (36%).

### Complications of therapeutic endoscopy

The principal complications of the different endoscopic treatments are summarized in table III. Morbidity related to the ther-

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**Table II** – Efficacy of endoscopic biliary drainage on cholestasis.

Efficacité du traitement endoscopique biliaire sur la cholestase.

<table>
<thead>
<tr>
<th>Biliary treatment</th>
<th>Number of patients</th>
<th>Number of treatments</th>
<th>Long-term efficacy N = 9*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biliary lesions alone</td>
<td>1</td>
<td>1</td>
<td>1/1 (100%)</td>
</tr>
<tr>
<td>Biliary and pancreatic lesions</td>
<td>14</td>
<td>12</td>
<td>3/8 (37.5%)</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>13</td>
<td>4/9 (44.4%)</td>
</tr>
</tbody>
</table>

* 4 patients still have a stent in situ

**Table III** – Complications of endoscopic procedures.

Complications des traitements endoscopiques.

<table>
<thead>
<tr>
<th></th>
<th>Simple PS</th>
<th>Simple BS</th>
<th>Simple cystoenterostomy + double pigtail stent</th>
<th>PS + stent</th>
<th>BS + stent</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 121</td>
<td>12</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>67</td>
</tr>
<tr>
<td>Stent occlusion</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Stent migration</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Impaction</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>1 (8%)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Pancreatic abscess/</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3 (4.5%)</td>
<td>1</td>
</tr>
<tr>
<td>infection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute pancreatitis</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ascending cholangitis</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>perforation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1 (8%)</td>
<td>0</td>
<td>0</td>
<td>20</td>
<td>16</td>
</tr>
</tbody>
</table>

Overall:
For 121 procedures
30.6%  

*PS* : pancreatic sphincterotomy

*BS* : biliary sphincterotomy

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The main reason for undertaking therapeutic endoscopy is to control pain, but pain is variable over time and perceived differently in individuals, making the assessment of treatment outcome arduous [22].

In our series, pancreatic stenting or sphincterotomy performed alone were successful in relieving pain in less than 4 days in two-thirds of the patients with long-term assessment. Therapeutic endoscopy appears to be more effective in patients with isolated pancreatic involvement (stricture of the proximal portion of the main pancreatic duct associated with distal dilatation) than in those with associated biliary complications. If long-term relief is not achieved, surgical pancreatico-jejunal bypass is generally proposed. As observed in four of our patients, the initial efficacy of pancreatic stenting in relieving pain is probably a factor predictive of a good outcome of subsequent bypass surgery.

Our results are quite similar to other reports in the literature (table IV) [23-33] showing the early efficacy of therapeutic endoscopy in 81% of patients and long-term efficacy in 61% (range: 24-95%).

The presence of a communicating PPC and MPD stricture near the papilla are the two main morphological factors predictive of effective pain relief after therapeutic endoscopy [31, 33].

The short duration of the pancreatic disease could also be a prognostic factor [29, 31, 33]. Three series reported on a surprising absence of correlation between successful alcohol abstinence and successful therapeutic endoscopy [25, 31, 33]. Most of our patients achieved complete or significant abstinence from alcohol and pain persisted after the end of therapeutic endoscopy sessions in four patients who continued to drink. Abstinence is an indispensable goal, but unsuccessful abstinence is not a contraindication for therapeutic endoscopy.

### Table IV. – Main publications on endoscopic therapy of pancreatic ductal disorders.

<table>
<thead>
<tr>
<th>Authors</th>
<th>Patients N</th>
<th>Type</th>
<th>Success</th>
<th>Immediate pain relief</th>
<th>Follow-up (months)</th>
<th>Late pain relief</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grimm (1989)</td>
<td>70</td>
<td>PS, stent</td>
<td>58%</td>
<td>82%</td>
<td>8 (2-36)</td>
<td>57%</td>
</tr>
<tr>
<td>Cremer (1991)</td>
<td>76</td>
<td>PS, stent</td>
<td>94%</td>
<td>94%</td>
<td>37</td>
<td>94%</td>
</tr>
<tr>
<td>Ponchon (1995)</td>
<td>33</td>
<td>PS, stent</td>
<td>85%</td>
<td>74%</td>
<td>12</td>
<td>53%</td>
</tr>
<tr>
<td>Sauerbruch (1989)</td>
<td>24</td>
<td>PS, stent,</td>
<td>87%</td>
<td>83%</td>
<td>24</td>
<td>50%</td>
</tr>
<tr>
<td>Delhaye (1992)</td>
<td>123</td>
<td>PS, stent,</td>
<td>95%</td>
<td>100%</td>
<td>14</td>
<td>37%</td>
</tr>
<tr>
<td>Schneider (1994)</td>
<td>50</td>
<td>PS, stent,</td>
<td>86%</td>
<td>70%</td>
<td>20</td>
<td>70%</td>
</tr>
<tr>
<td>Binmoeller (1995)</td>
<td>93</td>
<td>PS, stent,</td>
<td>74%</td>
<td>58</td>
<td>64%</td>
<td></td>
</tr>
<tr>
<td>Smits (1995)</td>
<td>51</td>
<td>PS, stent,</td>
<td>96%</td>
<td>81%</td>
<td>64</td>
<td>24%</td>
</tr>
<tr>
<td>Dumonceau (1996)</td>
<td>70</td>
<td>PS, stent,</td>
<td>95%</td>
<td>24</td>
<td>95%</td>
<td></td>
</tr>
<tr>
<td>Adamek (1999)</td>
<td>80</td>
<td>PS, stent,</td>
<td>85%</td>
<td>62%</td>
<td>29</td>
<td>58%</td>
</tr>
<tr>
<td>Heyries (1999)</td>
<td>70</td>
<td>PS, stent,</td>
<td>97% (65 treatments)</td>
<td>97.2% (among 37 patients)</td>
<td>9.7 (0-48) (among 25 patients)</td>
<td>9/14 (64.3%) (excluding pseudocysts)</td>
</tr>
</tbody>
</table>

(PPC excepted.)
In patients with pancreatic cysts or pseudocysts, endoscopic treatment has become the first-intention alternative to surgical drainage. Endoscopic transgastric or transduodenal drainage is possible for non-communicating cysts while transpapillary drainage is indicated for communicating cysts. The two methods can be combined. In reports concerning 191 treatments of pancreatic cysts by cystoenteroscopy [10, 34-38], mean failure rate was 6% (range: 0-15.4%) with 17.3% (range: 0-27.7%) recurrence. Long-term relief was achieved in 78% of patients (range: 51-82%). Complications were hemorrhage, perforation and infection; hemorrhage occurring more often during cystogastronomy than cystoduodenotomy [10]. In a more recent study, treatment of cysts provided early efficacy in 71% of patients with good results maintained in 62% at 46 months [39].

The efficacy of transpapillary treatment of communicating PPC is illustrated by the analysis of 121 cases reported in different series [10, 34, 37, 38, 40, 41]. Symptoms resolved in 87.2% of patients and cyst healing was achieved in 84.3% (range: 76-94%). Mean morbidity (infectious complications and acute pancreatitis) was 10% with secondary surgery required in 10.8% (range: 9-50%). In our series, endoscopic drainage of the PPC was successful in relieving pain in 90% of patients and in preventing recurrent cyst formation in 100%. The indications for therapeutic endoscopy for PPC are well defined: symptomatic or asymptomatic PPC measuring more than 4 cm and extrapancreatic extension. These two elements favor the persistent of symptoms and development of complications [42].

Use of endoscopy to treat strictures of the MBD in patients with pancreatitis is still a controversial issue. Debate concerns the expected results and the type of stent to use [43-47]. In recent series [12, 44, 45], therapeutic endoscopy has been successful in 10 to 28% of patients at mean 14 to 49 months. More than two-thirds of the patients had surgical biliary bypass or prolonged stenting due to rapid recurrence of cholestasis after stent removal. In the study reported by Vitale et al. [45], therapeutic endoscopy was effective in 80% of patients who underwent systematic balloon dilatation of the MBD before insertion of the stent. Mean stenting period in these patients was 13.3 months (range: 3-38). Our results (44.5% success rate) with the same protocol do not confirm this good rate achieved in a series of patients where the severity of the pancreatic disease was not described. Therapeutic endoscopy for biliary strictures appears to be less effective in patients with advanced-stage pancreatic disease or both biliary and pancreatic strictures. In our series, complications were mainly stent migration (11%) and obstruction (30.5%). The current plastic stents appear to be poorly adopted for long-term stenting. Devière et al. [46] used self-expanding metal stents and obtained favorable results in 90% of patients. Use of these non-extractable stents for benign stricture would however be questionable and in our opinion cannot be recommended.

Several randomized surgical studies have compared different surgical techniques [48-50] but there is no randomized comparison between the endoscopic and surgical options, probably because these two methods are complementary. Pancreatico-jejunal bypass is probably the closest to endoscopic pancreatic stenting. The different reported series show that surgical pancreatico-jejunal bypass is probably superior (79%, range 26-85%) to endoscopic stenting (61%, range: 24-95%) [50-52].

Follow-up has been longer with surgical series (47-96 months versus 12-94 months). Use of surgical resection for CP remains controversial. Several techniques can be used: Whipple procedure with or without preservation of the pylorus, Berger or Frey procedures which spare the duodenum [48, 49]. At the present time, pancreatic resection is reserved for patients whose MPD is not sufficiently dilated (<6-8 mm) to enable bypass surgery or for patients with suspected neoplasia. Despite the good results in terms of pain relief and weight gain, this type of intervention should be reserved for failure of conservative surgery or therapeutic endoscopy, or in selected patients suffering from severe pain without dilatation of the main pancreatic duct.

Results of endoscopic and surgical treatment of PPC are comparable in terms of efficacy and morbidity [10]. It is generally accepted that surgical drainage is not contraindicated after first-intention endoscopic treatment of PPC.

Results of therapeutic endoscopy for biliary stricture secondary to CP have been rather disappointing with the current techniques. Improvement is generally temporary, particularly in patients with both pancreatic and biliary strictures. In such patients, and considering our current technical possibilities, endoscopic treatment of MBD stricture should be reserved for patients with a temporary or definitive contraindication to surgery.

Our study confirmed the role of first-intention endoscopic treatment of pancreatic pseudocysts and ductal complications. Favorable outcome can be achieved with a small number of interventions and morbidity is low. Therapeutic endoscopy does not contraindicate later bypass surgery and early success is predictive of good outcome after surgical bypass. Therapeutic endoscopy appears to provide superior results for short isolated strictures of the cephalic portion of the main pancreatic duct. Controlled trials are however needed to assess mean duration of stenting. Endoscopic treatment of MBD complications of chronic pancreatitis is less satisfactory with current techniques and further evaluation is necessary.

RÉFÉRENCES


