Abstract

AIM: To describe the dietary recommendations of experienced endoscopists for patients who have undergone endoscopic retrograde cholangiopancreatography (ERCP) and the factors that influence these recommendations.

METHODS: Selected U.S. endoscopists with ERCP experience were surveyed by e-mail. A questionnaire with three hypothetical ERCP cases of patients at low, medium and high risk for development of post-ERCP pancreatitis (PEP) was shown. For each scenario, respondents were asked to recommend a post-procedure diet and time to first oral intake. Respondents were also asked about the effect of various clinical factors on their recommendations, including risk of PEP.

RESULTS: 97/187 selected ASGE members (51.9%) responded. When risk of PEP was either low, medium or high, 53%, 88% and 96% recommended a diet of clear liquids/NPO respectively, and 2%, 5% and 18% recommended delaying first oral intake until the following day. About 88% of respondents gave the same type of diet to patients at high as those with moderate-risk of PEP (P = 0.04). However, 37% and 43% of respondents gave different types of diet to patients at low vs moderate-risk and low-risk vs high-risk of PEP respectively (P < 0.001). No statistically significant associations were found regarding the effect of other clinical factors or respondent demographics.

CONCLUSION: Most experienced endoscopists limit diet to NPO/clear liquids after ERCP for patients at high or moderate risk of post-ERCP pancreatitis. About half allow a low-fat or regular diet in patients at low risk.
INTRODUCTION

Since the first report of endoscopic retrograde cholangiopancreatography (ERCP) and endoscopic sphincterotomy in 1974[1,2], there have been numerous advances in ERCP technique. Despite these advances, ERCP still causes significant morbidity[3]. Following ERCP, complications occur at rates of 5%-30%[3,4]. Pancreatitis, perforation, cholangitis and post-sphincterotomy bleeding are the most common complications. Most of these adverse events are diagnosed during the first 24 h after the procedure. Abdominal pain is common after ERCP and is not considered a complication; however pain may be a symptom of other post-ERCP complications.

The decision about when and how to feed patients after ERCP, although empirical, is likely based on the presence of risk factors for complications as well as post-ERCP symptoms. There may be a reluctance to begin feeding early after ERCP because of fear of precipitating post-ERCP pancreatitis or when abdominal pain occurs in the post-procedure recovery area.

There are no guidelines about timing and type of diet that should be prescribed after ERCP. The only randomized prospective study published about this issue concluded that in the absence of any perforation or severe acute pancreatitis, feeding could be initiated early[5]. However, it is not known what post-ERCP dietary practices are used in the U.S. and what factors influence these practices. Therefore, we undertook a survey of selected endoscopists with the U.S. who are ASGE members to better understand these practices.

MATERIALS AND METHODS

A total of three e-mail surveys comprised of three hypothetical cases of ERCP were sent to 187 physicians identified from the ASGE directory that were known or believed to perform ERCP as a substantial part of their practice. The first e-mail included a notice about the upcoming survey. The second e-mail contained the survey itself and the third e-mail was sent as a reminder to complete the survey.

The hypothetical cases contained within the survey were outpatients who underwent ERCP and were designed to be at low, medium, and high risk for post-ERCP pancreatitis based on previously defined criteria[7,8]. The high-risk scenario described a 21 year old woman with suspected sphincter of Oddi dysfunction who underwent multiple pancreatic duct injections, biliary sphincterotomy and placement of a prophylactic pancreatic stent. The moderate-risk scenario described a 56 year old woman who underwent biliary sphincterotomy and removal of a bile duct stone with one minimal pancreatic duct injection. The low-risk scenario described an 86 year old man with painless jaundice due to pancreatic cancer who underwent biliary metal stent placement with no pancreatic duct injection. The three cases were sent in randomized order to reduce bias. The physicians were not specifically alerted to the risk of pancreatitis nor that was this risk hypothesized to be a major factor in timing and type of diet prescribed.

For each scenario, respondents were asked to recommend a type of post-procedure diet (clear liquids until the next morning, low fat diet until the next morning, regular diet or other) and time to first oral intake after discharge (4, 6, 12 or 24 h). Questions were also asked about physician demographic data and the respondent’s opinion regarding the importance of five clinical factors when recommending a post-ERCP diet (1) risk of post-ERCP pancreatitis; (2) risk of other post-ERCP complications; (3) post-ERCP symptoms; (4) patient’s co-morbid medical illnesses; and (5) inpatient versus outpatient status.

Statistical analysis

Since each physician respondent answered the same questions for each of three scenarios, the data were considered paired. For statistical comparisons the recommended diet was grouped as: NPO/clear liquids versus low-fat/normal diet. Similarly, timing of the recommended diet was also grouped as: begin immediately/4 h later/6 h later vs 12 h later/24 h later. The three pair-wise comparisons of recommended diets (high-risk vs moderate-risk, high-risk vs low-risk and moderate-risk vs low-risk) were done using McNemar’s test for paired contingency tables. The percentage of discordant recommendations in these contingency tables is also reported, i.e. the off-diagonal cells in the tables.

The associations of physician factors with discordant diet recommendations for pairs of patients were examined (in the 2 × 2 contingency table cross-tabulating the recommendations, the number of discordant pairs is the sum of the off-diagonal cells). The associations between physician factors: years of ERCP experience (≤ 15 years vs ≥ 15 years), number of ERCPs done per year (≤ 250 vs ≥ 250), physician age (< 45 years vs 45-54 years vs ≥ 55 years), and physician’s practice location within the United States (northeast vs southeast vs southwest vs northwest) with diet recommendations for a pair of patients (categorized as discordant vs concordant) were examined using a Chi-square or Fisher exact test as appropriate.

In the same way as physician factors were examined for association with discordant vs concordant recommendations in patient pairs, the importance of patient factors in making diet recommendations was examined with regard to the 5 factors listed previously in the methods section. Possible responses to each of these questions was “very important”, “somewhat important”, “neither important nor unimportant”, “somewhat important” and “very important”. For analysis purposes these responses were grouped as important if answered either “very important” or “somewhat important” and not important otherwise.

The significance level was set at 0.05 for statistical significance. Because of the exploratory nature of the analysis, all P-values reported in the manuscript are not adjusted for multiple comparisons.

RESULTS

Ninety-seven of 187 physicians (51.9%) answered the survey. Table 1 shows the demographics of the respon-
Tables 2 and 3 show overall results regarding type of diet and time to first oral intake recommended by respondents in relation to the risk of post-ERCP pancreatitis. When risk of post-ERCP pancreatitis was either low, medium or high, 53%, 88% and 96% recommended a diet of clear liquids/NPO respectively and 2%, 5% and 18% recommended delaying first oral intake until the following day.

Tables 4 and 5 show analysis based on the paired nature of the study data. Table 4 shows how often individual respondents changed their recommended diet type based on differences in the patient scenarios. About 88% of respondents gave the same type of diet to patients at high risk of post-ERCP pancreatitis (P = 0.04). However, 37% and 43% of respondents gave different types of diet to patients at low vs moderate-risk and low-risk vs high-risk of post-ERCP pancreatitis respectively (P < 0.001). This shows that respondents tended to prescribe the same diet (usually NPO or clear liquids) to patients at high and moderate-risk but were more apt to prescribe a solid diet for patients at low-risk of post-ERCP pancreatitis.

Table 5 shows how often individual respondents changed their recommended time to first oral intake based on differences in the patient scenarios. This shows that most respondents did not vary their recommendations regarding timing of first oral intake between scenarios. Approximately 20% of physicians did change their recommendations based on patient scenario, in most cases delaying oral intake in patients at high-risk of post-ERCP pancreatitis but not in patients at low or moderate risk.

An analysis was done to examine whether physicians were more likely to change their diet type or timing recommendations based on their age, practice location, number of ERCPs they perform per year or years of ERCP experience (Tables 6 and 7). No statistically significant associations were observed. Additionally, an analysis was done to evaluate whether changes in diet type and timing recommendations were attributable to a physician's views on the importance of various clinical factors, including risk of post-ERCP pancreatitis, risk of other post-ERCP complications, post-ERCP symptoms, patient co-morbid medical illnesses and inpatient/outpatient status (Tables 8 and 9). No statistically significant associations were observed.

**DISCUSSION**

The endoscopists’ decision as to when and how to begin oral intake after a seemingly uncomplicated ERCP is largely based upon training and personal experience. There are theoretical considerations but essentially no empirical data to provide guidance. We believe that there are several clinical factors that affect dietary recommendations after ERCP. In this survey, we sought to determine practice patterns of selected American endoscopists regarding type and timing of diet after ERCP. Although we did not specifically cite the risk of post-ERCP pancreatitis, it is unlikely that ERCP complications, post-ERCP symptoms, patient co-morbid medical illnesses and inpatient/outpatient status are independent variables that would not be associated with the type and timing of post-ERCP dietary recommendations.

We found that about 88% of physicians recommended that patients at moderate and high risk of developing post-ERCP pancreatitis should be kept NPO or given clear liquids. In patients at high-risk of post-ERCP pancreatitis, approximately 20% of physicians recommend delaying time to first oral intake for at least 12 h after discharge. On the other hand, for patients who were at low risk of post-ERCP pancreatitis, about 40% of physicians varied their recommended type of post-procedure diet. In this scenario a solid diet was recommended more frequently and only 3% delayed first oral intake for at least 12 h.

We were unable to demonstrate that respondents’
changes in dietary recommendations were based on their general views regarding the importance of various clinical factors; however, this was probably because the great majority of respondents indicated that the risk of post-

ERCP pancreatitis was an important determinant of post-procedure diet, regardless of whether they changed their recommendations from scenario to scenario. No statistically significant associations were found between recommendations and other factors such as age of physician, number of ERCPs performed per year, or residency location.

### Table 4: Paired diet recommendations by patient scenario

| Scenario          | Diet Recommendation | % who changed recommendation based on scenario |
|-------------------|---------------------|---------------------------------------------|
|                    | NPO/CL              | L-F/Normal                                  |
| Moderate risk      | 83                  | 10                                          |
| High risk          | 2                  | 2                                           |
| Low risk           |                     |                                             |
| High risk          | 51                 | 42                                          |
| Low risk           | 0                  | 4                                           |
| Mod risk           | 30                 | 35                                          |

Significance: McNemar test; CL: clear liquids; L-F: low-fat; NPO: nil per os.

### Table 5: Paired time to first oral intake recommendations by patient scenario

| Scenario          | Time to first oral intake | % who changed recommendation based on scenario |
|-------------------|---------------------------|---------------------------------------------|
|                    | Not delayed | Delayed | Not delayed | Delayed | Not delayed | Delayed | Not delayed | Delayed | Not delayed | Delayed |
| Moderate risk      | 73          | 16      | 1           | 7       |
| High risk          | 74          | 20      | 0           | 3       |
| Low risk           | 88          | 6       | 1           | 2       |

Significance: McNemar test.

### Table 6: Diet type recommended based on age, practice location, number of endoscopic retrograde cholangiopancreatographies performed per year and years of endoscopic retrograde cholangiopancreatography experience of respondents

| Physician characteristic | Total number of pairs | Risk of post-ERCP pancreatitis |
|---------------------------|-----------------------|--------------------------------|
|                           |                       | High vs medium | High vs low | Medium vs low |
|                           |                       | Number with different recommendations | Number with different recommendations | Number with different recommendations |
|                           |                       | n (%) | P-value | n (%) | P-value | n (%) | P-value |
| ERCP experience           | ≤ 15 yr               | 36    | 11%)   | 17 (47) | 0.49    | 17 (47) | 0.09    |
|                           | > 15 yr               | 60    | 13 (%)  | 24 (40) | 0.49    | 18 (30) | 0.09    |
| Number of ERCPs/year      | ≤ 250                 | 48    | 12 (%)  | 21 (44) | 0.93    | 15 (31) | 0.24    |
|                           | > 250                 | 49    | 12 (%)  | 21 (43) | 0.93    | 21 (43) | 0.24    |
| Age of physician          | ≤ 45                  | 50    | 10 (%)  | 15 (39) | 0.39    | 16 (33) | 0.24    |
|                           | ≥ 55                  | 18    | 17 (%)  | 8 (44)  | 0.62    | 5 (28)  | 0.20    |
| Residency of physician    | NE                    | 47    | 11 (%)  | 23 (49) | 0.49    | 22 (47) | 0.24    |
|                           | SE                    | 13    | 15 (%)  | 5 (38)  | 0.38    | 3 (23)  | 0.38    |
|                           | SW                    | 13    | 23 (%)  | 8 (62)  | 0.58    | 5 (38)  | 0.38    |
|                           | NW                    | 21    | 10 (%)  | 6 (29)  | 0.24    | 6 (29)  | 0.36    |

Significance: McNemar test; CL: clear liquids; L-F: low-fat; NPO: nil per os.
Table 7 Timing of resumption of diet recommended based on age, practice location, number of endoscopic retrograde cholangiopancreatographies performed per year and years of endoscopic retrograde cholangiopancreatography experience of respondents

| Physician characteristic | Total number of pairs | Risk of post-ERCP pancreatitis |
|--------------------------|-----------------------|--------------------------------|
|                          |                       | High vs medium | High vs low | Medium vs low |
|                          |                       | Different timing recommendation | n (%) | P-value | n (%) | P-value | n (%) | P-value |
| ERCP experience | ≤ 15 yr 36 | 8 (22) | 9 (25) | 1 (3) |
| Number of ERCPs/year | ≤ 250 48 | 7 (15) | 8 (17) | 1 (2) |
| Age of physician | < 45 30 | 6 (20) | 6 (20) | 0 (0) |
| Residency of physician | NE 47 | 11 (23) | 14 (30) | 5 (11) |
|                         | SE 13 | 2 (15) | 3 (23) | 1 (8) |
|                         | SW 13 | 2 (15) | 2 (15) | 0 (0) |
|                         | NW 21 | 2 (21) | 1 (5) | 1 (5) |

Significance of the association between physician variable and recommendation of different timing for the recommended diets assessed using a Chi-square or Fisher’s exact test as appropriate. Timing dichotomized as: Immediate/4h/6h vs 12h/24h, to define “Different Timing Recommended”; Not completed for 1 physician; Not completed for 3 physicians; ERCP: endoscopic retrograde cholangiopancreatography.

Table 8 Diet type recommended based on clinical factors considered important or not by the respondents

| Clinical factors | Total number of pairs | Risk of post-ERCP pancreatitis |
|------------------|-----------------------|--------------------------------|
|                  |                       | High vs medium | High vs low | Medium vs low |
|                  |                       | Number with different recommendations | n (%) | P-value | n (%) | P-value | n (%) | P-value |
| Risk of post-ERCP pancreatitis | Important 12 | 2 (17) | 4 (33) | 2 (17) |
|                  | Unimportant 84 | 10 (12) | 38 (45) | 34 (40) |
| Risk other post-ERCP complication | Important 29 | 3 (10) | 12 (41) | 9 (31) |
|                  | Unimportant 67 | 9 (13) | 30 (45) | 27 (40) |
| Post-ERCP symptoms | Important 11 | 1 (9) | 2 (18) | 3 (27) |
|                  | Unimportant 85 | 11 (13) | 40 (47) | 33 (39) |
| Patient co-morbid medical illnesses | Important 60 | 9 (15) | 27 (45) | 24 (40) |
|                  | Unimportant 35 | 3 (9) | 15 (43) | 12 (34) |
| Inpatient/outpatient status | Important 60 | 6 (10) | 26 (43) | 24 (40) |
|                  | Unimportant 34 | 5 (15) | 15 (44) | 12 (35) |

Significance of the association between physician variable and recommendation of different timing for the recommended diets assessed using a Chi-square or Fisher’s exact test as appropriate. When the risk of complications is high, limiting diet to clear liquids on the day of the procedure is recommended by the majority of respondents in this practice location.

In a study designed to address dietary intake after ERCP, Barthet et al. randomized patients to early refeeding (4 h after ES - group 1) and later refeeding (24 h after procedure - group 2). Unfortunately, the type of diet prescribed in this study was not given. Abdominal pain was less prevalent in group 1 (11% vs 37%) while abdominal pain associated with oral intake was observed with higher frequency in group 2 (6.8% vs 17.8%). Finally, the mean hospital stay was significantly shorter in the early refeeding group. The authors conclude that in the absence of perforation or severe acute pancreatitis, early refeeding would be recommended.

When deciding about timing and type of diet to give patients after ERCP, physicians likely consider the patient’s risk of complications (especially post-ERCP pancreatitis), how well the procedure went (difficult cannulation, pancreatic injection etc), the complexity and risk of interventions (such as ampullectomy) and whether the patient has symptoms following the procedure. Since more than 2/3 of patients develop symptoms during the first 6 h post-procedure and the presence of symptoms is a poor predictor of complications, the presence or absence of symptoms is not adequate to guide dietary recommendations. When the risk of complications is high, limiting diet to clear liquids on the day of the procedure is recommended by the majority of respondents in this practice location.
Table 9  Timing of resume diet recommended based on clinical factors considered important or not by the respondents

| Clinical factors | Total number of pairs | High vs medium Risk of post-ERCP pancreatitis |
|------------------|-----------------------|-----------------------------------------------|
|                  |                       | Number with different recommendations | P-value | Number with different recommendations | P-value | Number with different recommendations | P-value |
| Risk of post-ERCP pancreatitis | Important | 14 | 1 (7) | 0.15 | 1 (7) | 0.15 | 0 (0) | 0.00 |
|                  | Unimportant | 81 | 16 (20) | 0.45 | 19 (23) | 0.29 | 7 (9) | 0.59 |
| Risk other post-ERCP complication | Important | 26 | 4 (15) | 0.10 | 5 (15) | 0.07 | 2 (8) | 0.14 |
|                  | Unimportant | 70 | 13 (19) | 1.00 | 16 (23) | 0.42 | 5 (7) | 1.00 |
| Post-ERCP symptoms | Important | 12 | 1 (8) | 0.00 | 0 (0) | 0.00 | 1 (8) | 0.00 |
|                  | Unimportant | 84 | 16 (19) | 0.69 | 20 (24) | 0.07 | 6 (7) | 1.00 |
| Patient co-morbid medical illnesses | Important | 65 | 11 (17) | 0.77 | 12 (18) | 0.41 | 5 (8) | 0.07 |
|                  | Unimportant | 31 | 6 (19) | 0.04 | 8 (26) | 0.59 | 2 (8) | 0.14 |
| Inpatient/outpatient status | Important | 65 | 8 (12) | 0.04 | 11 (17) | 0.59 | 5 (8) | 0.07 |
|                  | Unimportant | 30 | 9 (30) | 0.04 | 9 (30) | 0.15 | 2 (7) | 1.00 |

'Significance of the association between physician importance answers and recommendation of different diets assessed using a Chi-square or Fisher's exact test as appropriate. "Recommended diet dichotomized as NPO/Clears vs Low-Fat/Normal to define "Different Recommendation" importance dichotomized as: Very/Somewhat Important → "Important" vs Neither/Somewhat/Very Unimportant → "Unimportant"; Not completed for 1 physician; Not completed for physicians; ERCP: endoscopic retrograde cholangiopancreatography.

study. Prospective, controlled studies comparing post-ERCP dietary strategies are warranted.

**COMMENTS**

**Background**
Pancreatitis is a complication that occurs in up to 20% of patients following endoscopic retrograde cholangiopancreatography (ERCP). ERCP is a procedure that is used to diagnose and treat disorders of the bile and pancreatic ducts. Pancreatitis is an inflammation of the pancreas. It can range from mild to severe. It is unknown if the type of diet and when it is started after ERCP influences the risk of post-ERCP pancreatitis. It is assumed that a low-fat diet may be preferable in high-risk patients because fat causes stimulation of the pancreas.

**Research frontiers**
There is relatively little information in the literature about post-ERCP pancreatitis and diet. A previous study randomly assigned patients who underwent ERCP to begin eating either 4 h or 24 h after the procedure. There was no difference in the overall complication rate between the two groups.

**Innovations and breakthroughs**
This article is unique because the authors created a survey from experienced endoscopists on when and what to feed patients after ERCP. In the survey, three fictional patients were presented. The three patients had differing risks of post-ERCP pancreatitis. One was at low risk, one was at high risk and one was at medium risk. They found that most endoscopists recommend a clear liquid diet or low-fat diet at 12-24 h (no intake until then) in patients at high risk for post-ERCP pancreatitis and a regular diet sooner for patients at low risk. Although the survey did not inform the physicians that we were asking for their opinion based upon the risk of pancreatitis, most responders admitted that the risk of pancreatitis played a major factor in choice of diet.

**Applications**
The authors believe that physicians who are less experienced will read this article and change their practice based upon what experts in the field recommend. They also believe that this article will lead to other studies on the effect that diet has on post-ERCP pancreatitis, especially in high risk patients.

**Terminology**
The readers need to understand what ERCP is and what causes pancreatitis after the procedure. The also need to know what pancreatitis is and how the severity of the disease varies.

**Peer reviews**
This is a very well written paper focused on a relevant topic that has never been properly investigated. In my opinion, this article will promote future investigations on how to feed patients after ERCP and deserves publication.

**REFERENCES**

1. Classen M, Demling L. [Endoscopic sphincterotomy of the papilla of vater and extraction of stones from the choledochal duct (author's transl)]. *Dtsch Med Wochenschr* 1974; 99: 496-497
2. Kawai K, Akasaka Y, Murakami K, Tada M, Koli Y. Endoscopic sphincterotomy of the ampulla of Vater. *Gastrointest Endosc* 1974; 20: 148-151
3. Andriulli A, Loperfido S, Napolitano G, Niro G, Valvano MR, Spirito F, Pilotto A, Forlano R. Incidence rates of post-ERCP complications: a prospective study. *Am J Gastroenterol* 2007; 102: 1781-1788
4. Freeman ML, Nelson DB, Sherman S, Haber GR, Herman ME, Dorsher PJ, Moore JP, Fennerty MB, Ryan ME, Shaw MJ, Lande JD, Pheley AM. Complications of endoscopic biliary sphincterotomy. *N Engl J Med* 1996; 335: 909-918
5. Freeman ML, DiSario JA, Nelson DB, Fennerty MB, Lee JC, Bjorkman DJ, Overby CS, Aas J, Ryan ME, Bochna GS, Shaw MJ, Snady HW, Erickson RV, Moore JP, Roel JP. Risk factors for post-ERCP pancreatitis: a prospective, multicenter study. *Gastrointest Endosc* 2001; 54: 425-434
6. Masci E, Totti C, Mariani A, Curioni S, Lomazzi A, Dinelli M, Minoli G, Cresta C, Comin U, Fertitta A, Prada A, Passoni GR, Testoni PA. Complications of diagnostic and therapeutic ERCP: a prospective multicenter study. *Am J Gastroenterol* 2001; 96: 417-423
7. Vandervoort J, Soetikno RM, Tham TC, Wong RC, Ferrari AP Jr, Montes H, Roston AD, Sliwka A, Lichtenstein DR, Ruymann FW, Van Dam J, Hughes M, Carr- Locke DL. Risk factors for complications after performance of ERCP. *Gastrointest Endosc* 2002; 56: 652-656
8. Barthet M, Desjeux A, Gasmi M, Bellon P, Hoi MT, Salducci J, Grimaud JC. Early refeeding after endoscopic biliary or pancreatic sphincterotomy: a randomized prospective study. *Endoscopy* 2002; 34: 546-550
9. Cheng CL, Sherman S, Watkins JL, Barnett J, Freeman M, Geenen J, Ryan M, Parker H, Frakes JT, Fogel EL, Silverman WB, Dua KS, Aliperti G, Yakshe P, Uzer M, Jones W, Goff J, Lazzell-Pannell L, Rashdan A, Temkit M, Lehman GA. Risk factors for post-ERCP pancreatitis: a prospective multicenter study. *Am J Gastroenterol* 2006; 101: 139-147
10. Williams EJ, Taylor S, Fairclough P, Hamlyn A, Logan RF, Martin D, Riley SA, Veitch P, Wilkinson ML, Williamson PR,
Lombard M. Risk factors for complication following ERCP; results of a large-scale, prospective multicenter study. *Endoscopy* 2007; 39: 793-801

11 Freeman ML, Guda NM. Prevention of post-ERCP pancreatitis: a comprehensive review. *Gastrointest Endosc* 2004; 59: 845-864

12 Cooper ST, Slivka A. Incidence, risk factors, and prevention of post-ERCP pancreatitis. *Gastroenterol Clin North Am* 2007; 36: 259-276, vii-viii

13 Freeman ML, Nelson DB, Sherman S, Haber GB, Fennerty MB, Disario JA, Ryan ME, Kortan PP, Dorsher PJ, Shaw MJ, Herman ME, Cunningham JT, Moore JP, Silverman WB, Imperial JC, Mackie RD, Jamidar PA, Yakshe PN, Logan GM, Pheley AM. Same-day discharge after endoscopic biliary sphincterotomy: observations from a prospective multicenter complication study. The Multicenter Endoscopic Sphincterotomy (MESH) Study Group. *Gastrointest Endosc* 1999; 49: 580-586

S- Editor Zhang HN  L- Editor Roemmele A  E- Editor Liu N