

Is duodenal diverticulum a risk factor for sphincterotomy?

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SUMMARY It is uncertain whether ERCP and associated procedures are more difficult when the papilla is inside or adjacent to a duodenal diverticulum. We have therefore reviewed the data from 2458 consecutive, prospectively reported ERCPs between November 1983 and March 1988. Three hundred and eight patients (12.5%) had periampullary diverticula and in 21 the papilla was located deep within the diverticulum of whom 227 had undergone endoscopic sphincterotomy (73.7%). Comparison was made with the 2150 patients without diverticula of whom 1223 (56.9%) had undergone sphincterotomy. The success rate of specific duct cannulation was 94.2% in the diverticulum group and 96.7% in those without diverticula ($p < 0.05$). The overall success rate of endoscopic sphincterotomy was 95.2% in the diverticulum group, as compared with 98.0% in those without diverticula ($p < 0.05$). The procedure related morbidity and mortality of sphincterotomy were 5.2%/0.9% and 4.0%/0.7% respectively (NS). If only those who had successful cholangiography were included there was no difference in sphincterotomy success between those with and without diverticula. The group of patients with papilla deep within diverticula had a slightly higher failure rate of pure endoscopic sphincterotomy (11.8% v 5.7%: NS) but did not have a higher complication rate. In the subgroup of patients with choledocholithiasis, duct clearance of stones was as successful after sphincterotomy in those with diverticula as in those without. Medium term complications (mean 26 months) occurred in 1.4% of patients with diverticula and in 0.7% of patients without diverticula. We conclude that diagnostic cholangiography is more difficult when the papilla is closely associated with a diverticulum but that if diagnostic cholangiography is obtained, sphincterotomy may be performed as successfully and as safely in those with or without diverticula.

A periampullary diverticulum may be endoscopically defined as a mucosal outpouching either directly adjacent to or containing the papilla or intramural common bile duct. Cannulation of the papilla of Vater for endoscopic retrograde cholangiography (ERCP) has traditionally been assumed to be more difficult in the presence of these diverticula,¹⁻⁴ yet the failure rate of diagnostic ERCP was recently reported to be similar in patients with and without diverticula.⁵ Moreover, the differential failure and early complication rates of endoscopic sphincterotomy in patients with and without duodenal

diverticula remain unclear. To study these problems further we first assessed the failure rate of diagnostic ERCP and endoscopic sphincterotomy in patients with and without periampullary diverticula and second, reviewed the short and medium term complications of sphincterotomy in the two populations.

Methods

PATIENTS

Between November 1983 and March 1988, 2458 patients underwent ERCP at the Middlesex Hospital. The indication (intention to treat) (Table 1) for the procedure, the result of the procedure, the performance and success of sphincterotomy and the

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Accepted for publication 16 November 1988.

Table 1 Indications for endoscopic sphincterotomy

Indication	No of patients (%) with DD (n=227)	No of patients (%) without DD (n=447)
Choledocholithiasis with gall bladder <i>in situ</i>	126 (55.5)	240 (53.6)
Choledocholithiasis after cholecystectomy	64 (28.2)	129 (28.8)
Common bile duct dilatation	13 (5.7)	27 (6)
Insertion of endoprostheses	15 (6.6)	41 (9.1)
Papillary stenosis	4 (1.8)	4 (0.9)
Sclerosing cholangitis	2 (0.9)	3 (0.7)
Papillary carcinoma	2 (0.9)	2 (0.4)
Sump syndrome	1 (0.4)	1 (0.2)

presence or absence of a periampullary diverticulum were recorded prospectively on a computer program (PEDRO). Although not specifically demanded by the program, the endoscopists indicated whether the papilla was located deep within the diverticulum on the written report. The diagnostic procedure was considered to be successful when either biliary tree or pancreatic duct opacification was required and achieved and the sphincterotomy was deemed successful if a cut of sufficient size for desired therapy was achieved.

Three hundred and eight of the 2458 patients were reported to have periampullary diverticula. Two hundred and twenty seven of these patients, and 1223 of the 2150 without diverticula, underwent attempted endoscopic sphincterotomy. A random consecutive subgroup of 447 patients from the latter 1223 was selected from the computer for close follow up, together with the 227 diverticula patients. The sex ratios (M:F 1:1.2) and the mean ages (75 years; range 27–100) were similar in both groups. Three patients in either group were treated using the combined percutaneous endoscopic technique.⁶ Information was obtained by review of the inpatient notes and by correspondence with the referring consultant and general practitioner. Full follow up was available in 94% of diverticulum patients and 98% of those without a diverticulum.

Statistical analysis was carried out by a χ^2 test and correlation coefficient and regression analysis.

Results

The prevalence of periampullary diverticula increased with age (Figure). Twenty one patients had papilla within diverticula. In patients with and without periampullary diverticula, desired duct cannulation was eventually successful in 94.2% (290/308) and 96.7% (2078/2150) respectively ($p < 0.05$). In the diverticula group, cannulation was achieved at

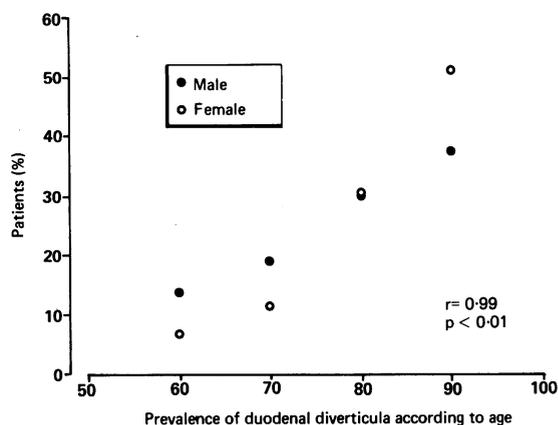


Figure Diagram showing the increased prevalence of duodenal diverticulosis with age.

the first attempt in 237/308 (76.9%), at the second attempt in 39 (12.7%) and at the third attempt in 14 (4.6%) (cumulative success rate 94.2%).

Sphincterotomy was successful in patients with periampullary diverticula at the first attempt in 76.2%, at the second in 15.4%, and at the third attempt in 3.5% (cumulative success rate 95.2%) and in those without diverticula in 81.6%, 12.5%, and 3.9% respectively (cumulative success rate 98.0%). The failure rate of sphincterotomy in patients with duodenal diverticula was thus 11/227 (4.8%) and in those without diverticula was 9/447 (2.0%) ($p < 0.05$). Of the group with failed sphincterotomy, three of the patients with diverticula (1.1%) and five of the patients without (1.3%) had had successful diagnostic ERCP. That is, if diagnostic ERCP was successful, then subsequent sphincterotomy was as successful in duodenal diverticula cases as in those without diverticula. In the 17 of 21 patients with papilla inside diverticula who had sphincterotomy, one had failed sphincterotomy and one only had successful sphincterotomy through the use of the combined percutaneous endoscopic technique. That is, the pure endoscopic failure rate in this subgroup was two of 17 (11.8%). In the 210 of 287 patients with papilla not deep within diverticula who had sphincterotomy, 10 had failed sphincterotomy and two required combined procedures for sphincterotomy, giving a pure endoscopic failure rate of 5.7% (NS).

The procedure related morbidity and procedure related mortality were 5.2% and 0.9% respectively for patients with periampullary diverticula and 4% and 0.7% respectively for patients without diverticula (NS) (Table 2). There was one complication in the subgroup with the papilla deep within the diverticulum (5.9%) and 10 (4.7%) in the subgroup

Table 2 Early complication (30 days) of endoscopic sphincterotomy

	With diverticulum (n=227)		Without diverticulum (n=447)	
		Death		Death
Haemorrhage	9	2	14	1
Pancreatitis	1	-	3	2
Cholangitis	1	-	1	-
Retroperitoneal perforation	1	-	1	-
Total	12 (5.2%)	2 (0.9%)	18 (4%)	3 (0.7%)

with papilla not deep inside the diverticulum (NS). All three patients who died from bleeding were over 80 years and only one was considered fit for any surgical intervention (urgent laparotomy with oversewing of bleeding point – patient died during surgery). Both patients who died of pancreatitis did so within 48 hours of sphincterotomy from multi-system failure, had failed therapy after successful sphincterotomy (one choledocholithiasis; one stent for malignancy), were otherwise well and were aged 60 and 64 years.

Endoscopic clearance of stones from the common bile duct was achieved in 160/190 (84.2%) of those patients with periampullary diverticula and choledocholithiasis and in 325/369 (88.1%) of those with choledocholithiasis but no diverticula (NS). Failures in both groups were managed by either permanent endoprosthesis insertion or by surgical clearance.

Medium term follow up was available in 213 of the 227 patients with periampullary diverticula (93.8%) for a mean of 26.2 months (range 3–78) and in 440 of the 447 patients without diverticula (98.4%) for a mean of 21.6 months (range 3–77). There were six deaths in the duodenal diverticula group and 12 deaths in the group without, none of which was biliary related. Further biliary symptoms (cholangitis, biliary colic) occurred in three patients in each group. That is 1.3% and 0.7% respectively (NS).

Discussion

This is the largest reported series from a single centre of patients with periampullary diverticula undergoing diagnostic ERCP and endoscopic sphincterotomy. The prevalence of diverticula in patients undergoing ERCP, previously reported as approximately 10 to 15%⁷ has been confirmed, wherein 308 of 2458 patients (12.5%) had diverticula. The reported increasing prevalence of periampullary diverticula with age has also been confirmed

(Figure). This fact, combined with the known increased incidence of choledocholithiasis in patients with periampullary diverticula³ (probably caused by poor duct drainage), explains why the endoscopic problems with periampullary diverticula largely occur in patients with advanced age.

The failure rate of diagnostic ERCP in patients with and without diverticula has been a matter of controversy, with traditional teaching suggesting a higher failure rate in the presence of periampullary diverticula but recent literature⁵ suggesting no difference. This study has proved traditional teaching to be correct with a significantly higher failure rate of diagnostic ERCP in patients with diverticula compared with patients without (5.8% v 3.3%: $p < 0.05$). Moreover, this review has revealed that the failure rate of endoscopic sphincterotomy is higher in patients with periampullary diverticula than those without (4.8% v 2.0%: $p < 0.05$). The procedural complication and mortality rates after attempted sphincterotomy are, however, unaltered by the presence of diverticula (5.2% v 4% and 0.9% v 0.7% respectively), confirming the results of the small series of Farkas *et al.*⁸ The complete clearance rate of the common duct after sphincterotomy was only marginally lower in the periampullary diverticula group (84.2% v 88.1%; NS). The difference in sphincterotomy failure rates was entirely because of the same access problems which produced the different diagnostic success rates rather than the diverticulum adding difficulty to the insertion of the papillotome into an already defined papillary orifice.

The position of the papilla within a diverticulum logically may affect cannulation and sphincterotomy success. All experienced endoscopists appreciate, however, that the location of the papilla relative to the diverticulum may alter in some cases between endoscopies and may in fact be altered somewhat during endoscopy by variation of air insufflation and pushing on associated redundant mucosal folds. In this review, a higher failure rate was found for sphincterotomy when the papilla was located deep within the diverticulum (11.8% v 5.7% – NS) but the complication rate of sphincterotomy was not increased at all in this subgroup.

In conclusion, periampullary diverticula should continue to evoke caution and meticulous technique from the endoscopist who may be comforted, however, by the fact that despite a higher diagnostic failure rate, the success of sphincterotomy and duct therapy after successful cholangiography is not less than in those without diverticula and nor should the complication rate be higher. The presence of periampullary diverticulosis should probably not greatly alter the clinical or endoscopic management of the patient.

References

- 1 Anacker H, Weiss HD, Kramann B. Techniques. In: *Endoscopic retrograde pancreaticocholangiography*. New York: Springer-Verlag, 1977: 10–24.
- 2 Lintott DT, Ruddell WST, Axon ATR. Pseudostone at ERCP due to juxtapapillary diverticulum. *Clin Radiol* 1981; **32**: 173–6.
- 3 Kirk AP, Summerfield JA. Incidence and significance of juxtapapillary diverticula at endoscopic retrograde cholangiopancreatography. *Digestion* 1980; **20**: 31–5.
- 4 Cotton PB. Endoscopic management of bile duct stones – apples and oranges. *Gut* 1984; **25**: 587–97.
- 5 Chi-Sin Chang-Chien. Do juxtapapillary diverticula of the duodenum interfere with cannulation at endoscopic retrograde cholangiopancreatography? *Gastrointest Endosc* 1987; **33**: 298–300.
- 6 Dowsett JF, Vaira D, Hatfield ARW, *et al.* Endoscopic biliary therapy using the combined percutaneous and endoscopic technique. *Gastroenterology* 1989; **96**: 1180–6.
- 7 Stewart ET, Vennes JA, Geenen JE. *Atlas of endoscopic retrograde cholangiopancreatography*. St Louis: CV Mosby, 1977.
- 8 Farkas IE, Preisich P. Endoscopic sphincterotomy in juxtapapillary diverticula. *Dig Dis Sci* 1986; **31**: 239S.