



# ERCP Success Rate and Periapillary Diverticula: The Pocket Makes No Difference

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Endoscopic retrograde cholangiopancreatography (ERCP), one of the more challenging procedures performed by gastroenterologists, is associated with higher rates of complications than general endoscopy. Over the past decade, a burgeoning literature has suggested that higher-volume centers with more experienced practitioners have superior outcomes with lower adverse events than do lower-volume centers [1]. Partly as a response to this observation, ERCP certification is now more commonly incorporated into an additional year of advanced training rather than into general gastrointestinal fellowship.

One of the most technically complex aspects of ERCP is the initial step of biliary cannulation. While there are many features that can increase the level of difficulty in cannulation, a periampullary diverticulum is often recognized as a significant risk factor for failed ERCP attempts. Periapillary diverticula (PAD), which are diverticula within 2–3 cm of the ampulla, have unclear etiology, though motility disorders, congenital defects, and aging may contribute to it. The prevalence of PAD varies widely in the literature (3–32%) [2]. There are reports of associations between PAD and biliary obstruction [3, 4], choledocholithiasis [5, 6], and pancreatitis [7], though they are generally thought to be asymptomatic. PAD can be subclassified based on location of the papilla within, on the rim of, or near the diverticulum.

The variation in location of the papilla in the setting of PAD can lead to an atypical orientation or obscured location, complicating endoscopic cannulation and stone extraction using traditional techniques. Indeed, there are many case reports highlighting innovative techniques to facilitate biliary cannulation in the setting of PAD including clip

placement [8], the use of small diameter forceps [9–11], cap-fitted forward viewing endoscopy [12], and a reverse guidewire technique [13]. Further, there is concern for both orientation and length of sphincterotomy when the typical landmarks are not present, due to the diverticulum. The extent of this difficulty in biliary cannulation and the potential for adverse events is not fully known, with some conflicting results in the established literature. Some authors have also argued that cannulation may actually be easier in setting of PAD, once the papilla has been identified [14].

In this issue of *Digestive Diseases and Sciences*, Jayaraj et al. seek to address this variation in the literature in their systematic review and meta-analysis [15]. In their report, 16 studies involving 2794 patients with PAD were included. They found that ERCP in the setting of a periampullary diverticulum was significantly less successful, with an odds ratio of 0.51 (95% CI 0.35–0.72). In a pooled estimate of adverse events, there was no statistically significant difference in post-ERCP pancreatitis, bleeding, perforation, or cholangitis. In the patients with periampullary diverticula, 92/1863 (4.9%) developed post-ERCP pancreatitis (PEP), comparable with historical standards.

The authors' analysis is affected by substantial heterogeneity of the studies analyzed. In early studies, although the success rate of ERCP in the setting of PAD was lower than those without PAD, the overall success rates (in absence of PAD) were lower than are currently generally expected, suggesting that older techniques or equipment may have contributed to the outcomes. Indeed, Jayaraj et al. suggest that these older studies were primarily responsible for the significant reduction in success rates in ERCP with periampullary diverticula. Thus, despite their overall finding, they argue that newer ERCP accessories combined with high-volume expert practitioners likely lead to equivalent cannulation rates.

In our review of the literature, more recent studies not included in their report appear to corroborate this assertion. In a study of the Clinical Outcomes Research Initiative

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(CORI) database from the National Institute of Diabetes and Digestive and Kidney Diseases Central Repository covering January 2000 to December 2012, 1325 cases with periampullary diverticula were reviewed [2]. In this nationwide study, there was no difference in therapeutic success in ERCP in those with or without PAD, while adjusting for potential confounders. There was no assessment of procedure complications in this study. In another contemporary report—not included in the meta-analysis—164 patients with PAD were compared with 663 without such diverticula [16]. Their cannulation rates were similar at approximately 98%. Yet, there were higher rates of complications—bleeding, pancreatitis, and perforation—in the patients with PAD. Interestingly, that increased risk of adverse events appeared mitigated when needle-knife fistulotomy was used. In another large case–control study conducted in 1489 patients with PAD, the cannulation rates were similar to those without PAD (98.59 vs. 99.07%,  $P=0.225$ ) [17]. Likewise, complication rates were also similar among groups.

Successful ERCP includes not just cannulation but also completion of therapy, often including stone extraction. Large stone removal can be difficult in the setting of PAD, when the altered anatomy and concern for perforation may limit the sphincterotomy length. The literature also supports a reduced rate of successful stone removal in patients with PAD with endoscopic sphincterotomy alone [17]. It is reasonable to estimate that this may have contributed to the less successful ERCPs in earlier studies, when balloon sphincteroplasty, endoscopic hydraulic lithotripsy, and other techniques for stone extraction may not have been as widely available. A recent multicenter retrospective review stressed the considerable efficacy of balloon dilation in the extraction of large CBD stones in setting of PAD [18].

In conclusion, ERCP in the setting of PAD has similar complication rates to those without PAD. And while the current systematic review and meta-analysis suggests the efficacy is reduced, we conjecture that had more recent studies been included, the success rates would have been comparable. Thus, we agree with the overall conclusion by Jayaraj et al. that the success of ERCP in the setting of PAD is comparable to ERCP without PAD given sufficient expertise and experience.

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