Viewpoint

Assessing the postoperative behaviors of minimally-invasive pancreatoduodenectomy versus open pancreatoduodenectomy

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As far as we're aware, pancreatic surgery is challenging for both surgeons and patients. Pancreatoduodenectomy, arguably the most complicated pancreatic operation, requires not only a demanding resection of the pancreatic head, bile duct and intestine, but also entails a strict reconstruction where major morbidity and mortality may occur. With the advent of minimally invasive surgical techniques, they are utilized in all facets of surgery, and being increasingly applied in pancreatoduodenectomy, like laparoscopic, robot-assisted, and hybrid minimally-invasive pancreatoduodenectomy (MIPD) (1). Cohort studies have suggested that MIPD can safely decrease the postoperative morbidity rates and improve postoperative recovery compared with open pancreatoduodenectomy (OPD) (2,3). However, many published studies were not comparative and selection bias has potentially influenced these findings. Besides, large multicenter and matched studies comparing outcomes for MIPD and OPD are still lacking.

This large propensity score matched cohort study conducted in 14 European centers by Klompmaker *et al.* found no differences in 30-day major morbidity, mortality, and length of stay between MIPD and OPD (4). However, MIPD was associated with a 10% higher rate of grade B/C postoperative pancreatic fistula (POPF) and longer (90 minutes) operative times, but no increase in bile leakage. No differences in risk of major morbidity, mortality, and POPF were observed among laparoscopic, robot-assisted, and hybrid MIPD, but the conversion rate was lower after robot-assisted versus laparoscopic MIPD (5% *vs.* 26%). Single-row pancreatojejunostomy was a newly identified risk factor for POPF in MIPD. This study has strict inclusion criteria. MIPD patients were included from European centers performing at least 10 MIPDs per year. OPD patients were included from centers performing at least 10 OPDs per year in 2 Dutch and German surgical registries. Propensity score matching was applied to achieve a balanced exposure groups at baseline, getting more robust results to reduce potential confounding factors.

The conclusions were verified in another study carried out in pancreatic cancer patients by Torphy *et al.* (5). The 90-day mortality between MIPD and OPD was statistically equivalent [OR =0.92, 95% CI: 0.75–1.14]. Patients undergoing MIPD tended to have a shorter hospital stay [OR =0.75, 95% CI: 0.68–0.82]. There was no difference in 30-day mortality, unplanned readmissions, margins, lymph nodes harvested, and receipt of adjuvant chemotherapy between MIPD and OPD groups. This large-scale research included 22,013 patients who underwent PD for pancreatic cancer in the National Cancer Database from 2010 through 2015, 18,259 (82.9%) were OPD and 3,754 (17.1%) were MIPD. They did interaction analysis between hospital volume and approach, and the results suggested the protective effects regardless of whether the patient underwent an OPD or a MIPD, with an estimated 30% reduction in 90-day mortality for institutions in the top 5th percentile. But they also indicated that the majority of

facilities performing OPD and MIPD are still low volume centers, in which they performed 38.6% of OPDs and 35.6% of MIPDs in the current study.

A previous systematic review and meta-analysis of MIPD and OPD performed by Dutch Pancreatic Cancer Group recruited 19 comparative cohort studies (1,833 patients) and 2 original registry studies (19,996 patients) (6). No difference was found in mortality [OR =1.1, 95% CI: 0.6–1.9] or POPF [OR =1.0, 95% CI: 0.8 to 1.3]. MIPD was associated with longer operation times [WMD =74 minutes, 95% CI: 29–118], but lower intraoperative blood loss [WMD =–385 mL, 95% CI: –616 to –154], less delayed gastric emptying [OR =0.6, 95% CI: 0.5–0.8], and shorter hospital stay [WMD =–3 days, 95% CI: –5 to –2]. This high-quality meta-analysis comprising only comparative cohorts and registry studies, avoiding selection and publication bias to some extent, summarized the similar conclusions. The authors also proposed that MIPD should be implemented in high-volume centers within a structured training program considering higher mortality in low-volume hospitals.

In general, this paper by Klompmaker *et al.* is the first international multicenter matched study on MIPD versus OPD with moderate sample size to date. And it investigated the heterogeneity among laparoscopic, robot-assisted, and hybrid MIPD. MIPD appears to provide superior perioperative and oncologic outcomes in patients, especially at experienced, high-volume centers. Its overall role in pancreatoduodenectomy needs to be better defined. Improved training opportunities, registry participation and prospective evaluation are still needed (7).

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Footnote

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