Robotic pancreaticoduodenectomy is associated with reduced morbidity compared with conventional laparoscopic pancreaticoduodenectomy: A systematic review and meta-analysis

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Abstract

Objective

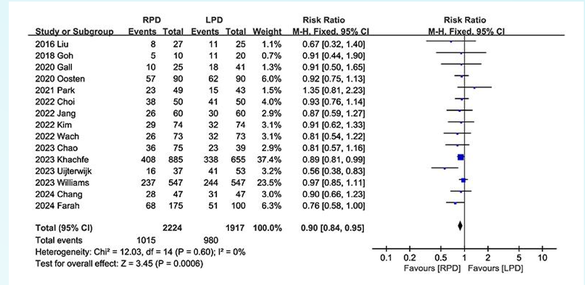
Minimally invasive Pancreatoduodenectomy is increasingly utilized. The flexibility of the robotic system in resection and reconstruction provides potential benefits in pancreaticoduodenectomy. Increasingly, robotic pancreaticoduodenectomy (RPD) has been reported with favourable outcomes. However, whether RPD is superior to laparoscopic pancreaticoduodenectomy (LPD) remains controversial. The study aims to assess the available literature and compare the perioperative outcomes of RPD and LPD.

Methods

The Embase, Web of Science, PubMed, Cochrane Library, and Scopus databases were searched for articles published up to August 20, 2024. Risk ratios (RRs) and mean differences (MDs) with 95% confidence intervals (CIs) were calculated. The I^2 statistic was used to assess the degree of heterogeneity. A random-effects model was used if $I^2 > 50\%$; otherwise, a fixed-effects model was employed.

Results

32 studies were included, with a total of 16227 patients (RPD group: 6718 patients; LPD group: 9509 patients). Compared with LPD, RPD has lower overall morbidity (RR 0.90, 95% CI 0.84, 0.95; Heterogeneity: $I^2 = 0\%$, P = 0.60) , conversion (RR 0.44, 95% CI 0.35, 0.56; Heterogeneity: $I^2 = 60\%$, P = 0.0003) and blood transfusion rates (RR 0.53, 95% CI 0.45, 0.62; Heterogeneity: $I^2 = 21\%$, P = 0.23) , shorter length of stay (MD, -0.50 days; 95% CI, -0.87, -0.13, P = 0.008), and higher number of harvested lymph nodes (MD, 1.93; 95% CI, 0.86, 2.99, P = 0.0004; $I^2 = 85\%$). There were no significant differences observed in 90-day mortality (RR, 0.93), major complications (RR, 1.03), operative time (MD, -1.71 mins), blood loss (MD, -26.19 mL), reoperation (RR, 0.97), bile leak (RR, 0.87), postoperative pancreatic fistula (RR, 1.01), delayed gastric emptying (RR, 1.09), and R0 resection (RR, 0.98) between the groups. In addition, according to the funnel plots and Egger tests, and no significant publication bias was observed.



Conclusion

Robotic-assisted surgery for PD is safe and feasible. Compared to LPD, it offers better short-term outcomes, such as reduced postoperative morbidity, blood transfusion, conversion, length of hospital stay, and increased number of lymph node dissection. Further randomized controlled trials to verify the potential advantages of RPD over LPD are warranted. In addition, these results may help pancreatic surgeons in their choice of surgical approaches.