

Laparoscopic pancreaticoduodenectomy: defining the learning curve

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BACKGROUND

Laparoscopic pancreaticoduodenectomy (LPD) is a minimally invasive technique proposed to reduce perioperative morbidity associated with a Whipple resection. Widespread uptake of this approach may be limited by the high technical demand of the procedure. Presently, there is no data describing the learning curve of LPD. This study describes a single-centre's initial experience and the learning curve associated with LPD.

METHODS

Institutional data were collected prospectively from sequential LPD cases between 2019 – 2023. Patients undergoing LPD for any indication were included. Outcomes of interest included length of stay (LOS), 30-day severe complications (Clavien-Dindo grade 3+), 30-day readmission, 30-day reoperation, 30-day mortality and clinically relevant postoperative pancreatic fistula (CR-POPF). An analysis after the initial 58 cases was conducted and subsequently quality improvement strategies were implemented including covering the dissected vascular structures with a round ligament patch, external pancreatic stenting and postoperative hydrocortisone. CUSUM (cumulative sum) analysis was performed to identify trends in outcomes as a function of case number.

RESULTS

96 Patients underwent LPD during the study period. 58 underwent LPD prior to review of cases and 38 were conducted after initial analysis and implementation of quality improvement strategies. Median LOS was 7 days (IQR 5 – 12). CR-POPF rate was 19.8%. 30-day severe complication rate was 33.3%. 30-day readmission was 20.8%, 30-day reoperation was 8.3% and 30d mortality was 4.2%. The rate vascular complications was 8.3%. There was improvement between the initial 58 cases and subsequent 38 cases in rates CR-POPF (20.7% vs. 18.4%), 30-day severe complications (34.5% vs. 31.6%), 30-day readmission (24.1% vs. 15.8%), 30-day reoperation (10.3% vs. 5.3%) and 30-day mortality (5.2% vs. 2.6%). CUSUM charts indicate that rates of 30-day severe complications, vascular complications and readmission worsened between cases 20 and 40. Stability in these outcomes occurs at approximately case 50 (Figure 1).

CONCLUSIONS

These results support the presence of a steep technical learning curve associated with LPD with initial increase in rates of negative outcomes. By case 50, there is evidence of plateau in rates of perioperative outcomes. Altogether, this suggests that proficiency in this technique is achieved by approximately the 50th case. Utilization of LPD should be undertaken carefully and with scrutiny as there may be a trend towards worse perioperative outcomes in the initial implementation of this approach.

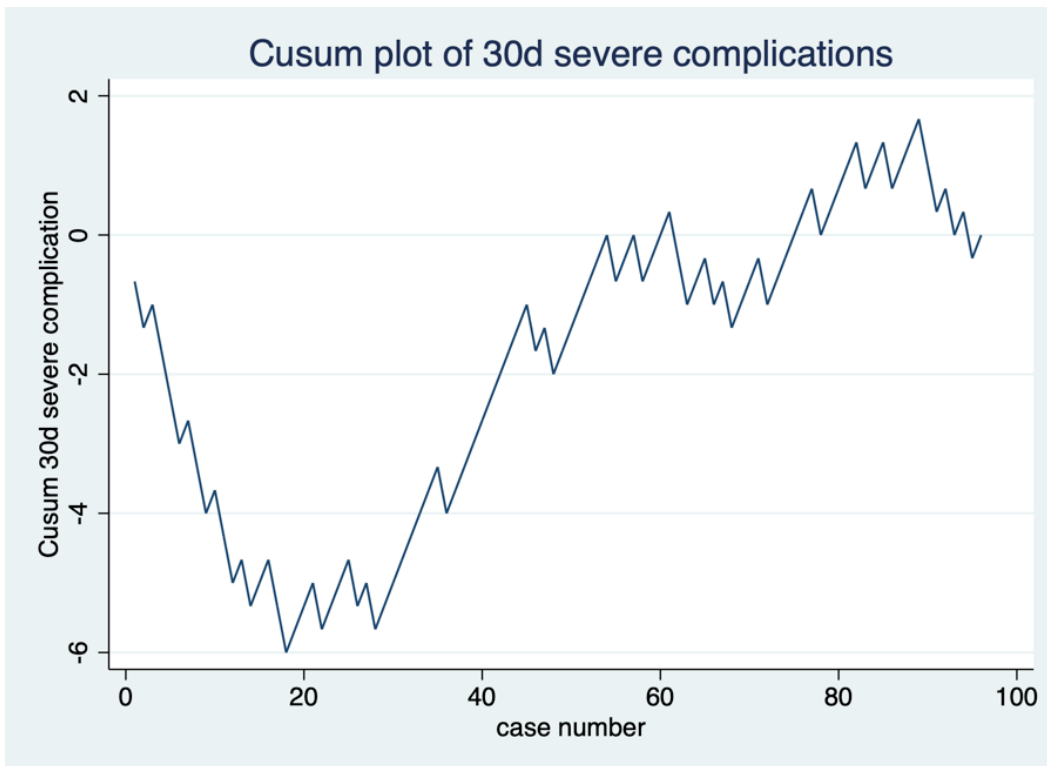


Figure 1: CUSUM plot demonstrating the cumulative severe complication rate within 30-days of the operation as a function of case number.