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INSTITUTIONAL LEARNING CURVE ANALYSIS FOR ROBOTIC PANCREATODUODENECTOMY: A CONSECUTIVE 100-CASE SINGLE-CENTER EXPERIENCE

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Background : The institutional learning curve reflects the cumulative experience required by a medical institution to implement novel surgical techniques or technologies. This process is facilitated through collaboration among surgical teams, supported by structured educational programs and systematic resources. The objective of this study was to evaluate the institutional learning curve for robotic pancreatoduodenectomy (PD) based on a consecutive series of 100 cases performed at a single institution.

Methods : From September 2022 to October 2024, patients with periampullary disease who underwent PD or pylorus preserving PD (PPPD) were analyzed. Clinical outcomes of open PD and robotic PD were compared. For robotic PD, a cumulative sum (CUSUM) analysis was conducted to assess the learning curve. Additionally, cases involving open conversion or Clavien-Dindo grade ≥III complications were categorized as surgical failures. Risk-adjusted CUSUM (RA-CUSUM) analysis was then employed to determine the risk-adjusted learning curve.

Results : During the study period, 408 open PDs and 100 robotic PDs were performed, with comparable clinical outcomes between the two groups. Among the 100 robotic cases, there were 15 open conversions, 18 complications, and 32 surgical failures. Risk factors for surgical failure included pylorus-resecting PD, high estimated blood loss, and transfusion requirements. RA-CUSUM analysis revealed an institutional learning curve of 44 cases for robotic PD.

Conclusions : The technically demanding robotic PD procedure was successfully implemented and stabilized within the institution, with the institutional learning curve established at 44 cases. Further studies are warranted to evaluate long-term outcomes and to assess individual surgeon learning curves in the context of robotic pancreatic surgery.

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