

Summary of the research project

Title:

Video-based assessment of surgical quality and its impact on outcomes in minimally invasive distal pancreatectomy: a step toward artificial intelligence assistance.

Background

IHPBA endorsed guidelines suggest minimally invasive distal pancreatectomy (MIDP), whether laparoscopic or robot-assisted, as the gold standard treatment for left-sided benign and low-grade malignant tumors¹. However, MIDP remains a complex procedure affected by clinically relevant postoperative pancreatic fistula (CR-POPF) in up to 20-32% of the cases² and requiring long learning curves despite training³. Video-based assessment (VBA) of surgical quality has already shown technical factors related to delayed gastric emptying⁴ and fistula⁵ following pancreaticoduodenectomy. In MIDP, a VBA of pancreatic transection has shown that pancreatic capsule disruption and staple line bleeding increase the risk of CR-POPF⁶. However, no VBA tools exist, currently, to assess surgical quality and its impact on MIDP comprehensively.

Aims

To develop and validate a VBA tool for MIDP, study the impact of surgical quality on MIDP outcomes, and explore the potential of artificial intelligence (AI) in MIDP. Such a tool would be used for formative guidance and summative assessment (once benchmarks achieved).

Methodology

Using both cognitive and hierarchal task analysis, a modified Delphi methodology will be used to draw consensus on items to include in a competency assessment tool (CAT) for MIDP. Content validity will be examined by expert pancreatic surgeons while reliability, criterion validity, and potential to study and improve MIDP will be tested applying the CAT to united videos from published trials and correlating the VBA with clinical outcomes. Finally, the annotated videos will be used to train a deep neural network to automatically perform the VBA.

Timeframe of the research

The first 4 months will be dedicated to the Delphi consensus, the development of the CAT, and data collection. Two surgeons will annotate at least 20 MIDP videos using the CAT tools in the subsequent 2 months. The last 6 months will be dedicated to data analysis, AI training and manuscript writing.

References

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4. Jung, J. P. *et al.* Use of video review to investigate technical factors that may be associated with delayed gastric emptying after pancreaticoduodenectomy. *JAMA surgery* **153**, 918–927 (2018).
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6. Zimmitti, G. *et al.* Investigation of intraoperative factors associated with postoperative pancreatic fistula following laparoscopic left pancreatectomy with stapled closure: a video review-based analysis. *Surg Endosc* **35**, 941–954 (2021).