



RESEARCH TOPIC MEM6

Materials and tools for improving pancreatic surgery

Curriculum MEM Clinical

Clinical Unit name and address

Pancreatic Surgery, Humanitas Research Hospital

Laboratory name

Laboratory of physico-chemical characterisation of pancreatic tissue, Humanitas University

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Abstract

This project aims to develop a new generation of advanced surgery tools to minimise the occurrence of postoperative pancreatic fistula (POPF) and set up innovative surgeons' training protocols. This project will focus on two main objectives, which will be carried out in close synergy between Politecnico di Milano and Humanitas University. Firstly, an artificial replica of the pancreas will be designed, fabricated and utilized, by using a nanoindenter machine (Bioindenter, Anton Paar GmbH), as a realistic phantom for testing different technical solutions to prevent POPF, as well as to develop new training practices for surgeons,. Secondly, a sealing device for pancreatic tissue will be developed to avoid or reduce the POPF rate. In this case, a new patch and/or a glue will be capable of sealing the pancreatic parenchyma/anastomosis and resisting the erosive action of pancreatic juice. Specific design, manufacturing, and testing strategies will be explored involving in-vitro, ex-vivo ad in-vivo studies as well as advanced material design and prototyping approaches.

Main technical approaches

Background of pancreatic surgery and medical statistics

Scientific references

- [1] M. Montorsi et al., "Efficacy of an absorbable fibrin sealant patch (TachoSil) after distal pancreatectomy: a multicenter, randomised, controlled trial.," *Ann. Surg.*, vol. 256, no. 5, pp. 853–860, 2012.
- [2] K. A. Vakalopoulos et al., "Tissue adhesives in gastrointestinal anastomosis: A systematic review," *J. Surg. Res.*, vol. 180, no. 2, pp. 290–300, 2013.
- [3] B. Eigl et al., "A Multimodal Pancreas Phantom for Computer-Assisted Surgery Training," *IEEE Open J. Eng. Med. Biol.*, vol. 1, pp. 166–173, 2020.
- [4] B. R. M. Perrin et al., "Surgical glues: are they really adhesive?," *Eur. J. Cardio-thoracic Surg.*, vol. 36, no. 6, pp. 967–972, 2009. [5] R. Kelmansky et al., "Strong tissue glue with tunable elasticity," *Acta Biomater.*, vol. 53, pp. 93–99, 2017.

Type of contract

Place without scholarship.

Posizione senza borsa.