PROJECT

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1) Project title

Anesthesia for Complex Surgery: Pharmacological, Respiratory, Hemodynamic, and Neuromuscular Approaches to Enhance Perioperative Outcomes

2)Abstract (max 500 words)

General, complex, and transplant surgeries present unique challenges that require highly tailored anesthetic management to improve perioperative quality, safety, and patient outcomes. This project aims to explore and optimize modern anesthetic strategies across four interconnected domains: pharmacology of anesthetics and analgesics, mechanical ventilation, hemodynamic management, and neuromuscular blockade.

The research will focus on the perioperative use of general anesthetics and analgesics, administered via target-controlled infusion (TIVA-TCI) systems, with particular attention to their pharmacokinetics and pharmacodynamics in high-risk surgical populations. Special emphasis will be placed on the clinical impact of different TCI models (e.g., Schnider vs. Eleveld) on depth of anesthesia, stability of the hypnotic state, and the incidence of unwanted events.

A second focus will investigate multimodal analgesia approaches aimed at reducing opioid use through opioid-sparing and opioid-free protocols. The use of non-opioid adjuvants, such as ketamine, lidocaine, and dexmedetomidine, will be analyzed for their efficacy and safety in enhancing recovery and minimizing opioid-related complications.

The third area will evaluate protective mechanical ventilation strategies and perioperative hemodynamic enhancement in high-risk patients, including those undergoing organ transplantation. These interventions will be studied using advanced monitoring technologies and within enhanced recovery after surgery (ERAS) protocols.

Finally, the project will address the optimization of neuromuscular blockade management through the integration of pharmacological agents and advanced monitoring techniques, and their impact on patient recovery in high-risk populations.