Abstract *(in English – Times New Roman 12 - max. one page)*

Title: Preoperative and Perioperative Anaesthetic Management of Pheochromocytomas and Paragangliomas: A Narrative Review

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Objective: To review evidence-based preoperative and perioperativ anesthetic strategies for management of pheochromocytoma and paraganglioma (PPGL) and identify key practices that enhance safety and reduce complications.

Background: PPGL are rare neuroendocrine tumors arising from chromaffin cells and characterized by excessive catecholamine secretion. Their clinical presentation is heterogeneous and often nonspecific, which may delay diagnosis and expose patients to severe cardiovascular complications, including hypertensive crises, arrhythmias, and catecholamine-induced cardiomyopathy. Surgical resection is the definitive treatment; however, perioperative management remains complex due to marked hemodynamic instability. Current guidelines recommend systematic preoperative pharmacological preparation. This review aims to synthesize key principles and recent evidence in anaesthetic management of PPGL. [1]

Methods:A narrative review of the literature was conducted using PubMed and Medline database. Relevant publications addressing preoperative optimization and intraoperative anesthetic management of PPGL were analysed. Particular attention was given to pharmacological preparation with alpha-adrenergic blockade, adjunctive treatments such as betablockers and calcium channel blockers, and anesthetic strategies aimed at minimizing intraoperative hemodynamic instability.

Results: Preoperative alpha-blockade is essential in PPGL management to reduce perioperative cardiovascular complications. Selective alpha-blockers like prazosin or doxazosin are preferred for their shorter action and better tolerability. It is crucial to address this beforehand, since using a betablocker, such as propranolol or atenolol, alone can lead to unopposed alpha-adrenergic activity causing marked vasoconstriction and potentially dangerous hemodynamic instability. [2] During surgery, hypertensive crises should be promptly treated when systolic blood pressure remains above 200 mmHg for longer than one minute, ensuring adequate anesthesia and administering rapid-acting vasodilators without delay. Nicardipine produces strong arterial vasodilation but has a relatively long duration of action (3–6 hours), which limits precise titration. In comparison, Urapidil allows for more stable hemodynamic control due to its rapid onset and short duration of action ("on–off" profile), making it particularly suitable for intraoperative use. [3] Following tumor resection, abrupt withdrawal of endogenous catecholamine secretion—especially in large tumors (>7 cm) producing both epinephrine and norepinephrine—may result in transient catecholamine deficiency and severe hypotension. In such cases, tailored vasopressor or inotropic support, including exogenous catecholamines, may be required. Drug selection should be individualized according to the tumor's secretory phenotype, making it particularly suitable for intraoperative use. [1,2]

Discussion and Conclusions: Rigorous preoperative alpha-adrenergic blockade remains the most impactful intervention to reduce perioperative risk in PPGL surgery. Optimal management requires a multidisciplinary approach and expertise in advanced hemodynamic control. Fine titration of vasoactive agents and anticipation of post-resection hypotension are critical determinants of outcome. Standardization of perioperative protocols and further prospective studies are needed to optimize management strategies.

Declaration of Interests: The authors declare no conflicts of interest.
Funding: This work didn't receive any financial support.

By submitting this abstract, the first author certifies that all authors agree on its content and on its submission.

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