

Revisiting Anesthetic Management of Pheochromocytoma

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Because of the rarity of Pheochromocytoma, most data on the anesthetic management and perioperative outcomes have been reported in small case series that spanned many years. About 25 to 50 percent of hospital deaths of patients with unmanaged or unknown Pheochromocytoma occur during induction of anesthesia or operative procedures for other conditions. Preoperative evaluation and medical management for pheochromocytoma resection should be multidisciplinary, including the surgeon, anesthesiologist, and endocrinologist. Patients with Pheochromocytoma need to be assessed at least 7 to 14 days before resection to allow time for modification of treatment, if necessary. Before modifying treatment, the endocrinologist needs to titrate the therapy aimed at minimizing the physiologic impact of catecholamine release. Patients who undergo pheochromocytoma resection exhibit labile blood pressure (BP), arrhythmias, and tachycardia during and after surgery, though most can be managed without lasting morbidity or mortality. Therefore, preoperative preparation or optimization encompasses negation of the alpha-1 mediated vasoconstriction and beta-1 mediated tachycardia and inotropy [1].

The objectives of preoperative care include:

- Arterial pressure control,
- Reversal of chronic circulating volume depletion,
- Heart rate and arrhythmia control,
- Assessment and optimization of myocardial function,
- Reversal of glucose and electrolyte disturbances [2].

A preoperative alpha-adrenergic blockade may prevent or reduce hypertensive crises during surgery for Pheochromocytoma, allow intravascular volume expansion, and improve cardiac function in patients with catecholamine-induced myocarditis and cardiomyopathy. While this process is usually managed by an endocrinologist, the anesthesiologist should understand the regimen used and the goals of therapy, which are two-fold control of hypertension including prevention of hypertensive crisis during surgery and normalization of intravascular volume.

The medications used for preoperative management of catecholamine excess have different properties that may impact the likelihood and management of perioperative hemodynamic changes. Combined alpha and beta-adrenergic blockade is the most commonly implemented strategy. The alpha blockade is initiated first, and for patients with tachycardia or arrhythmias, beta-blockade is typically added cautiously several days before surgery. The beta-adrenergic blocker should never be started before the alpha-blocker because blockade of vasodilatory peripheral beta-adrenergic receptors with unopposed alpha-adrenergic stimulation can lead to a further elevation in BP. Calcium channel blockers (e.g., nicardipine) are sometimes used to supplement combined alpha and beta-blockade or as an alternative for patients with intolerable side effects from other regimens.

Roizens criteria [3] are used for assessment of the adequacy of preparation of the patient for the surgery, which includes points like:

- No in-hospital BP is reading more than 160/90 mmHg for 24 hours before surgery.
- Orthostatic hypotension with standing BP > 80/45 mmHg
- ECG is free of ST-T changes for one week before surgery.
- No more than one ectopic beat every 5 minutes.
- Other indicators: Serial hematocrit, RBS control, improved psychological status.

Apart from the basic standards of monitoring as recommended by the American Society of Anesthesiologists, Invasive arterial monitoring should be obtained before induction of anesthesia. Central venous access is also desirable in these patients. Central venous access helps in guiding the fluid therapy in these apparent vasoconstricted patients as well as provides access to the central vascular compartment for infusion of vasodilators and vasoconstrictors when required. Case reports describe the use of intraoperative transoesophageal echocardiography to guide fluid management and titration of vasodilators [1].

Intraoperative management

All patients mostly require general anesthesia with endotracheal intubation irrespective of the type of surgical approach. Surgery is increasingly laparoscopic, reducing postoperative recovery times, but not hemodynamic instability. Open surgery is likely to be required for large or invasive adrenal masses and most paragangliomas.

The chosen anesthetic technique should:

- Avoid drug-induced catecholamine release,
- Avoid catecholamine release induced by anesthetic or surgical maneuvers,
- Minimize hemodynamic responses to tumor handling,
- Treat episodes of hypotension, particularly after tumor devascularization.

Drugs to be avoided include: Morphine, pethidine, curare, atracurium, etc. histamine releasers. Succinylcholine, pancuronium, Droperidol, metoclopramide, halothane, all of which increases catecholamine sensitivity also needs to be avoided.

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