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ANAESTHETIC MANAGEMENT OF PHEOCHROMOCYTOMA. A CASE REPORT

Anesthesiology

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ABSTRACT

Pheochromocytomas are neoplasms of chromaffin tissue that synthesize catecholamines. These chromaffin tissue tumors are not uncommon in anesthetic practice and have varied manifestations. Pheochromocytoma represents very significant challenges to the anesthetist, especially when undiagnosed. By some estimates, 25 to 50 percent of hospital deaths of patients with unmanaged or unknown pheochromocytoma occur during induction of anesthesia or during operative procedures for other conditions.1 Anaesthetic management includes Preoperative use of alpha-adrenergic antagonists, beta-adrenergic antagonists with or without other antihypertensive agents, fluid therapy as well as insulin therapy for hyperglycemia if required. Despite this preoperative preparation, many patients will have hypertensive crises intraoperatively which need to be promptly and carefully managed by the anesthesia team which requires intensive and advanced monitoring techniques. With advancement in surgical and anesthetic techniques, the incidence of severe morbidity and mortality associated with the surgery is low in high volume centers.

KEYWORDS

Introduction-The 2004 WHO classification of endocrine tumors defines pheochromocytoma (PCC) as a catecholamine-producing intra-adrenal tumor arising from the chromaffin cells. In the United States, the published incidence is 2-8 diagnoses per million populations, per year2. The 2014 Endocrine Society Clinical Practice Guidelines state an overall PCC prevalence of 0.2-0.6% in patients with hypertension. Perioperative management of patients with phaeochromocytoma requires detailed knowledge on the pathophysiology and potential complications. Intraoperatively, hypertensive crisis and tachyarrhythmias may occur resulting from massive catecholamine release. Thus, preoperative treatment with the alpha-antagonist phenoxybenzamine is obligatory.3 Intraoperatively pt. may develop hypertensive crisis which demands prompt management.

Case Report-

A 42 years old female patient, weighing 45 kg presented with complaints of palpitation and syncopal attack pain abdomen since one month. On general examination, she was a poor built and undernourished lady with pulse 80/min and blood pressure 110/70 mmHg. All other physical findings were within normal limits except for a palpable mass in her left hypochondrium. In preoperative checkup CECT abdomen showed a large heterogenous supra renal mass measuring 61 x 69 mm. At the time of admission, her Hb was 7.2 gm, so two units of packed red blood cells were transfused during a period of 10 days to raise her Hb prior to surgery to 10 gm. Her serum cortisol level was 0.62 mg/dl and DHEAS (dehydroepiandrosteronesulphate) was 65%. Rest of the investigations were within normal limits. Chest x-ray PA view showed cardiomegaly with normal lung fields. 2-D echocardiography showed ejection fraction 60%, mild aortic regurgitation and diastolic dysfunction. A case of pheochromocytoma was diagnosed and decided to treat patient surgically.tab prazocin 5 mg BD and tab propranolol 40 mg QID were started around 15 days prior to surgery to reduce risk of intra operative hypertensive crisis and arrhythmias. she was a known case of diabetic melliates which was managed with injection insulin. Informed written consent was signed by the patient. In the operating room routine monitors were connected (SpO2, NIBP and ECG) and IV infusion was started. Prior to surgery her pulse rate was 68/min, BP 124/82 mmHg with SpO2 100%. She was premedicated with inj. glycopyrrolate 0.2 mg and inj. fentanyl 100 µg. Preoxygention was done with 100% O2 for three min and anesthesia was induced with inj. propofol 100 mg, vecuronium bromide 0.1 mg/kg and she was intubated with 7.5 mm ID cuffed ETT. Anesthesia was maintained on sevoflurane in O2:N2O (33:66). A double lumen central venous catheter was inserted and CVP was measured to be 9 cmH2O, arterial line inserted in left radial artery and blood pressure was continuously monitored. After opening the peritoneum, when the surgeon started exploring near the abdominal mass, the BP suddenly shot upto 210/118 mmHg and heart rate rose to 170/min. The depth of anesthesia was increased. As an acceptable reduction in BP and HR was not obtained, nitroglycerine infusion was started at 0.5 µg/kg/min. Gradually, the dose of the infusion was increased to 1µg/kg/min. BP was not controlled so injection sodium nitropruside was started at 0.5-1.0 mcg/kg/min. inj. labetalol 5 mg was administered IV. The BP dropped to 180/100 mmHg and HR reduced to 126/min. Labetalol 5 mg was repeated. Meanwhile, the surgeon explored the abdomen and found spleen, pancreas and the liver to be normal. After clamping of suprarenal vein there was sudden fall in BP to 90/60 mmHg. Nitroglycerin infusion was stopped and dopamine infusion was started at 7 µg/kg/min. As the fall in BP continued, dobutamine infusion was also added at 5 µg/kg/min. Meanwhile, the mass was removed and was sent for histopathology. BP was still low (72/50 mmHg), so noradrenaline infusion was also started at 0.15 µg/kg/m. Intravenous fluids were given to improve the left ventricular filling. Total blood loss was estimated to be about 700 ml, so two units of packed cells were transfused. At the end of surgery the patient was still hemodynamically unstable so the patient was shifted to ICU on mechanical ventilation with full inotropic support. Total urine output was 400 ml.

In ICU, patient was put on pressure control mode with FiO2 0.5, PEEP 5 cmH2O, pressure support above PEEP 15 cm H2O and RR 12/min. Inotropic support was continued. ABG's report showed pH 7.35, PCO2 40, PO2 165 and HCO3 24. Overnight, mechanical ventilation was continued with high inotropic support. On second post-op day, her HR was 110/min, BP 106/74 mmHg, and the chest was clear without any additional sounds. So we decided to wean him off ventilator and taper off the inotropes. When the patient was fully awake and followed verbal commands, ventilator setting was changed from pressure control mode to continuous positive pressure mode. T piece trial was given and patient remained comfortable and tolerated the trial well, so was extubated with thorough suctioning. Histopathology report was received after seven days, which confirmed the diagnosis of benign pheochromocytoma. The patient was observed in ICU for four more days and was shifted to the ward on sixth postop day.

Anaesthesia management-

Pheochromocytomas represent significant management challenges to the anesthesiologists. Preoperative evaluation of these patients is key to successful perioperative management. Roizen et al. in 1982 proposed a set of criteria (now called the Roizen criteria)4 to objectively gauge the efficacy of adequate preoperative alpha blockade, and they include: No in-hospital blood pressure >160/90 mmHg for 24 h prior to surgery; No orthostatic hypotension with blood pressure <80/45 mmHg; No ST or T wave changes for 1-week prior to surgery; No more than 5 premature ventricular contractions per minute. Over the years, these criteria have remained consistently reliable; data does exist in the literature reflecting poorer outcomes when patients have not met these criteria prior to tumor resection. Most

centers use some (if not all of these criteria), during the preoperative evaluation process for PCC resection. Alpha blockade has been the mainstay of preoperative preparation for pheochromocytoma patients for over 60 years.[5]

In most centers, a combination of alpha-adrenergic and beta-adrenergic blockade and calcium channel blockers, in addition, are routinely used. The alpha-adrenergic blockade is typically administered starting 10-14 days preoperatively which, in addition to normalizing blood pressure, also aids in expanding the highly contracted intravascular volume - an often underappreciated issue, especially in the higher risk pheochromocytoma patients.Relief from anxiety prior to anesthetic induction is a key component, as apprehension can predispose to catecholamine surges. Ideally, a long-acting benzodiazepine such as lorazepam or diazepam administered the night before the operation (as tolerated) in addition to a judicious dose of IV midazolam prior to transfer to the operating suite creates a calm patient less prone to hypertensive crises at induction. anesthetic induction is one of the most critical portions of the procedure, with every effort being made to limit the hemodynamic stresses of direct laryngoscopy. Agents commonly used include propofol and etomidate. Ketamine is usually avoided due to its sympathomimetic effects, as are ephedrine and meperidine. Propofol has been documented to be safe in these patients; etomidate has the advantage of conferring cardiovascular stability, especially in volume-depleted patients6. For neuromuscular blockade vecuronium is the most widely used and preferred. Sevoflurane is most commonly used for pheochromocytoma excision . Aside from standard American Society of Anesthesiologists monitors, intra-arterial monitoring is the gold standard in the pheochromocytoma resection for beat-to-beat blood pressure monitoring. Central venous catheterization and monitoring is essential in these patients and has been the standard of care for over 50 years5. Hypertension during resection may arise from positioning, skin incision, intubation and is usually transient and responds to quick therapy7. Tumor manipulation usually generates a far more dramatic pressor response and usually associated with severe hemodynamic instability including significant reductions in cardiac output, left ventricular systolic and diastolic dysfunction. Prompt responses should include deepening the depth of anesthesia and rapidly administering direct arterial vasodilators, sodium nitroprusside being the key drug in conjunction with nitroglycerin, to reduce preload. Communication with the surgeon is critically important before tumor manipulation is begun to reduce the likelihood of major hemodynamic events. Hyperglycemia is common as a result of catecholamine excess, and insulin infusion therapy, as indicated, should be routine management in these patients. Sudden hypotension may also occur following ligation of the tumor which usually managed with massive fluid transfusion. DA-1, norepinephrine, and vasopressin have been used with success in refractory cases. Consideration should also be given to rapid steroid replacement in the hypotensive patient following bilateral adrenalectomies. Postresection all pheochromocytoma patients need intensive monitoring.

Conclusion-

pheochromocytoma may cause significant morbidity and mortility if not managed properly. Successful management requires careful preoperative optimization, meticulous intraoperative planning, and hemodynamic management. All patients need icu care in postoperative period. Intensive hemodynamic monitoring instituted intraoperatively may need to be continued in the postoperative period as well to tide over the initial period of hypotension after tumor removal.

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