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Balancing The Surge: Anesthetic Management Of Elderly Pheochromocytoma In Laparoscopic Adrenalectomy

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Abstract
Pheochromocytoma is a rare tumor of adrenal medulla that poses significant anesthetic challenges due to its unpredictable hemodynamic fluctuations. Medical management by multidisciplinary approach is essential for hemodynamic stability during the perioperative period. Vigilant anesthetic management with beat-to-beat variability of hemodynamics and multimodal analgesia improves patients' safety and peri operative pain management. Laparoscopic adrenalectomy has become the preferred surgical approach as it is associated with minimal manipulation of the tumor, thereby minimizing the resultant catecholamine surge. A thorough pre anesthetic evaluation and preparation is important in early ambulation and discharge of the patient.
Keywords*: Adrenal medulla, catecholamine, laparoscopic adrenalectomy, pheochromocytoma.*

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I. Introduction

Pheochromocytoma is a rare neuroendocrine tumor arising from chromaffin cells of adrenal medulla secreting epinephrine, norepinephrine (predominantly) and/or dopamine. Both sexes are equally affected with an increased prevalence in third to fifth decades of life which are responsible for less than 0.1% of all cases of hypertension in adults. It arises mainly from adrenal medulla but there are certain extra adrenal sites like celiac ganglia, superior and inferior mesenteric ganglia, thorax, urinary bladder but the most common extra adrenal site being organ of Zuckercandyl which is present near the aortic bifurcation. Headache, sweating and palpitation is the classical triad present in most of the cases. Headache is the commonest symptom whereas hypertension is the commonest sign. Symptoms like flushing, abdominal pain, anxiety, nausea and vomiting, blurry vision, tachycardia can also be present. If not treated early, there can be uncontrolled release of catecholamine leading to uncontrolled hypertension, causing cerebrovascular accident and ultimately premature death. Here we report a case of laparoscopic adrenalectomy of a pharmacologically well controlled elderly pheochromocytoma patient with minimal hemodynamic fluctuation resulting in early ambulation and discharge of the patient.[1,2,3,4]

II. Case Report

A 62-year-old elderly female, homemaker by profession with a body weight of 65kg presented to us with significant weight loss, lower abdominal pain and generalized fatigue for 2 months. History revealed occasional episode of chest discomfort and palpitation. She denied any known family history of endocrine tumors. She had a history of vaginal hysterectomy 14 years back under general anesthesia which was uneventful. Noninvasive blood pressure (NIBP) on sitting position was 150/90 with a pulse rate of 101 beats per minute. On standing position, the blood pressure was 170/110 with a pulse rate of 116 beats per minute. On evaluation, routine blood investigations were normal. CECT abdomen showed a well-defined mass of 65X80X70mm in the region of right adrenal gland. Specific investigations like 24 hours urine metanephrine was 894.6 (normal <350), urine normetanephrine was 3300 (normal <600) all suggestive of pheochromocytoma. She was advised to undergo surgery and was started on anti-hypertensives for 6 weeks with tablet prazosin 5mg BD PO for alpha blockade with instructions of home blood pressure and heart rate monitoring followed by tablet prazosin 5mg PO BD, metoprolol succinate 25mg PO BD for beta blockade and cilnidipine 10mg PO OD, once the alpha blockade was achieved as per endocrinologist. She was additionally instructed to maintain adequate hydration. ECG showed sinus tachycardia (@110/min) and non-specific ST-T changes. 2D Echo revealed ejection fraction of 64%, concentric left ventricular hypertrophy with no regional wall motion abnormality.

An informed written consent was taken for surgery. The patient was subsequently taken to the operating room. Plan of anesthesia was balanced general anesthesia. Standard ASA monitors were placed, baseline NIBP was 150/70mmhg and heart rate was 117 beats/minute. Left radial artery cannulation was done for beat-to-beat

blood pressure monitoring. Central venous cannulation was done on the right internal jugular vein, all under local anesthesia. Dexmedetomidine infusion was started at 1mcg/kg/hr, 10 minutes before induction to attenuate laryngoscopic surge and tachycardia. Following preoxygenation, midazolam 0.02mg/kg, fentanyl 2mcg/kg and ondansetron 0.1mg/kg was given IV. Dexamethasone was given for post operative nausea and vomiting. The patient was preloaded with 1L of balanced salt solution. Induction with propofol 2mg/kg followed by rocuronium bromide 1mg/kg was given for muscle relaxation. A 7mm ID cuffed endotracheal tube was used for intubation. Patient was maintained with oxygen and air with sevoflurane 1.5% to achieve a MAC of 1. The end tidal CO2 was kept at 35-45mmhg.

Patient was positioned left lateral with kidney bridge. Peritoneal insufflation was done with CO2 where the intraabdominal pressure was maintained at 10-12mmhg. After adequate hydration with balanced salt solution, patient was started with sodium nitroprusside infusion of 0.3mcg/kg/min wrapped in an aluminum foil as exposure to light causes the drug to break down, which produces a potentially lethal byproduct, cyanide. When the right adrenal vein was ligated, patient had severe hypotension which was managed by titrated doses of nor adrenaline infusion and fluid boluses. Patient was hemodynamically stable with normal arterial blood gas analysis following resection of the tumor. Multimodal analgesia with the help of paracetamol, diclofenac and ketorolac was given along with ketamine boluses. The surgery went for around 3 hours and the patient was extubated using sugammadex 1mg/kg IV. Extubation response was attenuated with the help of esmolol 0.5mg/kg IV.

The patient was brought to post anesthesia care unit (PACU) in stable condition where vitals were checked and the patient was shifted to the intensive care unit (ICU). On post operative day 1, the patient was alert and conscious, vitals were stable and the pain was well controlled. She was shifted to the ward on day 2 and was sent home on day 4 with instructions to follow up with urologist and endocrinologist.

III. Discussion

Pheochromocytoma is a rare neuroendocrine tumor arising from the chromaffin cells of adrenal medulla that produces, stores and releases catecholamines (epinephrine, norepinephrine and dopamine) into systemic circulation causing a variety of signs and symptoms like hypertension, headache, palpitation, anxiety, abdominal pain, dizziness, tachycardia, blurry vision, heart failure to name a few. A plasma free nor metanephrine higher than 400pg/ml or a metanephrine level higher than 220pg/ml confirms diagnosis.

MIBG (Monoiodobenzylguanidine) is an additional tool if available apart from MRI/ CT.[5] A glucagon stimulation test is said to be the safest and most specific provocative test. Clonidine suppression test and the provocative test with histamine or tyramine have been obsolete now. Triggers of catecholamine release include stress, certain medications like morphine and atracurium which causes histamine release, pain, surgical excision, pneumoperitoneum, manipulation of the tumor and positional changes need to be avoided by increasing the depth of anesthesia or by giving certain short acting drugs. Invasive blood pressure monitoring and central venous cannulation are critical for real time hemodynamic assessment and rapid administration of vasoactive drugs. The mainstay of preoperative management involves antihypertensive treatment first with alpha blockade followed by beta blockade and/or calcium channel blockers. Prazosin, an alpha-1 blocker is the most common drug used in pheochromocytoma as it doesn't block alpha-2 receptors and therefore do not induce tachycardia as a side effect.[6]Alpha blockade helps to control BP, increases intravascular volume, prevention of hypertensive episodes, reduces myocardial dysfunction and allows desensitization of adrenergic receptors. Beta blocker if given before alpha blockade can lead to unopposed action of alpha receptors leading to vasoconstriction. As these patients are already hypertensive, because of unopposed action there will be exacerbation of vasoconstriction leading to further increase in BP and worsening symptoms. Additionally, pre operative therapy should include high sodium diet and adequate fluid hydration to counteract the catecholamine induced blood volume contraction.[7] Sodium nitroprusside, a direct vasodilator is the agent of choice to manage intraoperative hypertensive crisis. Other drugs like nitroglycerine and phentolamine can also be used but it causes reflex tachycardia.[8] Following tumor resection, significant hypotension may occur due to the reduction in catecholamines preloading with balanced salt solution if tolerated can attenuate hypotension upon ligation of adrenal vein. Vasopressors and inotropes are required to maintain hemodynamics. Also, a reduced level of plasma catecholamines can lead to release of insulin causing hypoglycemia in the post operative period. Laparoscopic approach for adrenalectomy is minimally invasive with least tumor manipulation, early mobilization, reduced intraoperative blood loss and less post operative analgesic requirement but pneumoperitoneum can lead to sudden catecholamine surge resulting in hypertensive crisis and arrythmias which needs to be addressed. Patient has to be managed in surgical ICU for optimum patient care, early mobilization and discharge.[9,10]

IV. Conclusion

The variegated clinical manifestation of pheochromocytoma pose significant diagnostic challenges despite advances in medical science. Laparoscopic approach to pheochromocytoma though remain formidable to the anesthesiologists due to a variety of reasons still has reduced morbidity and mortality to a great extent. A

polymathic preoperative preparation, intraoperative management and post operative care can lead to a victorious outcome.

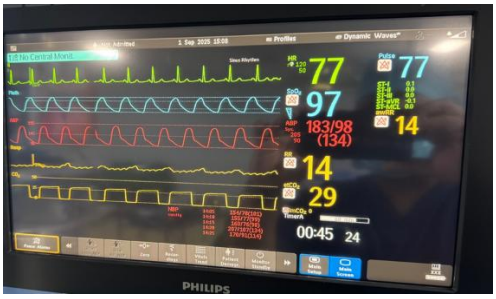

FIG.1: shows hemodynamic parameters before tumor resection with variation in MAP.

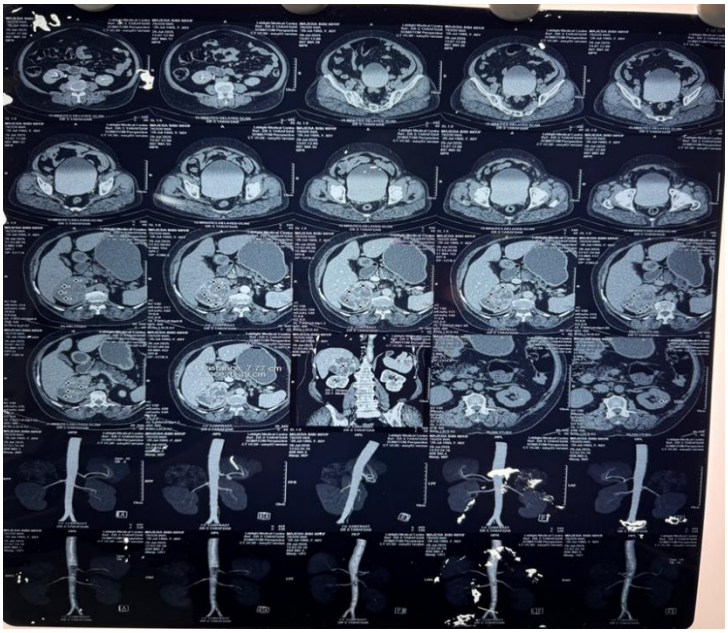

FIG 2: CECT Abdomen shows adrenal mass compressing the liver.

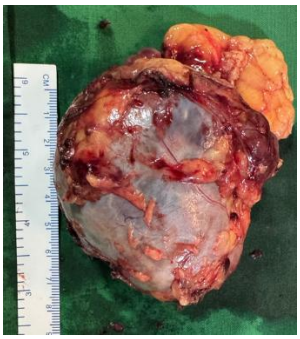

FIG 3: shows adrenal mass after resection

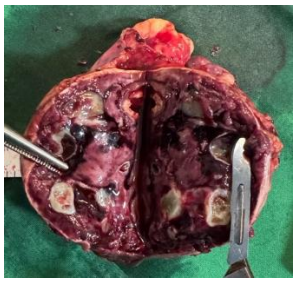

FIG 4: shows cut section of adrenal mass

References

[1]. Gladston DV, Nair VA, Valasareddy SK. Anaesthesiologist's Perspective Of Laparoscopic Adrenalectomy-A Case Report With Current Concepts In Management.

[2]. Michaud KL, Thiele RH, Forkin KT. Anesthetic Management Of Laparoscopic Adrenalectomy For A Patient With Concomitant Pheochromocytoma And Bilateral Carotid Artery Stenosis. Case Reports In Anesthesiology. 2023;2023(1):2172464.

[3]. Bouaiyda A, Jeddab A, Mounir K, Jaafari A, Bensghir M, Balkhi H. Anesthetic Management Of Pheochromocytoma Complicated By Takotsubo Syndrome: A Case Report About A Dual Challenge. International Journal Of Surgery Case Reports. 2025 Jun 19:111544.

[4]. Sprung J, O'Hara Jr JF, Gill IS, Abdelmalak B, Sarnaik A, Bravo EL. Anesthetic Aspects Of Laparoscopic And Open Adrenalectomy For Pheochromocytoma. Urology. 2000 Mar 1;55(3):339-43.

[5]. Gunseren KO, Cicek MC, Bolat D, Yeni S, Vuruskan H, Oz Gul O, Yavascaoglu I. Is Laparoscopic Adrenalectomy For Pheochromocytoma Safe And Effective In Geriatric Patients?. International Journal Of Clinical Practice. 2021 Sep;75(9):E14427.

[6]. Ramachandran R, Rewari V. Current Perioperative Management Of Pheochromocytomas. Indian Journal Of Urology. 2017 Jan 1;33(1):19-25.

[7]. Subramaniam R. Pheochromocytoma–Current Concepts In Diagnosis And Management. Trends In Anaesthesia And Critical Care. 2011 Apr 1;1(2):104-10.

[8]. Eisenhofer G, Rivers G, Rosas AL, Quezado Z, Manger WM, Pacak K. Adverse Drug Reactions In Patients With Phaeochromocytoma: Incidence, Prevention And Management. Drug Safety. 2007 Nov;30(11):1031-62.

[9]. Farrugia FA, Martikos G, Tzanetis P, Charalampopoulos A, Misiakos E, Zavras N, Sotiropoulos D. Pheochromocytoma, Diagnosis And Treatment: Review Of The Literature. Endocrine Regulations. 2017;51(3):168-81.

[10]. Kinney MA, Narr BJ, Warner MA. Perioperative Management Of Pheochromocytoma. Journal Of Cardiothoracic And Vascular Anesthesia. 2002 Jun 1;16(3):359-69.