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ANAESTHETIC MANAGEMENT OF PHEOCHROMOCYTOMA A REVIEW OF 3 CASES

Anaesthesiology

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ABSTRACT

INTRODUCTION: Pheochromocytoma is pharmacologically volatile, potentially lethal catecholamine- Containing tumor of chromaffin tissues [1]. Pediatric pheochromocytomas, although rare, have an increased incidence of bilateral, multifocal, and familial preponderance when compared to adults. It occurs in less than 2% of pediatric patients with hypertension and is a diagnosis of exclusion[2]. They are usually located in adrenal medulla or sympathetic paraganglia but may be found anywhere chromaffin tissue exists. These locations extend from the base of skull to anus[3]. Traditionally it was thought that 90% of pheochromocytoma are found in adrenal medulla and 10% occuredelse where. Prevalence of extra adrenal tumorsis now thought to be as high as 20%.theseare commonly called paragangliomas[4]. **RESULT:** The child was premedicated with midazolam 30mcg/kg intravenously and was transferred to the operating room on an infusion of normal saline 60 mL/hr and hydrocortisone 10mg/hr according to the endocrinologist's advice. After instituting electrocardiogram (ECG), noninvasive blood pressure (NIBP), and pulse oximeter (SpO2) monitors, the child was pre-oxygenated and anesthesia was induced with propofol2 mg/Kg and fentanyl 2 mcg/Kg. Endotracheal intubation was facilitated with vecuronium0.1 mg/Kg. Right internal juglar vein and right radial artery were cannulated for continuous invasive pressure monitoring. A 19G epidural catheter was inserted in T8-T9 interspace for analgesia. **CONCLUSION:** On the basis of these case reports, we want to emphasize that while dealing with surgeries of pheochromocytomahaemodynamic instability should be kept in mind. Preoperative blood pressure optimization is necessity along with intraoperative beat to beat monitoring and use of titrated doses of antihypertensive accordingly. Persistent hypertension after removal of pheochromocytoma occasionally signifies that a residual tumor is present, so post operative biochemical assay and imaging studies are repeated for confirmation and further management.

KEYWORDS

Pheochromocytoma, Incidence of bilateral, multifocal, and familial preponderance

INTRODUCTION

Pheochromocytoma is pharmacologically volatile, potentially lethal catecholamine- Containing tumor of chromaffin tissues [1]. Pediatric pheochromocytomas, although rare, have an increased incidence of bilateral, multifocal, and familial preponderance when compared to adults. It occurs in less than 2% of pediatric patients with hypertension and is a diagnosis of exclusion[2]. They are usually located in adrenal medulla or sympathetic paraganglia but may be found anywhere chromaffin tissue exists. These locations extend from the base of skull to anus[3]. Traditionally it was thought that 90% of pheochromocytoma are found in adrenal medulla and 10% occuredelse where. Prevalence of extra adrenal tumorsis now thought to be as high as 20%.theseare commonly called paragangliomas[4].

Pheochromocytomas account for only 0.1% of all cases of arterial hypertension. They are prevalent in 0.005% to 0.01% of the population[5].

Adrenal incidentalomas a term applied to an incidentally discovered adrenal mass on imaging performed for reasons unrelated to adrenal pathology [6]. Its prevalence is rising because of big volume of radiologic explorations that are done every day.

Laparoscopic adrenalectomy has become the standard approach in the management of adrenal mass. This technique is minimally invasive and has the advantage of decreasing convalesces, less post-operative pain and blood loss with improved cosmoses.

The perioperative course and anesthetic management of patients with catecholamine-secreting pheochromoytoma has typically been reported only in small case series because of the infrequent incidence of these tumors. In this case series, we *explaineda successful management of a cases of pheochromocytoma that underwent adrenalectomy with *good outcome.

MATERIALAND METHODS

A 2yr-old female presented to paediatric surgery department complaining of weight gain, excessive hair growth on face and pubic region, breast enlargement, increased appetite since 1.5 month. General examination and systemic examination findings were unremarkable except for a blood pressure of more than 160/100 mmHg for which oral nifedipine*5 mg twice daily was started. On further investigations including complete blood counts, serum calcium, electrolytes, urea, and echocardiography (ECHO) results were normal. Ultrasound examination (USG) of the abdomen showed a heterogenous mass lesion at site of upper pole of left kidney measuring 6.9cm x 6.9cm.Further evaluation was confirmed by CECT whole abdomen*(figure 1).Suspicion of pheochromocytoma was confirmed when 24 hr urinary normetanephrine was markedly elevated *(4.897mcg/day, normal 0-600mcg).Volume expansion was achieved by increased salt intake and iv fluids during 3 days prior to surgery. Patient was scheduled for open left adrenalectomy under general anaesthesia.

A 5 yr-old female referred to us for left adrenalectomy. She complained of pain abdomen, For 4 months, with severe headache and palpitation. On physical examination, she had high grade fever, blood pressure 160/108mmHg, raised jugular venous pressure(JVP).Investigations revealed normal routine blood work. The patient was admitted to paediatric surgery ward. MRI of the abdomen done which showed well defined hetrogenous mass lesion seen in left suprarenal gland measuring around 5.5cm X 4.3cm displacing the left kidney downwards.The right adrenal gland and liver are grossly unremarkable.Echocardiogram showed mild globular LV systolic dysfunction. Thediagnosis of pheochromocytoma was confirmed by vanillymandelic acid (VMA) 24-hr urine collection concentration was 87mcmol/day(normal range 5-25mcmol/day). Patient was started on oral phenoxybenzamine 10 mg twice daily and oral amlodipine 5mg once daily. Three days after starting the antihypertensive medication, blood pressure was controlled and the range of reading were in the

range of 108/72 to 130/78. She was scheduled to undergo right open adrenalectomy under general anaesthesia.

A male, 8 years of age presented with complaints of vague abdominal pain with nausea and generalized body weakness since two months, was found incidentally to have left adrenal mass on USG whole abdomen. CT scan of abdomen confirmed the presence of the mass 2.7cm X 3.3cm and laboratory studies were done and found within normal range. Patient had no history of headache, diaphoresis, hypertension, or palpitation and the mass considered non-functioning and patient was scheduled for laparoscopic adrenalectomy under general anaesthesia.

DISCUSSION AND RESULT

Pre-operative assessment of patients with pheochromocytoma is an essential part in management[7,8]. Although alpha – blockade is not universally considered as absolute necessity, other investigators recommended proper alpha1-receptor blockade[9,10,11]. In our second case, we have used high dose alpha-adrenergic blockade prior to surgery and our target was the development of postural hypotension in order to ensure full blockade.

Roizen et al recommended the following preoperative conditions prior to surgery for pheochromocytoma: (a) blood pressure < 160/90 mmHg for 24 hr before surgery, (b) postural hypotension > 80-45 mmHg, (c) ECG should be free of any ST-T changes for a week and (d) no PVCs more than 1 in five min7. In our case we strictly adhered to Roizen's criteria.

Preoperative benzodiazepine and reassurance reduces anxiety and pressure fluctuations. Combined epidural and general anesthesia is the most preferred anesthesia technique. Standard monitors like ECG, NIBP, and SPO2are mandatory before induction of anesthesia. Invasive arterial pressure and central venous pressure monitoring are essential and are ideally employed after anesthesia induction in a pediatric patient. Temperature and urine output should also be monitored. Thiopentone or propofol can be used for induction of anesthesia along with fentanyl and both have a good hemodynamic profile. Vecuronium is the preferred muscle relaxant for cardiovascular stability but atracurium and rocuronium have been used without any untoward effect. Epidural infusion of bupivacaine 0.0625%-0.125% with fentanyl 2 mcg/mL at the rate of 5-10 mL/hr can be used for post-operative analgesia .Intraoperative hypertensive spikes during induction and tumor manipulation can be impeded by deepening anesthesia and infusions of NTG, phentolamine, esmolol, labetalol.

Post resection, patients should be monitored for complications of hypotension, hypoglycemia And persistent hypertension.hypotension can be severe and might need phenylephrine, adrenaline or noradrenaline , or vasopressin infusions, especially in the patients receiving phenoxybenzamine. Hypertension might persist for few days due to elevated circulating catecholamines. Hypoglycemia might ensue after removal of tumor, secondary to increase in insulin levels due cessation of pancreatic beta cell suppression . Decision for post-operative extubation or elective ventilation depends on hemodynamics stability and other vital parameters. Post-operative ICU care is necessary for close monitoring of the complications. In the event of persistent hypertension beyond 7-10 days, presence of residual tumor or extra adrenal tumor should be considered.

A multidisciplinary approach team comprising of anesthesiologists, surgeon, endocrinologists, and cardiologist are vital for successful outcome.

The child was premedicated with midazolam 30mcg/kg intravenously and was transferred to the operating room on an infusion of normal saline 60 mL/hr and hydrocortisone 10mg/hr according to the endocrinologist's advice. After instituting electrocardiogram (ECG), noninvasive blood pressure (NIBP), and pulse oximeter (SpO2) monitors, the child was pre-oxygenated and anesthesia was induced with propofol2 mg/Kg and fentanyl 2 mcg/Kg. Endotracheal intubation was facilitated with vecuronium0.1 mg/Kg. Right internal juglar vein and right radial artery were cannulated for continuous invasive pressure monitoring. A 19G epidural catheter was inserted in T8-T9 interspace for analgesia. Anesthesia was maintained with isoflurane 0.5-1.5% in air-oxygen mixture and titrated propofol infusion.*Intra operative blood pressure surge during tumor dissection was controlled with titrated infusion of esmolol and nitroglycerine. Estimated blood loss was about 330 mL, which was replaced by crystalloids and 1/3rd of whole blood . urine output was monitored throughout the procedure. After completion of surgery reversal was given in form of neostigmine 50mcg/kg and glycopyrolate 10mcg/kg and trachea was extubated.Postoperatively, the child was transferred to PICU with NTG infusion. Analgesia was managed with epidural infusion of 0.0625% bupivacaine with 2mcg/mL of fentanyl at 5 mL/hr. Patient made uneventful recovery and 2 days later she was discharged to regular paediatric surgical ward. Histopathology of left adrenal gland confirmed the diagnosis of pheochromocytoma. Postoperative CECT scan of whole abdomen was done to rule out any residual tumor. The child was discharged after 10 days with stable parameters. In the follow up after three months, the child had normal blood pressure and serumcortisol level.

CONCLUSION

On the basis of these case reports, we want to emphasize that while dealing with surgeries of pheochromocytomahaemodynamic instability should be kept in mind. Preoperative blood pressure optimization is necessity along with intraoperative beat to beat monitoring and use of titrated doses of antihypertensive accordingly. Persistent hypertension after removal of pheochromocytoma occasionally signifies that a residual tumor is present, so post operative biochemical assay and imaging studies are repeated for confirmation and further management.

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