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Research Paper

Anaesthetic Management of A Case of Phaeochromocytoma Posted For Laparoscopic Bilateral Adrenalectomy With Magnesium Sulphate Infusion : A Case Report

Medical Science

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Dr Deepa Chandran — DA ,DNB Anaesthesia,1864 sruthi officer model colony , opposite ayappan temple, dasarahalli po Bangalore 560057

Dr Joel Chakravarthy — MD Anaesthesia, consultant anaesthesia, Bangalore Baptist Hospital, Vinayaknagar, Hebbal, Bangalore

Dr Varghese Zachariah — MD Anaesthesia, senior consultant anaesthesia, Bangalore Baptist Hospital, Vinayaknagar, Hebbal, Bangalore

ABSTRACT

Phaeochromocytoma is a rare catecholamine secreting neuroendocrine tumour commonly arising from the adrenal medulla. The classic triad of headache , palpitations and diaphoresis is present in 70% of patients and only 50% of the cases have sustained hypertension. The definitive treatment for phaeochromocytoma is surgical excision of the affected adrenal gland. The anaesthetic management is challenging as it is associated with wide haemodynamic fluctuations especially during induction, intubation , tumor handling and following tumour vessel ligation. There is wide institutional and global variation in the intraoperative anaesthetic technique and there is insufficient data to suggest one technique over the other. We hereby report a case of bilateral phaeochromocytoma in a 38 year male patient who underwent laparoscopic bilateral adrenalectomy for bilateral phaeochromocytoma. We successfully managed the case with intravenous magnesium sulphate infusion instituted intraoperatively, along with epidural infusion with minimal haemodynamic changes. The use of labetolol and sodium nitroprusside infusions was minimal.

Introduction:

The incidence of phaeochromocytoma is approximately 2-8 in 1,000,000. In adults about 80% of adrenal cases are unilateral and only 10% of adrenal cases are bilateral. Bilateral phaeochromocytomas are associated with hereditary disease.10%of these tumours are malignant and 10% of these tumours are extraadrenal. Most of the tumours weigh <100gms and are ,10 cms in diameter. These are highly vascular tumours. Pheochromocytoma is a tumor of the multiple endocrine neoplasia syndrome, type IIA and type IIB (also known as MEN IIA and MEN IIB, respectively). The other component neoplasms of that syndrome include parathyroid adenomas, and medullary thyroid carcinomas.

Case report :

A 38 year male patient with no comorbidities came with a one year history of occasional severe throbbing headache associated with palpitations which used to last for 5 minutes. The symptoms had aggravated in the last in the last 3 months for which he took a medical consultation. In the OPD his blood pressure was 190/100 which settled after the episode. On further evaluation the urinary Vanellyl Mandelic Acid report showed 36mg/day and metanephrines were 3350 units. The CT abdomen showed undetermined heterogeneously enhancing mass lesions in bilateral adrenal glands. A provisional diagnosis of phaeochromocytoma was made. MIBG scan was done which showed well defined somatostatin receptors expressing left prerenal soft tissue mass lesion(4.1×3.9×6.5 cms) with a lobulated superior pole in continuity with heterogeneously enhancing well defined focal lesion (1.8×1.9×2 cms) of left adrenal gland. The endocrinologist started the patient on tab phenoxybenzamine 10 mg BD. After adequate alpha blockade, which was suggested by postural hypotension of 10 mm of Hg in systolic blood pressure the patient was started on tab metoprolol 12.5 mg BD. The BP was stabilized preoperatively to a range of100/60 to 110/64 with the above drugs over a period of 15 days . There was no significant change in the haematocrit during this period. The preoperative investigations were as follows:

Hb :13.5 gm/dl ; post α and β blockade Hb was 13.4gm/dl

TC:7500

Platelet count:252000 cells/cu mm

PT:Test:15.3,Control:13.8

INR:1.13

PTT: Test:31.1 T:31.1

Serum electrolytes: sodium:137.4, potassium:4.2

HBA1C: 6.2

HIV, HBsAg, HCV : Negative

FBS: 95mg/dl

Blood group: O positive

Lipid profile was within normal limits

Cardiologist opinion was taken . ECG and Echo were normal.

Preoperatively tab phenoxybenzamine was stopped on the night prior to surgery and on the morning of surgery and instead tab prazosin 5mg was administered. The other medications were continued as adviced till the morning of surgery. High risk consent explaining the surgical and anaesthetic implications was taken. Fasting guidelines were followed as recommended. Patient was premedicated with tab diazepam 10mg orally on the night before and on the morning of surgery.

On the morning of surgery the patient was shifted to the preoperative room. Anaesthesia monitors were connected and the vitals recorded showed a BP of 130/80mm of Hg and pulse rate of 70 beats/minute. An 18 gauge B Braun intravenous canula was inserted in the non dominant hand. After explaining the procedure, epidural was inserted at the level of T9_T10. Arterial line was secured in the right radial artery under LA with a 20 gauge vasofix and central venous line (Arrow 7F Quad lumen) was inserted under ultrasound guidance through the right Internal jugular vein. Incremental doses of intravenous fentanyl to a total of 100mcg and midazolam 1mg was administered during the procedure. During the placement of these lines an increase in BP to 150/90 and HR to 80/minute was documentad. After shifting to the Operating room a baseline reading of BP was 93/53 and HR of 53/min were documented. After pre-oxygenation patient was induced with IV propofol 100mg followed by IV lignocaine 80mg, IV magnesium 2gms over 10 minutes and IV atracurium 35 mg . BP of 65/40 mm of Hg and a HR of 54/minutes was documented after this. Laryngoscopy was done

and patient intubated with #8mm cuffed portex endotracheal tube(smiths medicals). Post intubation the BP was 74/52 and HR was 56/minute. Fluid bolus of 1 litre crystalloid was infused and 500 ml of colloid started. IV phenylephrine 50mcg was administered following which the BP stabilized to 104/74mm of Hg and the HR was 60/minute. A continous infusion of 1gm/ hour of magnesium sulphate was started. Anaesthesia was maintained with 60% oxygen in air and isoflurane to MAC of 1 . IV morphine 7.5 mg was administered for analgesia. Capnoperitoneum was established within 30 minutes of induction; intra-abdominal pressures were maintained at 14 mm of Hg. There were no significant changes in haemodynamics during carbondioxide insufflation. Epidural infusion of 0.25% bupivacaine was started @ 3ml/hour. Patient was put in the right lateral position with adequate padding to the pressure points. Intermittent boluses of iv MgSO4 500mg was administered upto a total of 2 gms throughout the intraoperative period. The left sided adrenalectomy took 4 hours. During the initial period of tumour handling there was one episode of sudden rise in BP to 220/110 mm of Hg. Bolus IV magnesium of 500mg was administered; an infusion of sodium nitroprusside at a dose of 0.5mcg/kg/min was started as the BP control was inadequate with the bolus. Following this BP reduced to 110/60 mm of Hg. After the ligation of the left sided tumour vessels the BP was 94/60 mm of Hg, HR 60/ min, RBS 316mg/dl and urine output was 300 ml. Blood gas analysis done at this period showed Ph:7.283, Pco2:39.8 mm of Hg; Po2:214mm of Hg and bicarbonate of18.2m mol/lt. After resection of left sided tumour the patient was turned to right lateral position. The right sided resection took 2.5 hours. Tumour handling in this side did not produce any significant haemodynamic changes and the magnesium infusion was tapered down to 500mg/hour. The sodium nitroprusside infusion was also tapered down and stopped just before tumour vessel ligation. Following tumour vessel ligation the magnesium sulphate infusion was also stopped. There was no hypotension and the blood glucose was 210mg/dl after the ligation. The intra operative course was uneventful after this. A total of 6 grams of magnesium was infused throughout the intra operative period. Intra operative serum magnesium was 3.1mg/ dl after right adrenalectomy(second side).

In view of the prolonged duration of surgery, the patient was not extubated and was shifted to ICU where he was ventilated on SIMV mode for 12 hours followihifted tng which he was extubated. Epidural infusion was continued for 24 hours at 4ml/ hourof 0.125% bupivacaine. There was no post-operative hypoglycemia and postoperative hypotension. Tab hydro cortisone and fludro cortisone were started. Patient was discharged on the sixth post-operative day.

Discussion

The anaesthetic management of phaeochromocytoma is challenging and there is no particular drug regimen for the intraoperative management of the wide haemodynamic swings. The main goal of preoperative management of a pheochromocytoma patient is to normalize blood pressure, heart rate, and function of other organs; restore volume depletion; and prevent a patient from surgery-induced catecholamine storm and its consequences on the cardiovascular system(1). This is done by a combination of alpha blockers ,beta blockers and other drugs like calcium channel blockers. During alpha receptor blockade tachycardia and arrhythmias can occur due to resultant unopposed beta receptor activity. The tachycardia and arrhythmias are controlled by carefully introducing beta adrenergic blockers. Beta blockade should never be instituted until alpha adrenergic blockade is fully established as unopposed alpha stimulation may lead to severe hypertension.(2) In most medical centers, adrenergic blockade usually starts 7–14 d preoperatively to have adequate time to normalize blood pressure and heart rate and to expand the contracted blood volume (3). After correction of heart rate and blood pressure with alpha and beta blockade, a repeat hematocrit is checked to assess the volume status of the patient. If patient is adequately volume replenished there will be a fall in hematocrit.(4)

Preoperatively the anaesthesiologist should take relevant history, assess the severity of hypertension and look for any end-organ damage, especially catecholamine induced cardiomyopathy and cardiac failure,which is associated with a high mortality. (5) Preoperative investigations should include full blood count, hematocrit, assessment of renal functions and complete cardiovascular evaluation with elecrocardiography, chest x ray and M mode echocardiography . M-mode echocardiography should be used to assess left ventricular dysfunction, evaluate improvement after alpha adrenergic blockade, and determine the optimal timing of surgery.(6) Insulin therapy may be required if hyperglycaemia is present. If hypercalcaemia is present, the presence of MEN type 11 should be considered.(4)

Laparoscopic excision of bilateral phaeochromocytoma incurs greater haemodynamic changes due to associated capnoperitoneum in addition to tumour handling(7). Magnesium sulphate blocks the catecholamine release from the adrenergic nerve terminals and adrenal medulla(8). It also blocks the adrenergic receptors directly. The use of magnesium for intra-operative management of phaeochromocytoma dates back to 1989 when James et al used it on on 17 patients. 15 of these patients could be managed solely with magnesium sulphate. The remaining 4 patients required sodium nitroprusside(9). In our patient we used magnesium at a loading dose of 40mg/kg over 10 minutes followed by 1 gm/hour of magnesium sulphate. The haemodynamics were stable in our patient with the continuous infusion except one episode during tumour handling when the blood pressure had risen to 210/130 mm of Hg. . We had to start infusion of sodium nitroprusside to combat the increased pressures. The infusions of sodium nitroprusside and magnesium sulphate were tapered and stopped intra-operatively itself as the haemodynamics were stable. The therapeautic range has to be maintained since its toxicity can lead to neuromuscular paralysis and renal failure. Minami et al have reported the effective use of magnesium in laparoscopic adrenalectomy for phaeochromocytoma for a paediatric patient with unilateral tumour(10). The decision for an epidural infusion of bupivacaine for laparoscopic adrenalectomy was taken as it has been reported to be effective and safe method to reduce fluctuations in hormonal levels (11). We had introduced epidural infusion at a rate of 3ml/hour from the start of the surgery and it was continued post-operatively. The surgery lasted for 8 hours and our total dose of magnesium was 6 gms and that of sodium nitroprusside was 0.5mcg/kg/min for 4 hours. This is much lesser than the conventional requirement of vasodilators. In conclusion the intra-operative haemodynamic fluctuations during laparoscopic bilateral adrenalectomy can be successfully managed with intra-venous infusion of magnesium sulphate combined with sodium nitroprusside infusion and epidural infusion of local anaesthetic as adjunct.

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