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Combined general and epidural anaesthesia for excision of phaeochromocytoma – a unique and safe technique

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Summary

Surgical excision of phaeochromocytoma is usually associated with elevation of arterial blood pressure above 200 mmHg for some time irrespective of the use or not of preoperative alpha - adrenergic blockade. Attempts at controlling the elevated blood pressure usually involve the use of many drugs through induction, maintenance, termination and post operative period. We recently used a combined general and epidural anaesthesia for excision of a huge phaeochromocytoma in a 24 yr old Nigerian lady with a satisfactory outcome. The combined technique seemed to have modified the anaesthetic course considerably, resulting in the use of fewer drugs and a steady haemodynamic state which is very unusual in anaesthetising patients with phaeochromocytoma (see haemodynamic record Illustration II) Post-operative analgesia was provided with morphine given through the epidural catheter.

Keywords: *Combined, general anaesthesia, phaeochromocytoma*

Résumé

L'excision chirurgicale de la phaeochromocytoma est habituellement associée avec l'elevation de la pression arterielle du sang au dessus de 200 mmHg pour un certain temps, independamment de l'usage ou non de l'avant operation alpha - blockage adrenergique. Les essais de control de la pression elevee du sang habituellement inclus l'usage de plusieurs medicaments par induction, maintien, fin et la periode post operative. Nous avons recemment utilise une combinaison generale et l'anaesthesie epidurale pour l'excision d'un gros phaeochromocytoma sur une femme Nigerienne adulte de 24 ans avec satisfaction. La technique combinee parait avoir modifier considerablement le cours anaesthetique, resultant de l'usage de peu de medicaments et la stabilite de l'etat haemodynamique qui est tres inhabituel dans l'anaesthesie des patients souffrant de la phaeochromocytoma (voir le record haemodynamique, illustration II). L'Analgesie post operative etait fournie avec la morphine donnee pendant le catheter epidural.

Case presentation

U.U. a 24yr. Old lady was referred to the Urologist on account of a left adrenal mass and hypertension.

She had a 2 yr history of dizziness, excessive sweating, palpitations and headache. Physical examination was essentially normal except for elevated blood pressure,

with the diastolic pressure above 110 mmHg.

The packed cell volume, electrolytes and urea and urinalysis were within normal limits.

Ultrasound of the kidneys, ureters and bladder (KUB) revealed a left adrenal mass and a C.T. scan of the abdomen confirmed a huge isodense mass anteromedially to the left kidney and displacing the kidney downwards and laterally. There was no paralympadenopathy.

The urinary V.M.A. (vanilylmandelic acid) was 6.2 mg/twenty- four hours (normal 0.7 - 6.8 mg/twenty-four hours).

Anaesthetic management

Premedication was with oral diazepam 10 mg and chlorpromazine 50 mg given the night before and the morning of surgery. Antihypertensive therapy was with labetalol 100 mg and chlorothiazine which were allowed for 7.00 a.m. the morning of operation. An intravenous saline solution 1 litre ran through 8 hours of the night.

In the operating theatre, monitoring devices consisted of an automated non-invasive blood pressure monitor, pulse oximeter, electrocardiogram and temperature probe. Blood glucose monitoring was also carried out hourly using a glucometer. Vital signs were set to record every 5 mins. With a baseline blood pressure of 160/110 mmHg, preloading with 100 ml of normal saline using a 16 gauge cannula, and epidural catheter was inserted in a sitting position at L3/L4 level. Following a test dose of 3 ml., 2% plain lignocaine which was negative for intradural puncture, a T4 block was established using 20 ml of 0.5% plain marcaine (bupivacaine).

Four bolus doses of 5 mg Hydrallazine was administered because the blood pressure shot up to 200/140 mmHg; blood pressure then fell to 150/90 mmHg with a pulse rate of 140 beats per minute.

While the patient was breathing 100% O₂ via a face mask, general anaesthesia was induced with morphine 10 mg and midazolam 20 mg. Endotracheal intubation was facilitated with administration of atracurium 20 mg intravenously. Three minutes before laryngoscopy and intubation, intravenous lignocaine 100 mg was administered slowly. Ventilating manually till full muscle relaxation was achieved, intubation was carried out easily. N₂O: O₂ mixture with halothane 0.5% was then administered with IPPV. An infusion of hydrallazine 1 mg/ml was set up in anticipation of possible problems with blood pressure ranging at 140-120 mmHg systolic. A urinary catheter was inserted for hourly urine output. The right external jugular venous access was opened for infusion of fluids and vasopressors in emergency.

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nervous system due to blockade of major autonomic ganglia in the mesenteric, coeliac, and cardiac plexuses, sparing only the cervical chain whose stimulation is seen, balanced by the autonomic neutrality of the lower part of the body. (The pathophysiological alteration of the patient's response with combined epidural and light general anaesthesia is an interesting experience which these writers will like to share with other anaesthetists).

Previous documented experiences in literature had a drug armamentarium included in the list of drugs in the table B illustration 1. Drugs used in this case were few. The haemodynamics were more stable and the outcome very satisfactory, as shown in the anaesthetic chart illustration.

Narcotic post-operative analgesia could also be provided via the epidural catheter previously inserted. Morphine at a dose 2 B 5 mg epidural injection has been shown to provide satisfactory post-operative analgesia for up to 24 hours. A mixture of local anaesthetic with narcotic, e.g., Bupivacain 0.5% in fentanyl have been preferred.

Conclusion

Various anaesthetic techniques have been described for anaesthesia for phaeochromocytoma excision with almost all anaesthetic drugs being used to reduce blood pressure during the stimulation of the adrenal medulla. This patient had an epidural anaesthesia combined with light general anaesthesia which has been shown to be a good technique of choice.

Table of drugs - Illustration 1

Combination used in management of phaeochromocytoma - modified or augmented by epidural blockade up to the cardiac ganglion - T₄. Autonomic neutral status is produced by the epidural block similar state seen in hypertensive disease of pregnancy eclampsia and Pre-eclampsia.

Haemodynamic Effects			
Inotropes	HR	BP	CO
1. Dopamine	↑↑	↑↑	↑
2. Dobutamine	↑	↑↑↑	↑
3. Dopexamine	→	↑↑↑	↑↑
Catecholamines			
1. Isoprenaline	↑↑	↑	↑
2. Epinephrine (Adrenaline)	↑	↑↑	↑↑
3. Noradrenaline (Levophed)	+	↑↑	↑

Illustration - Table 1

Vasodilator	Vasodilation Effects		
	Arterial	Venous	Blood Pressure
1. Nitroglycerin	+	+++	0↓
2. Nitroprusside (Nepride)	+++	+++	↓
3. Hydralazine (Apressoline)	+++	±	↓↓
4. Phentolamine (Rogitine)	++	±	↓
5. Calcium Blockers	+	0	↓→
6. ACE Inhibitors	++	+	↓↓

HAEMODYNAMIC RECORDS IN A CASE OF EXCISION OF PHAEOCHROMOCYTOMA WITHIN 24HRS OF SURGERY WITH COMBINED GENERAL AND EPIDURAL ANAESTHESIA.

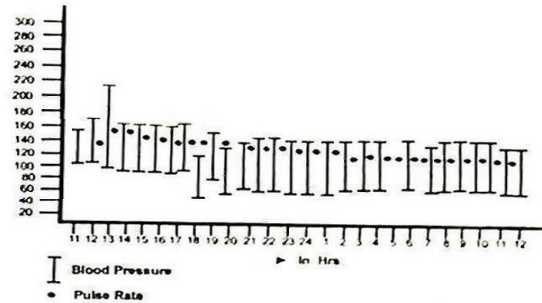


Illustration Table 11

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During manipulation of the tumour, there was a rise of both the blood pressure and heart rate; controlled with a further 10 ml of bupivacaine given via the epidural catheter augmented by hydrallazine infusion for a brief period.

Blood pressure dropped to 60/40 mmHg as soon as the ligations of the veins draining the tumour was carried out.

Halothane was thus turned off maintaining anaesthesia with $N_2O + O_2$. An adrenaline infusion at a concentration of 0.05 mg/ml was allowed to run through the jugular vein till blood pressure got back up to 100 mmHg systolic. The blood pressure was maintained until the tumour was excised. This precipitated another precipitous, but brief drop in blood pressure which was controlled easily with adrenaline infusion through the jugular vein for a brief period.

A left adrenal tumour weighing 145 gm was excised at surgery. Intraoperative blood loss was estimated at 1500 ml requiring a replacement with 2 units of blood in addition to other fluids administered for maintenance and replacements.

At the end of surgery pharyngeal suctioning was carried out after reversal of residual neuromuscular paralysis with atropine and Neostigmine mixture at a dose of 1.2 mg and 2.5 mg, respectively. The patient was extubated following satisfactory signs of adequate reversal and was then transferred to the intensive care unit for observation and monitoring. Post-operative analgesia was provided with bolus doses of 3 mg morphine in 10 ml saline through the epidural catheter.

Blood pressure on admission into intensive care was recorded as 120/80 mmHg with a pulse rate of 96 min. Respiratory rate was 18/min with an oxygen saturation of 100% using an ohmedia oximeter. Oxygen therapy at this time was via nasal catheter flowing at 21/min.

The patient required only 5 mg adrenalin infusion in the first hour of admission and this was tailed off completely with 24 hours as blood pressure was maintained at above 100 mmHg systolic.

She was discharged to the ward 72 hours after and the epidural catheter was taken out intact. She did not require any further antihypertensive medication, and her postoperative recovery was essentially uneventful.

Discussion

Phaeochromocytomas are catecholamine secreting tumours with capacity to take up and decarboxylate certain biological amides and amine precursors* [1,2,3,4]. They arise from the embryonic nest of the neural crest tissue which include the adrenal medulla and the paravertebral sympathetic chain from the base of the pelvis to the cervical region and also the sympathetic ganglia within the urinary bladder. Phaeochromocytoma may be a part of several endocrine abnormalities termed multiple endocrine neoplasia (MEN). MEN 1 combines pancreatic islet cell tumour, parathyroid adenoma and pituitary tumor. MEN 2 [5,6] consist of phaeochromocytoma, medullary

carcinoma of the thyroid, and parathyroid adenoma.

Phaeochromocytoma is a rare disease (seen once or twice in a lifetime in the practice of an anaesthetist. Mortality rate is high (put at 20 B 25%); of undiagnosed as intercurrent disease presenting for other surgery and anaesthesia [7]. For excision surgery mortality rate is also considered high and the anaesthesia especially difficult due to outpouring of secretion of adrenalin and noradrenalin into the circulation resulting in very high blood pressures encountered during laryngoscopy, intubation as well as during manipulation of the tumour. Due to damage done to end-organs of the kidney, brain and myocardium these episodes of hypertension and severe hypotension, following excision, infusion of every potent vasoactive agents is the practice.

Continuous juggling of the appropriate infusion of alpha blockers (such as phenoxybenzamine in doses of 20-60 mg per day and phentolamine causing a decrease in peripheral resistance) B blockers such as propranolol and more recently labetalol [8,9] against potent vasoactive agent such as adrenaline, noradrenaline and inotropic dopamine, dobutamine and dopexamine to restore blood pressure to normal. This is following tumour excision.

Sodium nitropruside has also been found useful in controlling hypertension [10]. Magnesium sulphate as continuous infusion [11], and glyceril trinitrate have been successful.

The haemodynamic problems encountered in the perioperative period include heart rate and rhythm disturbances, hypotension, hypertension, myocardial ischaemia, congestive cardiac failure and low perfusion status. Multiple problems may present themselves alternately or simultaneously and act together to the detriment of the patient.

A continuous epidural anaesthesia with block up to T4 was augmented with light general anaesthesia in our patient. This technique, like in cases of eclamptic toxemia of pregnancy, may provide adequate vasodilation which can be manipulated with volume expansion before surgery and induction. The vascular tone is reduced which due to preloading will not cause a fall in blood pressure. This mimics the traditional use of alpha blockers where further drop in blood pressure is needed. It can easily be provided as seen in records of blood pressure B using bolus doses of hydrallazine which soon restores blood pressure to normal limits.

Calcium channel blocker diltiazem has been used as the sole agent pre-operatively to control blood pressure [9] while labetalol the combine alpha and beta blocker has been used both pre-operatively and also intra-operatively for blood pressure control [10,11]. This patient had labetalol and chlorothiazine for pre-operative blood pressure control only.

The problematic induction of anaesthesia marked by very high rise in blood pressure was easily controlled and not long lasting in our patient which we believe is due to the technique of anaesthesia that was used with this case. In this, the blunting of the autonomic

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