UNSUSPECTED PHAEOCHROMOCYTOMA PRESENTING DURING SURGERY

D.L. WOOSTER AND R.I. MITCHELL

ABSTRACT

A patient with an unsuspected phaeochromocytoma presented with transient hypertension during anaesthesia for an elective hernia repair, and developed severe post-operative hypotension. The management of this acute crisis, appropriate preoperative preparation and the subsequent successful removal of the tumour is described. Awareness of this unusual presentation may help the attending physician to save such a patient.

KEY WORDS: COMPLICATIONS, phaeochomocytoma.

PHAEOCHROMOCYTOMA is an unusual cause of hypertension arising during anaesthesia and in this context it is often associated with a poor prognosis. Subsequent safe management depends on establishing the diagnosis followed by appropriate pre-operative preparation and removal of the tumour. This tumour can present with any of a wide spectrum of clinical manifestations. These include sustained or paroxysmal hypertension with or without arrhythmias, sweating, headaches, diabetes, anxiety or symptoms suggesting hyperthyroidism; however, there may be no overt symptoms or signs at all.[1] If the diagnosis is not suspected before an operation for an unrelated reason, unexplained shock or sudden death may occur in the asymptomatic patient. The following is a report of a patient successfully resuscitated from such an episode.

Case report: This 55-year-old man was admitted for an elective herniorrhapy with a three week history of a left inguinal hernia. He denied any other complaints. Past history revealed duodenal ulcer disease and renal calculi; however, no hypercalcaemia or underlying pathology was demonstrated. He had undergone a partial gastrectomy and ureterolithotomy ten years before this admission with no suggestion of complications either during anaesthesia or post-operatively. The specific details of this operation are not available. He denied any history of angina, palpitations or hypertension.

Physical examination revealed an active man with a moderate sized inguinal hernia. Hydration appeared adequate, blood pressure was 130/70 mm Hg and heart rate was 80/minute and regular. Oral temperature was 37.6 degrees Celsius. No thyroid or abdominal masses were noted.

Routine preoperative blood tests revealed Hb 16.5 g/dl., Hct 49, W.B.C. 9,100/cu. mm, creatinine 1.0 mg/litre and normal electrolytes. The electrocardiogram was entirely normal.

The herniorrhaphy was done under general anaesthesia using thiopentone 300 mg, Innovar® 2 ml, fentanyl 50 µg, pancuronium 7 mg, nitrous oxide 70 per cent and oxygen 30 per cent (Figure 1). During the procedure the patient's blood pressure rose from 140/80 to 200/100 mm Hg and his pulse increased from 80 to 130/minute. No arrhythmia apart from the tachycardia occurred. Halothane one per cent was administered to lower the blood pressure towards its preoperative level. Neostigmine 2.5 mg, atropine 1.2 mg and naloxone 0.4 mg were given at the end of the procedure. The patient's temperature was then 37.8 degrees C and he was stable at his preoperative haemodynamic values. He received 400 ml of lactated Ringer's solution intravenously; no blood was given during operation. The total anaesthetic time was forty-five minutes. No postoperative electrocardiogram was obtained.

He remained stable and was subsequently returned to the ward after an uneventful recovery period. Six hours later he was noted to be dyspnoeic and had a temperature of 40 degrees C, blood pressure of 170/120 mm Hg, and pulse rate of 132/minute. He was diaphoretic and although he was tachypnoeic, his chest was clear. He was oriented and denied chest or abdominal pain. The wound and all intravenous sites were clean. There was no history of vomiting or suggestion of aspiration.

D.L. Wooster, M.D., F.RC.S.(C), Associate Staff, St. Joseph's Health Centre, Toronto; R.I. Mitchell, M.D., F.R.C.S.(C), Associate Professor, Department of Surgery, University of Toronto, The Wellesley Hospital, Toronto, Ontario.

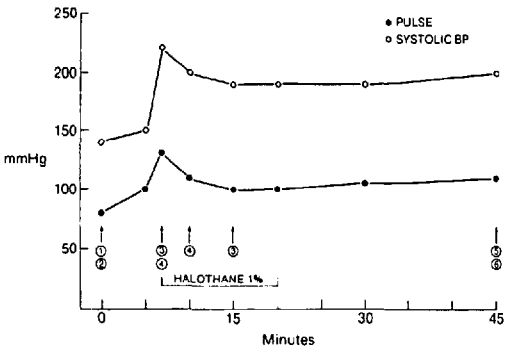

FIGURE 1 Intra-operative Course: Left Inguinal Herniorrhaphy: (1) Thiopentone 300 mg, (2) Pancuronium 7 mg, (3) Innovar® 1 ml, (4) Fentanyl 25 μg, (5) Prostigmine 25 mg, Atropine 1.2 mg, (6) Narcan 0.4 mg.

He was transferred to the intensive care unit with a presumptive diagnosis of sepsis, although a source was not evident. Cultures of sputum, urine and blood subsequently were negative and only a light growth of staphylococcus albus was isolated from the tip of the intravenous catheter. Oxygen 50 per cent by Puritan mask (10 litres flow), was initiated. Gentamicin 80 mg, clindamycin 600 mg and methylprednisolne 1000 mg were given intravenously. Normal saline to total 1200 ml was administered over the first thirty minutes of resuscitation. Little change occurred in the patient's vital signs, but he was more confused and less than 20 ml of urine were obtained over the first hour after a Foley catheter was inserted. Laboratory results at this time were as follows: Hb 20.3 g/dl, Hct 61, WBC 28,000/mm^3, Pa_{O_2} 6.52 kPa (49 mm Hg), Pa_{CO_2} 3.86 kPa (29 mm Hg), HCO_3^- 13 mmol/l, $[H^+]_a$ 52.48 nmol/l (pH 7.28), B.E. −11 mmol/l, Sa_{O_2} 78% ($F_{I_{O_2}}$ 0.5).

An arterial line was inserted to facilitate pressure monitoring and blood collection. A Swan Ganz flow directed pulmonary artery catheter was inserted and the initial pulmonary wedge pressure was 23 mm Hg with pulmonary artery pressures of 30/11 mm Hg. The cardiac index was 2.7 l/minute and systemic blood pressure fell to 70 mm Hg. An electrocardiogram was consistent with acute myocardial infarction. Digoxin 0.5 mg and furosemide 20 mg were given intravenously and dopamine (200 mg in 250 ml D5W) titrated to maintain blood pressure at 90–110 mm Hg. At the same time mechanical ventilation with 70 per cent oxygen and 5 cm H_2O positive end expiratory pressure (PEEP) was instituted with a tracheal tube in place.

Although he was clinically more stable and urine output was re-established at more than 30 ml/hour, the subsequent cardiac index was 2.3 l/minute. As the filling pressures were adequate, afterload reduction was then utilized with sodium nitroprusside up to 150 mg/minute for two hours. Over the next twenty-four hours the patient was stabilized (Table). By forty-eight hours after the onset of this crisis the dopamine was discontinued. He developed atrial fibrillation which was controlled with digoxin and the trachea was extubated after a short course of intermittent mandatory ventilation on the fourth day. Ten days after transfer to the intensive care unit he returned to the ward in stable condition.

Further investigation demonstrated normal blood pressure and minimal symptoms of anxiety; however, the vanillymandelic acid (VMA) measured during the episode of hypotension was 18 mg/dl (Normal 0–8). Computerized tomography demonstrated a mass associated with the left adrenal and angiography, after preparation with phenoxybenzamine 10 mg q.12H and propranolol 10 mg q.6H, for one month, confirmed the 4 cm mass. He was maintained on these blocking agents for an additional month. He tolerated these agents well without orthostatic hypotension and had no further hypertension or arrhythmias. A 4 × 5 × 4 cm phaeochromocytoma was removed at a subsequent operation. Anaesthesia was with thiopentone, enflurane and nitrous oxide. Pantopon, phentolamine and propranolol were also used. A Swan Ganz catheter as well as intra-arterial pressure lines were used during operation. Postoperatively he did well and the VMA estimations returned to normal.

DISCUSSION

The wide spectrum of presenting features of phaeochromocytoma can make diagnosis difficult.[2] If suspected, screening for the metabolites of norepinephrine and epinephrine in urine should be done. Remine[3] found 0.6 per cent of all hypertensive patients and 0.1 per cent of autopsies revealed the presence of phaeochromocytoma. In the Mayo Clinic series of 138 patients, 10 were not diagnosed pre-operatively and, although details were not presented, were noted to show a "hazardous" clinical course.[3] Apgar[4] described four patients with unsuspected phaeochromocytoma all of whom died postoperatively (one after a breast biopsy). In reporting 44 patients Scott[5] notes three patients who died with unsuspected phaeochromocytoma after appendectomy, salpingectomy and hysterectomy

TABLE I

SUMMARY OF HAEMODYNAMIC EVENTS FIRST 72 HOURS POSTOPERATIVELY

		BP (systolic)	PWP	C.O.	Fluid/8H	Output/8H	Temp.	
Day 1	0800–1600	140-220*	—	—	1000	—	37–40	
	1600–2400	190-120-70	10–20	—	2800	300	40–39	Dopamine
	2400–0800	70–120	23	2.7	1800	800	39–37	Dopamine Nitroprussite
Day 2	0800–1600	120-80	23–25	4.0	1075	500	37–39	Dopamine
	1600–2400	90–100	18	4.5	2000	150	38	Dopamine off
	2400–0800	100	18	—	2000	180	38	
Day 3	0800–1600	100–120	14–20	5.2	1800	300	37–38	
	1600–2400	120	14	5.0	1400	350	37	
	2400–0800	120	14	—	.500	800	37	

*operati

respectively. Two of these patients had been normotensive preoperatively. In an earlier report,[1] he had described another patient who died after retrograde pyelogram under a general anaesthetic. These reports suggest a common picture of arrhythmias, cyanosis, pulmonary oedema and shock, similar to the presentation of the case reported here. These findings are consistent with severe myocardial infarction in any patient. Gupta[6] notes the high incidence of myocardial infarction in patients with phaeochromocytoma. In addition he relates a further case of postoperative death in a patient with unsuspected phaeochromocytoma. Postoperative myocardial infarction occurring in a young patient without risk factors must raise the question of underlying phaeochromocytoma.

There are isolated reports[7,8] of patients surviving after operations were stopped when marked hypertension was noted on induction of anaesthesia. These patients subsequently underwent resection of the tumour after appropriate pharmocological coverage. Although it is not possible to estimate the precise incidence of this problem, it should be suspected in any patient who develops unexplained tachycardia or hypertension.

Although the operative mortality in resection of these tumours before pharmocological blocking was reported as 20 per cent,[4] those reported cases of patients with unsuspected phaeochromocytoma operated on for a wide variety of reasons virtually all died.[2–6] Early recognition of signs suggesting a phaeochromocytoma and early discontinuance of a procedure in such circumstances may allow for recovery of these patients. As illustrated in the case reported here, established shock must be treated vigorously in an intensive care unit with fluids and invasive monitoring by a Swan Ganz catheter and intra-arterial lines. Appropriate use of lidocaine (50 mg intravenously) to treat ventricular arrhythmias and propranolol (0.75–1.0 mg intravenously) for tachyarrhythmias,[8] as well as phentolamine, sodium nitroprusside and dopamine to modify swings in blood pressure may save these patients. As the patient may initially settle postoperatively only to deteriorate later. Continuous monitoring is indicated and vigorous therapeutic measures should be instituted early.

After the patient has been stabilized, blocking agents are continued to allow time for re-expansion of the intravascular volume and appropriate diagnostic tests and investigation to localize the tumour. The short acting alpha blocker phentolamine HCl (5–10 mg, in 500 ml D5W) controls hypertensive episodes and the long acting alpha blocker phenoxybenzamine (20 mg per day orally) is used to stabilize the blood pressure in a more normal physiological range. Beta adrenergic blockade with propranolol (10–40 mg orally three times daily) is employed to treat tachyarrhythmias.[9] After appropriate blockade and workup, safe removal of the tumour is then possible.

SUMMARY

The onset of severe hypertension due to an unsuspected phaeochromocytoma during elective hernorrhaphy is described. Review of similar cases from the literature demonstrates this to be a situation attended by a high mortality. Early recognition of tachyarrhythmia and hypertension followed by vigorous intensive care unit management is necessary to resuscitate these patients. Successful removal of the tumour may be subsequently accomplished at a later date.

REFERENCES

1. VANWAY, C.W., SCOTT, H.W., PAGE, D.L. & RHAMY, R.K. Phaeochromocytoma. Curr. Probl. Surg. June 1974, 1–59.
2. TOLIS, G. & KUCHEL, O. The Multiple Faces of Phaeochromocytoma. C.M.A.J. *116*: 337–8 (1977).
3. REMINE, W.H., CHONG, G.C., VAN HEERDEN, J.A., *et al.* Current Management of Phaeochromocytoma. Ann. Surg. *179*: 740–48 (1974).
4. APGAR, V. & POPPER, E.M. Phaeochromocytoma: anesthetic management during surgical treatment. Arch. Surg. *62*: 634–48 (1951).
5. SCOTT, H.W., OAKES, J.A., NIES, A.S., BURKO, H., PAGE, D.L. & RHAMY, R.K. Phaeochromocytoma: present diagnosis and management. Ann. Surg. *183*: 587 (1976).
6. GUPTA, K.K. Phaeochromocytoma and Myocardial Infarction. Lancet *i*: 281–2 (1975).
7. EDELIST, G. Multiple anaesthetics in a patient with phaeochromocytoma. Canad. Anaesth. Soc. J. *22*: 715–18 (1975).
8. SMITH, D.S., AUKBERG, S.M. & LEVIT, J.D. Induction of anaesthesia in a patient with an undiagnosed phaeochromocytoma. Anesthesiology *49*: 368–369 (1978).
9. PRATILAS, V. & PRATILA, M.G. Anaesthetic Management of Phaeochromocytoma. Canad. Anaesth. Soc. J. *26*: 253–59 (1979).

RÉSUMÉ

Un malade porteur de phéochromocytome dont on ignorait la présence a subi une cure de hernie en chirurgie réglée qui s'est compliquée d'une crise hypotensive post-opératoire grave. La conduite a tenir en pareil cas, la préparation pré-opératoire et l'excision de la tumeur qui fut couronnée de succès sont décrites. Cette expérience exceptionnelle est rapportée ici dans le but d'aider le médecin traitant à faire face à une complication qui peut s'avérer mortelle.