PULMONARY OEDEMA DUE TO LATENT PHAEOCHROMOCYTOMA

BY

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The somewhat rare condition of phaeochromocytoma is occasionally diagnosed, but is all too often a necropsy diagnosis. Death is usually due to cerebral haemorrhage, pulmonary oedema, or ventricular fibrillation (Wood, 1950). In the case reported below an unsuspected phaeochromocytoma caused pulmonary oedema during a planned operation for repair of inguinal hernia.

Case History

A robust man of 60 complained of left sciatic pain, thought to be due to a truss he was wearing for a left inguinal hernia. He was admitted to hospital for repair of this hernia. He was robust and apparently in good health: his pulse rate in bed was 60 a minute and blood pressure 140/80 mm. Hg. For the operation he was given premedication morphine, 1/6 gr. (11 mg.), and atropine, 1/100 gr. (0.65 mg.), one hour before operation. Anaesthesia was induced with thiopentone, 0.4 g., and gallamine triethiodide, 80 mg., and maintained with cyclopropane, ether, and oxygen in a closed circuit. A No. 4 Waters airway was inserted. He was placed supine on a horizontal operating table. Respiration was almost adequate by the time he was on the table, and was assisted.

Some 20 minutes after the operation had begun the pulse became irregular at a rate of 80 and cyclopropane was discontinued. The pulse irregularity ceased almost at once, but the rate increased gradually to 120; in the course of a few minutes his skin colour changed from pink to blue and then to grey, the respiration rate increased and moist sounds were noticed, first in the trachea and then in the lungs. The face-mask was removed and mucus aspirated from nose and pharynx. When this had been done he was almost conscious and would not tolerate the airway. The operation had been completed, so he was returned to the ward. There he was conscious and reacted to questions, but cyanosis gradually increased, breathing became laboured, and he was distressed: his pulse rate was about 140 and irregular. It was realized that he had developed heart failure with pulmonary oedema of unknown cause. Oxygen was given by B.L.B. mask and from an Oxford inflator. Nikethamide was given intravenously, two doses of 2 ml.; aminophylline, 0.5 g. intravenously; morphine, ¼ gr. (16 mg.) intravenously, with no improvement. Death occurred approximately three and a quarter hours after induction of anaesthesia.

At necropsy the lungs were congested and waterlogged, and blood-stained froth was present in all the passages. A haemorrhagic tumour, 2 in. (5 cm.) in diameter, was found in the left adrenal gland; this proved to be a phaeochromocytoma. The histological appearance was typical, the tumour consisting of sheets and columns of polygonal cells separated by a rich plexus of sinusoids with which the cells were in intimate contact. A weak chromaffin reaction was given by these cells when fixed in a solution containing potassium dichromate.

Comment

Macintosh and Mushin (1946) describe how pulmonary oedema may develop during anaesthesia in the presence of an obstructed airway. In this case there was no respiratory obstruction. Death was due to congestive heart failure and pulmonary oedema, which probably followed a sudden rise

in blood pressure and perhaps ventricular fibrillation due to outpouring of adrenaline or noradrenaline. It is uncertain why this developed during operation, but release of histamine at the site of operation may be concerned. Small injections of histamine lead to a fall in blood pressure, and following this there may be a rise in blood pressure above the normal, due to a compensatory secretion of adrenaline (Samson Wright, 1952). The mechanism in this compensation is probably the fall in blood pressure via the carotid sinus, thence via the nerve to the adrenal gland. During operation in normal subjects this complex would be unnoticed, there being no change in blood pressure, but in the presence of phaeochromocytoma it is possible that the secondary overaction of the adrenal glands may be exaggerated.

According to Graham (1951) a potentially fatal paroxysm may be induced by the anaesthesia or by the positioning of the patient. Ward, Riches, and Johnson (1952) discuss anaesthesia for removal of phaeochromocytoma. They advise against drugs which affect the myocardial irritability or cardiac rate, such as cyclopropane, trichlorethylene, and gallamine, and point out that high concentrations of ether may limit any rise in blood pressure. They recommend the use of benzodioxane to limit rise of blood pressure, and intravenous injection of procaine amide to control gross cardiac irregularity. Cobb *et al.* (1953) report the successful control of blood pressure by benzodioxane and *L-nor*-adrenaline during surgical removal of a phaeochromocytoma.

The tragedy in this case is that the patient's wife revealed after his death that for two years he had had attacks of palpitations, faintness, sweating, and pallor lasting a few minutes, followed by a sensation of exhaustion. These are very like the paroxysmal attacks described by Smithwick *et al.* (1950). The patient was ashamed of these attacks and did not mention them before operation.

Summary

A case is described in which death occurred due to pulmonary oedema which developed during a planned operation for inguinal hernia. Necropsy revealed a phaeochromocytoma of the left adrenal gland which caused the pulmonary oedema.

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REFERENCES

- Cobb, C. C., Hall, J., and Hall, R. A. (1953). *Lancet*, 1, 973.
Graham, J. B. (1951). *Int. Absr. Surg.*, 92, 105.
Macintosh, R. R., and Mushin, W. W. (1946). *Physics for the Anaesthetist*, p. 203. Oxford.
Smithwick, R. H., Greer, W. E. R., Robertson, C. W., and Wilkins, R. W. (1950). *New Engl. J. Med.*, 242, 252.
Ward, G. E. S., Riches, E. W., and Johnson, B. (1952). *Arch. Midl. Hosp.*, 2, 133.
Wood, P. (1950). *Diseases of the Heart and Circulation*, p. 421. London.
Wright, Samson (1952). *Applied Physiology*, 9th ed., pp. 337, 554. London.

The hygiene of seafarers has been receiving attention from a joint International Labour Organization and World Health Organization committee in Geneva. The chairman was the vice-president of the International Shipping Federation, Norway, and Dr. W. M. Frazer, emeritus professor of public health at Liverpool, was vice-chairman. The main recommendations concern the provision of medical advice by radio, the equipment of medicine chests, and the examination of all new entrants to the Merchant Navy for tuberculosis. In general the radio facilities are considered now to be satisfactory. The committee drew up a list of minimum requirements based on the *International Pharmacopoeia* for the medicine chests of ships not carrying a doctor. The drugs in the chest are intended for use by the master on his own initiative in the case of minor ailments and after wireless advice in serious illness.