against them, making a quantitative assessment quite unreliable. The baby must, however, have bled extensively, as the extremely low level of haemoglobin (5.1 g. per 100 ml.) is unlikely to have been produced by haemolysis only. It seems much more likely that this low level was the result of blood loss plus haemolysis. The production of anaemia in babies through blood loss into the maternal circulation had been suggested by Wiener (1948), and we think that this case is a further example, though no doubt haemolysis played some part in the production of the anaemia.

Summary

A case of foetal blood loss into the maternal circulation is described. The foetal cells were recognized during the pregnancy in the blood stream of an immunized mother.

The maternal serum contained an anti-rhesus antibody which coated the foetal cells in the maternal circulation and gave rise to a positive direct Coombs test. It was successfully eluted from the coated cells.

We thank Mrs. June Wingham for much technical assistance.

ADDENDUM.—Since this paper was submitted a further article on transplacental bleeding from the foetus (Goodall *et al.*, 1958) has appeared.

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INTRAVENOUS PHENTOLAMINE FOR PHAEOCHROMOCYTOMA AND "ADRENALINE SHOCK"

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The management of the usual patient with phaeochromocytoma is now well established, with a welcome improvement in mortality (Kvale *et al.*, 1957). The most significant factor in this success has probably been the use of oral or intramuscular phentolamine ("rogitine"*) to block the effects of circulating adrenaline and noradrenaline (Iseri *et al.*, 1951 ; Emlet *et al.*, 1951 ; Newton *et al.*, 1955).

We wish to focus attention on the management of the unusual patient with phaeochromocytoma in whom the classic symptomatology of the disease is punctuated by wild unpredictable fluctuations of the systemic blood pressure with periods of alarming hypertension alternating with periods of profound shock. Such a patient has recently been under our observation, and in this instance the usual doses of phentolamine intramuscularly were found to be ineffective ; however, a continuous intravenous phentolamine infusion produced dramatic improvement and, we believe, was life-saving. It enabled us effectively and leisurely to organize a programme of therapy for the operative and post-operative periods.

*Known as "regitine" in the U.S.A.

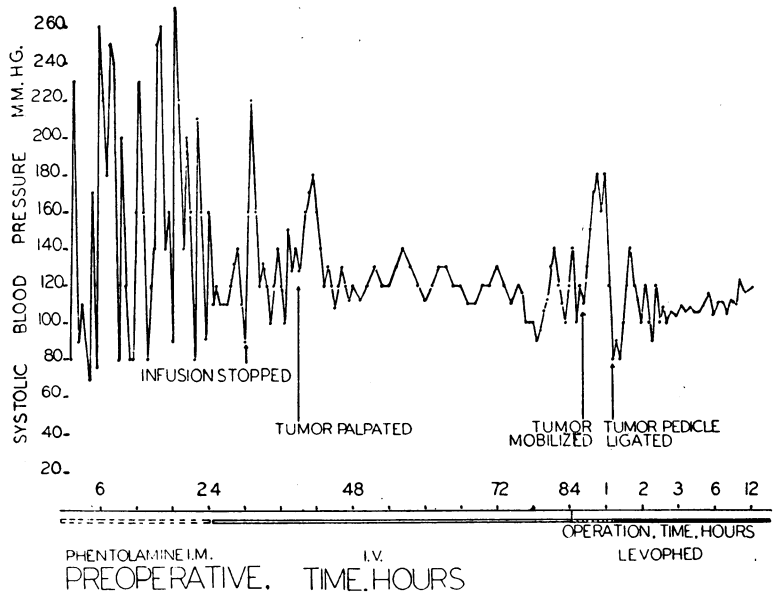
Case Record

The patient, an 18-year-old coloured girl, was first seen at the Cook County Hospital on January 8, 1957. She complained of nervousness, sweating, difficulty in breathing, severe lower abdominal pain, and vomiting of four hours' duration. For one year prior to admission she had had daily episodes of sweating and nervousness which began on arising and persisted until noon. Upon inspection she was seen to be orthopnoeic, grey, cold, and perspiring. The oral temperature was 101° F. (38.3° C.). The blood pressure was 80/0. The pulse was barely perceptible, with a rate of 140. The cardiac rhythm was regular. The left heart border was 3 cm. left of the mid-clavicular line in the fifth interspace. The heart tones were not unusual. Auscultation of the lungs disclosed fine and coarse moist rales throughout both lung fields. Upon palpation of the abdomen, a rounded mass, approximately 3 cm. in diameter, was detected in the left upper quadrant ; it was in close proximity to the left kidney. The remainder of the physical examination showed nothing of importance.

Following palpation of the left upper quadrant of the abdomen, the patient began to tremble, her dyspnoea increased, and she sat bolt upright. She complained of a "nervousness," first in her abdomen and then "all over." This sensation was followed by increasing abdominal pain. The blood pressure was recorded as 230/17. The symptomatology suggested the presence of phaeochromocytoma complicated by acute left ventricular failure. Immediate therapy directed towards the relief of the left ventricular failure was successful. Additional therapeutic measures included sedation, complete bed rest, and elimination of all procedures which might augment tumour secretion. The patient's condition remained grave. Hypertensive–hypotensive swings in the systemic pressure continued, despite the administration of phentolamine intramuscularly in amounts of 5 mg. every four hours. For a period of 24 hours the blood pressure fluctuated between 290/140 and 80/0.

One of us (R. B. T.) suggested that phentolamine be given by continuous intravenous infusion. A solution of 30 mg. of phentolamine in a litre of 10% dextrose and water was infused intravenously at a rate of 20–80 drops a minute, depending upon the systemic blood pressure. The response was dramatic. The patient's sweating, pallor, coldness, and weakness disappeared, and within two hours she complained of hunger and was able to eat with obvious pleasure.

After surgical consultation, all agreed that the patient should be explored, but in view of her response to intravenous phentolamine there seemed to be no reason for hasty action. Two and a half days were allowed to elapse before the condition of the patient was considered to permit laparotomy. We were thus able to alert all personnel who were to be concerned with her care ; and detailed check lists were prepared of all the procedures and medications necessary for proper management during and following surgery. During the 60 hours prior to surgery the patient received 250 mg. of phentolamine, and the blood pressure and pulse were recorded approximately every half-hour. Adjustments in the rate of flow of the infusion served to control all signs of tumour secretion. The patient had no symptoms, and there were no further hypertensive–hypotensive swings in the blood pressure (see Chart).



The systolic blood pressures recorded during the pre-operative period demonstrate the effect of continuous intravenous infusion of phentolamine. Also shown are the moderate blood-pressure excursions encountered during removal of the phaeochromocytoma.

Surgical premedication was by scopolamine and meperidine (pethidine) hydrochloride. The method chosen was thiopentone sodium for induction, followed by maintenance of anaesthesia with nitrous oxide through an endotracheal airway (Zintel and Bottie, 1956). Muscular relaxation was provided by an intravenous drip of suxamethonium. During induction of anaesthesia and throughout the operative period the systolic blood pressure was utilized to regulate the phentolamine infusion (30 mg. per 1,000 ml. of 5% dextrose and water). The abdomen was explored through a horizontal upper abdominal incision, and a phaeochromocytoma was found medial to the lower pole of the left kidney. The phentolamine infusion effectively controlled all hypertensive swings of the blood pressure during the period of anaesthesia induction and tumour manipulation. When the pedicle of the tumour was ligated the systolic blood pressure fell precipitously and was unobtainable for two minutes. An intravenous infusion of L-noradrenaline was started immediately (16 mg. per 1,000 ml. of 5% dextrose and water), and the hypotension was effectively controlled. L-Noradrenaline infusion in progressively decreasing amounts was continued for 12 hours post-operatively. The post-operative course was otherwise uneventful.

Discussion

Although there is ample experience to which one may refer for information concerning the management of the usual patient with phaeochromocytoma, there are few (Wilkins *et al.*, 1950; Rothermich, 1952; Gjøl *et al.*, 1957) which discuss the management of the patient in whom periods of alarming hypertension alternate with periods of profound shock. These wild swings in the systemic blood pressure are best explained if we assume that the rate of liberation of pressor substances from the tumour is inconstant. The truth of this assumption is supported by the observation that manipulation of the tumour through the abdominal wall would produce a dramatic hypertensive episode; we need not infer, however, that secretion ceases during the hypotensive episodes. Freeman *et al.* (1941) produced shock in unanaesthetized dogs by the continuous infusion of adrenaline, and the reports of Green *et al.* (1948) and Blacket *et al.* (1950) demonstrated that prolonged infusion of pressor amines was followed both in the experimental animal and in man by a period of hypotension. It is logical to assume that the infusion of pressor amines invokes compensatory mechanisms which favour hypotension if the infusion is terminated or if the rate of infusion is abruptly diminished.

In this instance, since intermittent intramuscular phentolamine failed to control the fluctuating blood pressure, we decided to administer the drug by continuous infusion. Not only were the hypertensive episodes immediately and completely controlled, and further hypotensive crises prevented, but the patient's general clinical condition was rapidly and markedly improved. We believe that the dramatic response of the patient is a reflection of the efficacy of this approach. Many patients with phaeochromocytoma are poor surgical risks. Our results in this case suggest that the prolonged pre-operative intravenous infusion of phentolamine may be of value in the preparation of these doubtful-risk patients, whether hypertensive-hypotensive crises are present or not.

Summary

A patient with a phaeochromocytoma, in whom the classic symptomatology was complicated by wildly fluctuating blood pressure, was managed by a continuous pre-operative intravenous infusion of phentolamine over a period of two and a half days with dramatic results. The tumour was removed by surgical excision and the patient's recovery was uneventful.

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The Wellcome Trustees have made a grant to the Medical Research Council of up to £26,000 for the provision of a vessel which could serve as a floating laboratory and means of transport for use by the Council's laboratories in the Gambia. On September 26 the *Lady Dale*, as the launch is named, was inspected at the boat yard of Aldous Successors Ltd., Brightlingsea, by a party from the Medical Research Council and the Wellcome Trustees. The *Lady Dale* will be based on Bathurst, at the mouth of the River Gambia, and will sail from there not only to the subsidiary field laboratories at Keneba, some 70 miles up-river, but also to other parts of the territory along the river where laboratory facilities would not otherwise be available. The research programme of the M.R.C. laboratories is concerned mainly with parasitic diseases, primarily malaria; in addition, the facilities of the laboratories, including accommodation, can be made available to visiting scientists. Formed originally after the second world war as a subsidiary of the council's human nutrition research unit in London, the laboratories are now an independent unit under the direction of Dr. I. A. McGREGOR.