

can be of great assistance and is not unduly difficult to anyone with some experience of difficult midwifery.

The Third Stage after Anaesthesia

Any discussion of the management of difficult vertex presentations would be incomplete without mention of the management of the third stage. Where labour has been protracted and delivery effected by forceps under anaesthesia, we should anticipate the probability of third-stage bleeding. The uterus is frequently atonic, partly from exhaustion and partly as a result of the anaesthetic. The practice of completing the delivery of the child and allowing the patient to recover from the anaesthetic before dealing with the placenta is, I am convinced, a bad one; for where this is done excessive loss in the third stage is all too common, and a later attempt either to express or to remove the placenta will cause shock, which the patient can ill withstand.

I now prefer to complete the third stage before allowing the patient to come out of the anaesthetic. My own practice is to inject ergometrine after the delivery of the child and, within minutes, to deliver the placenta. This may sometimes be spontaneous where the anaesthetic is light. Often it can be easily effected by a mere expulsion, but, where this does not occur, expression or even manual removal is definitely preferable to administering a second anaesthetic some time after delivery and before the patient has had time to recover fully from the shock of the first. The so-called hour-glass constriction of the uterus rarely occurs, and when it does it can be easily overcome.

As I mentioned at the beginning of this lecture, I make no claim to any originality in the procedures which I have outlined in the management of cases of difficult vertex presentation. Sometimes, in this period of rapid medical progress, there is a danger of the obvious becoming less obvious. It is therefore advantageous to review the principles upon which we base our practice. I have tried to apply to my own practice some of the scientific advances which have been placed at our disposal during the past twenty years, and by so doing have endeavoured to enhance the art which has been handed down to us by generations of teachers and to evolve therefrom a form of management of difficult vertex presentations. This form of management, on the whole, has been found to give good results.

Basic principles for the provision of health care for children of school age have been defined by a group of medical men, health educators, and nurses called together by the World Health Organization under the chairmanship of Dr. Fraser Brockington (U.K.). The committee emphasized the need for school health services to be organized co-operatively. They should be "team projects," involving parents, community, professional groups, social agencies, and others interested in the welfare of the child. They should, moreover, be a direct continuation of pre-school services and be so correlated that the benefit of information about the child accumulated during the pre-school period might be available in the school health programme. Healthy school buildings, with good ventilation and lighting, and adequate washing and sanitary facilities, should not only promote the child's health but also serve as an educational example to the community. The committee considered that preventive measures against communicable diseases in childhood should be organized by each school; and, "for the very reason that the school is the centre of educational stimulation in most communities; it has a unique role to play in the dissemination of knowledge about communicable diseases." The committee also recommended the establishment, wherever possible, of health education programmes with parents and community groups, adapted to the social, cultural, and economic environment in which the children are living.

TREATMENT OF SEVERE HYPERTENSION WITH HEXAMETHONIUM BROMIDE

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A number of drugs producing a fall in blood pressure have been investigated in an attempt to obtain a gradual but sustained fall in patients suffering from severe hypertension, as a support to the commonly employed measures of rest, sedation, limitation of salt intake, and diuretics. Treatment with thiocyanate has been reported on by Hines (1946) and Watkinson and Evans (1947), and this work has been reviewed favourably by Alstad (1948). More recently tetraethylammonium salts have been used by Lian and Bergamo (1948), Stead *et al.* (1948), and others. With these drugs it is possible to produce a marked fall in both the systolic and diastolic blood pressures, but protracted treatment is unsatisfactory in that it is limited by serious side-effects and by difficulties of administration.

Paton and Zaimis (1948) drew attention to the clinical potentiality of hexamethonium in hypertension, as they had found that, compared with tetraethylammonium, it gave a slower onset of action combined with a greater potency and longer duration of effect. They have recorded a detailed study of the ganglionic blocking action of hexamethonium and pentamethonium (Paton and Zaimis, 1949), the former being the more active. The clinical effect of these compounds upon the blood pressure was subsequently examined by Arnold and Rosenheim (1949), Burt and Graham (1950), and Kay and Smith (1950).

From this work it was evident that these drugs were capable of producing a marked and protracted reduction of the systolic and diastolic pressures, and they were therefore used in the treatment of patients suffering from severe hypertension. Eight cases of hypertension with papilloedema were selected for this trial and were treated with hexamethonium bromide.

Dosage and Method of Administration

A dose of 100 mg. administered intramuscularly every four hours was found to produce a progressive reduction in the blood pressure in all cases.

Subsequently, oral treatment was determined to be satisfactory, and indeed it produced a more constant fall of the blood pressure without the fluctuations encountered when the parenteral route was used. The drug was administered in solution formed by dissolving tablets—0.5 g. in 20 ml. of water. On the first day of treatment 0.25 g. should be given twice, followed by 0.25 g. thrice daily for the next two days, then 0.5 g. thrice daily for two days, the dosage being progressively increased until by the tenth day 0.5 g. is being given four to six times a day—a daily total of 2 to 3 g. It was found that the drug is more effective when given before meals.

Case 1

A woman aged 21 was seen in December, 1949, with dimness of vision and increasingly frequent headaches of over two months' duration. She was then in the third month of her first pregnancy. She had hypertension but no albuminuria, and there was no history of renal disease. Despite the termination of her pregnancy on February 2, 1950, the hypertension increased and albuminuria developed. She was pale, her blood

pressure was 220/140, there was no evidence of arteriosclerosis, and the femoral pulses were easily felt. The heart was not enlarged and radiologically was normal in contour. The electrocardiogram was normal. Her vision was 6/36 both eyes; the fundi showed marked papilloedema of both disks, numerous soft exudates, and linear haemorrhages, with classical macular stars. There was fullness of the veins, with nipping at the A.V. crossings, and an A.V. ratio of 1:3.

Urine examination showed an albuminuria of three parts Esbach, occasional red cells, hyaline and granular casts, no pus cells or organisms. The specific gravity was fixed at 1004, with maximum urea concentration of 1.1%. The night volume exceeded the day volume. The blood urea was 115 mg. per 100 ml. A straight radiograph of the urinary tract revealed normal renal outlines, and no calculi were seen; the intravenous pyelogram showed no function up to 22 minutes. The sodium amyltal test gave a maximum fall at the fifth hour, the systolic pressure dropping from 230 to 180, and the diastolic from 140 to 115 mm. of mercury.

The patient's progress with rest in bed, sedation, and a salt-free diet, which had been instituted on admission, was disappointing. Over a period of 10 weeks the vision did not improve, the physical findings were unaltered, and the lowest blood pressure recorded was 180/115 mm.

It was decided to use hexamethonium bromide orally. A small dosage was given initially, and within a few days was raised to a total of 3 g. daily, divided into six doses. Her blood pressure fell gradually during the next three weeks and settled to a systolic pressure between 120 and 140 and a diastolic of 80 to 95 mm. The blood urea fell to 70 mg. per 100 ml. Renal function tests showed a maximum concentration of 1018 and a maximum dilution of 1004. Albuminuria remained at two parts Esbach. Vision improved to 6/6 in both eyes; papilloedema disappeared; and fundal haemorrhages and exudates showed absorption and organization.

The patient was allowed up from May 21 and complained of some faintness due to postural hypotension for the first three days. On June 5 hexamethonium bromide was withdrawn, after seven weeks' treatment with it. There was no rise in her blood pressure, which after two months without treatment still varied between 130/95 and 120/75 mm. She was free of all symptoms, and has undertaken work as a nursing orderly in the wards for eight hours a day.

Case 2

This patient, a woman aged 46, was admitted on April 19, 1950, complaining of increasingly severe headaches of four years' duration, with recent transient paraesthesiae in one or more limbs, associated with severe paroxysms of occipital and frontal headaches, and followed by a transient loss of muscle power. She had had four normal pregnancies, the last nine years previously, at which time no hypertension was present. There was no history of renal disease.

On admission her blood pressure was 230/120 mm. The heart was not enlarged clinically, slight radial arteriosclerosis was noted, and the femoral pulses were present. Well-marked papilloedema was seen; the A.V. ratio was 1:2; slight exudates were present, but no haemorrhages. No albuminuria was found; the maximum concentration was 1025, and the minimum dilution of the specific gravity was 1005. Radiological examination of the urinary tract and chest revealed no abnormality. The sodium amyltal test gave a maximum fall at the sixth hour—the systolic from 230 to 160 and the diastolic from 130 to 90 mm.

Absolute rest, sedation, a salt-poor low-calorie diet, and xanthine diuretics for three weeks produced no improvement in her condition or fall in blood pressure. On two occasions transitory arm and leg pareses occurred.

Oral treatment with hexamethonium was begun, the dosage being raised to 3 g. daily. Complete relief from all symptoms occurred within six days, her blood pressure falling to between 130/75 and 150/100 mm. She was allowed up, and during the next fortnight complained only of faintness due to postural hypotension. Fundal examination showed disappearance of

papilloedema. The blood urea was 20 mg. per 100 ml., and there was no change in renal function. After a further month she was discharged, and attends as an out-patient, receiving a maintenance dosage of hexamethonium.

Case 3

A man aged 39 was admitted on April 20 with retrosternal discomfort and pain radiating down the left arm, occurring at rest and aggravated by effort. He complained also of palpitation and dyspnoea, and suffered from severe headaches. His vision had been failing for the past two months. There was a history of acute nephritis at the age of 20. The blood pressure was 240/120, the heart was slightly enlarged, and there was left ventricular preponderance in the electrocardiogram. Triple rhythm was present. The blood urea was 35 mg. per 100 ml. The maximum renal concentration was 1015 and the maximum dilution 1002. The fall obtained in the sodium amyltal test was 240 to 190 systolic and only 140 to 130 diastolic.

After 14 days in bed on a salt-poor low-calorie diet and phenobarbitone, 1 gr. (65 mg.) three times a day, the patient complained of deterioration of vision; increasing papilloedema was observed in addition to numerous linear haemorrhages and exudates.

Hexamethonium bromide was given orally—a total of 3 g. daily. His vision improved, the headache, retrosternal discomfort, pain, and dyspnoea disappeared, and he was allowed up on May 31, his pressure varying between 115/75 and 145/95 with occasional transient variations above these limits. The blood urea was 30 mg. per 100 ml., and the renal function tests were unaltered. After a further month in hospital he was discharged on maintenance dosage. He felt well and was symptom-free.

Case 4

A woman aged 50 was admitted with essential hypertension of 10 years' duration. Cardiac enlargement, moderate arteriosclerosis, and papilloedema were present. Her blood pressure was 230/140 mm.

No improvement was noted during four months of hospital treatment, and on June 14 hexamethonium was given orally, 3 g. daily. In 10 days the blood pressure fell to 160/100 mm. and remained fairly constant. The patient became ambulant and all symptoms were completely relieved.

Case 5

This patient, a man aged 56, developed severe hypertensive heart failure and was admitted on April 24, when cardiac asthma was found to be a prominent feature. There was no history of renal disease. During the next fortnight his blood pressure was constantly 260/155. The heart was clinically enlarged, and radiological examination showed an increase of the transverse diameter of the heart and pulmonary congestion indicating left heart failure. Medium crepitations were present at both bases. Papilloedema was observed. Preliminary treatment without hexamethonium had no effect and the prognosis was grave.

Hexamethonium was given in total dosage of 2.5 g. a day from May 11. From being orthopnoeic the patient became symptom-free and ambulant in 35 days. His blood pressure varied between 140 and 150 systolic and 80 and 110 diastolic. There was no clinical evidence of cardiac enlargement. Radiological examination revealed a transverse diameter of the heart which was within normal limits. A month later he became capable of light exercise without dyspnoea, and he has been discharged on maintenance dosage.

Case 6

A woman aged 49 had been treated in bed for the previous 10 months at home with no relief of her symptoms of dyspnoea on effort and at rest, anginal pain, severe headaches, and failing vision. Her blood pressure on admission was 240/160 mm. There was gross cardiac enlargement, left ventricular preponderance, and triple rhythm. Marked papilloedema and numerous exudates and haemorrhages were seen. She was admitted on

June 14 and treated from the 25th with hexamethonium bromide, 2.5 g. total a day. Her blood pressure fell in 10 days to 170/110 mm. and there had already been relief of dyspnoea, anginal pain, and headache; after a further three weeks she was allowed up, and improvement has been maintained.

Case 7

This patient, a woman aged 41, was admitted on February 15, 1950, with a history of cardiac asthma, severe headaches, and dyspnoea on effort of two years' duration. She had had acute nephritis at the age of 20. Gross heart enlargement was present and triple rhythm. There was early papilloedema with exudates and haemorrhages. Her blood pressure during the next three months in hospital with routine medical treatment was at a constant level of 275/170 mm.

Hexamethonium treatment was begun on June 14 and raised to a total daily dosage of 3 g. Her blood pressure fell to 180/120 mm., and remained at this level. The headaches and dyspnoea disappeared, papilloedema regressed, and the patient could sleep recumbent. After four weeks' treatment hexamethonium was withdrawn. There was no subsequent rise of her blood pressure. She is ambulant and well.

Case 8

A man aged 30 was admitted on April 5 with malignant hypertension, and his blood pressure was found to be 195/130 mm. The symptoms were of four weeks' duration, and during the next two weeks of observation a rapid deterioration in his condition took place, headache, nausea, and vomiting being associated with gross fundal changes and visual failure. There was an albuminuria of four parts Esbach with numerous red cells microscopically and a blood urea of 100 mg. per 100 ml. The intravenous pyelogram showed no function in either kidney after 25 minutes.

Hexamethonium treatment was begun on April 17 in a dosage of 3 g. a day, which produced a steady fall of blood pressure to 130/80 mm. Complete relief of headache followed. The fundal changes regressed, with some improvement in vision. There has been no change in his renal function, and albuminuria averages two parts Esbach.

Hexamethonium was withdrawn on July 9. There was no alteration in the blood pressure for the next month, but a subsequent rise of blood pressure to 170/110 mm. necessitated a further course of treatment with hexamethonium, which has reduced the pressure again to within normal limits, and his blood urea has fallen to 30 mg. per 100 ml.

Discussion

Throughout this series the substitution of normal therapeutic measures other than rest in bed by oral medication with hexamethonium bromide led to an immediate fall in the blood pressure to a level which could readily be maintained by a daily total dosage of 2 to 3 g.

The most striking results were obtained in Cases 1 and 8, young patients with no previous history of renal disease, with symptoms of short duration and rapid progression, and with no arteriosclerosis. Although there was a remote possibility of a remission in Case 1, there can be no doubt about the efficacy of the intervention of hexamethonium in Case 8.

In the presence of long-standing hypertension without a previous history of renal disease, the blood pressure could be reduced to within normal limits or to such levels as were considered desirable clinically. Thus in Cases 5, 6, and 7 gross arteriosclerotic changes were present and reduction of the blood pressure to normal limits was considered inadvisable.

Headache has been abolished, papilloedema has markedly regressed, and vision has improved in every case. All the patients are now ambulant.

Complete relief from paroxysmal nocturnal dyspnoea was observed in Cases 5, 6, and 7, and from angina in Case 3, contrary to the experience of Bjorkenheim (1948) with tetraethylammonium. Clinical and radiological evidence of the return of an enlarged heart to normal size was obtained in Case 5.

Alteration of the balance of fluid intake and output was negligible during treatment, and the volume of urine was slightly increased at first in some patients. It was possible to lower the blood pressure sufficiently to relieve symptoms in patients with chronic nephritis without disturbing renal function.

Hexamethonium was withdrawn in Cases 1, 7, and 8 without an immediate rise in the blood pressure; and, although Case 8 required further treatment, Case 1 still had a stable normal level of pressure after eight weeks. It seems likely that continuous administration may be unnecessary.

During the earlier part of this trial, shortages of hexamethonium led to substitution by pentamethonium bromide and iodide. This drug was found to be less effective in equal dosage, and nausea and tachycardia were troublesome. Hexamethonium is considered preferable.

Side-effects.—Blurring of vision, dry mouth, nausea and heartburn, and constipation were encountered in every case from the beginning of treatment. These side-effects were not severe and disappeared during the first two weeks, but recurred and disappeared with any significant increase in dosage. However, apparent paralytic ileus was encountered in two patients, necessitating withdrawal of hexamethonium for a period of 24 hours and treatment by the administration of a high enema, full dosage being subsequently resumed without complication. It was found necessary to begin treatment with a small dose of the drug, as the administration of a full dose initially produced a circulatory collapse in two patients. Faintness due to postural hypotension was complained of when patients became ambulant, but was of only a few days' duration.

Summary

Eight cases of severe hypertension have been treated with hexamethonium bromide, with a marked lowering of the blood pressure and relief of symptoms. Although experience with this series of patients is limited and the place of hexamethonium in the treatment of hypertension has still to be defined, this preliminary report is recorded because hexamethonium seems to provide a useful method of reducing the blood pressure in severe hypertension, with ready administration and relative freedom from toxicity.

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