MANAGEMENT OF MALPOSITIONS OF THE VERTEX*

BY

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With so much maternity work being done in hospitals there is to-day a tendency to study the various problems associated with obstetrics solely from the statistical angle. Of course, much very useful information is gained by this approach; but it can be cold and lifeless, and there are some problems which can be expressed in another way. It is not my intention to belittle the value of these statistical analyses, especially when, for all I know, there may be a Hogben sitting amongst us. I would prefer, however, to present the subject from the angle of the practitioner of obstetrics who is working on his own without the panoply of the hospital around him to share his burden and sometimes to shield him from his failures. I would rather talk of my experiences as an obstetrician doing private domiciliary midwifery than as a consultant engaged in institutional midwifery. By so doing we can meet on common ground and compare notes.

During the past twenty years I have myself conducted a fair number of booked confinements: excluding emergency calls, there are over 2,500 which can be drawn upon. From such a number it is possible to form a judgment on what constitutes a difficult vertex presentation. In these cases I carried out my own antenatal work, and almost all the patients had a radiological examination at the thirty-sixth to thirty-seventh week. It was thus possible to select, with some accuracy, the cases of malposition of the vertex, and the malpositions which I here deal with are the occipito-posterior position with the head lying in the oblique diameter of the brim, the direct occipito-posterior with the head lying in the conjugate, and the occipito-lateral with the long axis of the head lying in the transverse diameter of the brim.

Incidence

The first question to be considered is, How often do we encounter such cases, and do they in fact give rise to difficulty in labour? I found among my cases that the occipito-posterior position with the head in the oblique occurred in 15%, the occipito-lateral in 26%, and the direct occipito-posterior in only 1%. The very great differences in the incidence of occipito-posterior presentation which are recorded by various authors are in all probability due to the fact that the diagnosis was made at different times—before the onset and during labour—and that hospital records are in themselves often incomplete, lacking accurate information from which a reliable figure can be ascertained. Thus we have such differences as:

Seidentopf ..	..	12.4% in Chicago and 1.4% in Leipzig
Munro Kerr ..	..	20-25% in private practice, early in labour
McBride ..	..	4% in Glasgow
McGregor ..	..	6.8% in Edinburgh

Prognosis of Difficulty

As to whether or not the occipito-posterior position causes a difficult labour, we find that Munro Kerr and

Chassar Moir state: "Occipito-posterior positions of the vertex have in recent years come to be looked upon as the *bête noire* of obstetric practice. It may be a somewhat exaggerated view to take of this very common complication—we think it is; nevertheless, the difficulties which develop may occasionally be very serious—particularly in primiparae—and they always demand judicious handling." And Morris says: "The detection of an occipito-posterior position prior to the onset of labour should not cause alarm, for in a very high proportion of cases correction at least to an occipito-lateral position occurs spontaneously when labour commences." These are two ways of regarding the problem. I would prefer to express it in a different way. The manner in which I venture to suggest it strikes most of us who are engaged in domiciliary midwifery is that an occipito-posterior presentation in a primigravida may at any time from the onset of labour until its completion bring very considerable difficulties—with a prolongation of the first stage, perhaps a very difficult forceps delivery in the second stage, and a possibly complicated third stage—and on that account it causes us concern and anxiety from the time when we first diagnose the condition until the confinement is successfully accomplished.

It is agreed that the occipito-posterior position and deep transverse arrest are responsible for a high percentage of the stillbirths which occur in mature infants. These cases play a large part in producing the dystocia which may be followed by the trauma of a difficult delivery, and, later, the increased possibility of haemorrhage from an atonic uterus. Trauma and haemorrhage in many instances will in turn be followed by obstetric shock, which is one of the major causes of maternal mortality and is to-day responsible for over 30% of the deaths in our hospital. In our part of the world occipito-posterior and deep transverse arrest is the commonest cause of failed forceps now that the grosser degrees of contracted pelvis have become less common and the general standard of midwifery has improved.

Knowing that this is so, and appreciating the danger not only to the child but occasionally to the mother, we can now comfort ourselves with the knowledge that the majority of occipito-posterior cases do not fulfil our worst fears. This, however, is cold comfort if, having at the thirty-sixth week made a diagnosis of an occipito-posterior position, we cannot prophesy with any certainty in any given case how it will finish, and if only when the case is finished are we able to experience relief in the knowledge that this was one of the many easy cases which gave no trouble. Wisdom after the event is very little consolation for the anxious foreboding we may have had for the last week or two before the confinement and at the actual confinement itself. Therefore, while fully admitting that many of these cases have simple uncomplicated confinements, let us examine in more detail the difficulties which we know may confront us—and which we fear—in an endeavour to find ways and means to deal with them when they do arise.

I shall consider first the primigravida. When the diagnosis of occipito-posterior or occipito-lateral presentation is made at the thirty-sixth week we know that in a number of cases this will have become anterior by the time the patient goes into labour, but where the head is engaged or even partially engaged at this time it is unlikely that there will be any improvement in the position before labour starts: in this I differ from Munro Kerr and Chassar Moir, who say that the third and fourth vertex positions are infrequent before the onset of labour and that the largest proportion develop early in labour. They therefore make an arbitrary division into primary and secondary occipito-

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posteriors. I regard this as the very reverse of what actually happens in practice.

Can one correct the position antenatally? Buist's pads have been advocated, and recently by no less an authority than Farquhar Murray, but we in Glasgow have been unsuccessful with this treatment. Postural treatment has been recommended, and this also has in our hands failed to produce satisfactory results. I know of no means of correcting this malposition antenatally. If there is no method of correction, is there any value in diagnosis? Most certainly there is. Most primigravidae hope for an easy and quick labour. They are fortified in this hope by some of their fortunate friends who have had the experience. Where the doctor in charge knows that the occipito-posterior presentation exists he should be able to prepare the patient for a labour which is unlikely to be short. In so doing it is essential that he should not alarm her, and it may be of value to have a word or two with the relatives. It should again be stressed that there is no need to give them cause for undue apprehension or concern, but a certain amount of psychological preparation can be quietly instilled into the minds of the patient and her associates, so that if labour does not follow a rapid course she does not become unduly despondent or panicky. When well carried out, this psychological preparation can only increase the confidence of the patient in her doctor, and thus will have an incalculably beneficial effect upon the whole course of the labour.

Clinical Post-maturity

In cases where the head is high and the position is posterior or lateral, the antenatal period may be prolonged beyond the expected date of confinement. In other words, such cases often become clinically post-mature. Prophecy of such an occurrence by the doctor in charge will also increase the confidence of the patient and prevent that rising tide of impatience and perturbation which is so apt to occur when a primigravida goes more than a few days past her expected date.

So much for the psychological value of antenatal diagnosis of the occipito-posterior position.

The question of clinical post-maturity may now be considered a little more fully, for it is often here that we meet our first difficulty. The longer pregnancy continues past the expected date the larger the child may become, the harder the head, the less easy the moulding, and the more difficult the ultimate confinement. Are we justified in inducing labour in such cases?

Before answering this question there is a further essential in the diagnosis. It is desirable to make a pre-delivery assessment of the pelvic capacity. This can be done by an internal digital pelvimetric examination. The shape of the brim can to some extent be appreciated, and, what is much more important, the curvature of the sacrum. A sacrum which is flattened antero-posteriorly will markedly reduce the pelvic capacity, and its full significance must be appreciated in determining the future course of the labour. The prominence of the ischial spines and the length of the sacro-spinous ligament should be ascertained. Caldwell and Moloy allow two fingerbreadths as a rough guide to a normal sacro-spinous ligament. The mobility of the coccyx, the width of the subpubic angle, and the posterior sagittal diameter are all of great value in determining the pelvic capacity. In these days of radiology much can be learned from a lateral view of the pelvis, which can be taken at the same time as the diagnosis of the foetal position is confirmed, and, while perhaps to have an x-ray pelvimetry in every primigravida would be desirable, it is a counsel of perfection and not always feasible. It should

not replace internal digital pelvic examination, as it is really, to my mind, an adjuvant rather than a primary factor in diagnosis. The width of the sacro-sciatic notch, whether it is acutely angled or obtuse, will help to guide one in assessing an android pelvis, and this can be appreciated from a simple lateral view.

It is not my purpose to discuss the value of radiological pelvimetry. My own impression is that too much stress is being placed upon this. None the less, it does play an important part in the assessment of pelvic capacity, and before deciding the question of induction in a clinically post-mature patient the pelvic capacity would require to be known.

Induction of Labour

Where the capacity appears ample a modified medical induction is usually justified in a primigravida when she is a few days past term; but surgical induction is another matter, and here at the moment I am referring strictly to the primigravida. While surgical induction by artificial rupture of the membranes in primigravidae may frequently be followed by a satisfactory labour, there are occasions when this is not so. Where the cervix is long and hard, where there is no attempt at taking up the internal os, where it is displaced into the posterior fornix, induction may be followed by a long latent period, and foetal distress may become evident before it is possible to effect a vaginal delivery. Surgical induction of labour is therefore inadvisable in primigravidae when the grounds are solely clinical post-maturity and occipito-posterior presentation.

There are, however, special circumstances in which surgical induction is, I think, well justified, and indeed almost obligatory. Let us take for example an occipito-posterior position occurring in the patient whose pelvic capacity, while not contracted in any serious way, is not more than adequate for the average baby and where the child appears to be getting larger—here the certainty of disproportion looms ahead; or in the patient with a minor degree of restricted pelvic capacity, especially in the mid-plane or cavity. Again, there is the type of patient who has been married for a number of years and to whom the baby is more than ordinarily precious. She need not necessarily be an elderly primigravida. There is also the case of clinical post-maturity where careful observation of the foetal heart has disclosed irregularities, where the movement of the foetus has been noticed by the patient to become less obvious, or where there is reason to suspect the possibility of impending intrauterine death of the foetus—a most difficult type of case to diagnose with accuracy. If we treat any of these cases expectantly, the result may be disastrous to the child, and it is on this account that a number are subjected to caesarean section—and yet caesarean section may be entirely unnecessary.

Trial Induction

I would therefore at this stage put in a plea for what I have called elsewhere "trial induction" in such cases. By "trial induction" I mean that surgical induction of labour may be carried out on the understanding that, should the induction prove unsuccessful, it may be followed by caesarean section, under an "antibiotic umbrella." By this means a number of successful inductions will result and some unnecessary caesarean sections will be avoided. I should repeat, however, that trial induction and caesarean section are procedures to be reserved only for special cases in circumstances other than the mere presence of an occipito-posterior in a clinically post-mature patient, and they do not fall within the ambit of domiciliary midwifery. With the clinically post-mature primigravida who is to be

delivered at home, it is usually best to wait until labour begins spontaneously, and this may mean leaving her for anything up to two or even three weeks.

In multiparous patients the problem can be easily solved. The cervix is usually soft and patulous, membranes rupture easily, and the practice of timely induction in such cases will often avert the danger of a large child which can make occipito-posterior presentation doubly difficult.

Prolonged First Stage

When the patient ultimately goes into labour the first stage may be considerably prolonged. Whether this is due to the fact that the presenting part inaccurately fills the pelvis and fails to elicit what has been described as the cervical reflex, or to incoordinate uterine action, which so frequently accompanies this type of case, or whether it is due to some other factor, I do not propose to discuss. Suffice it to say that a prolonged first stage of labour with the occipito-posterior position is commonplace. How, then, are we to contend with the difficulty? In the initial hours of the first stage no treatment whatever is required. The patient should already have been psychologically prepared for such an eventuality. It is a mistake to administer sedatives too early in these cases. Patients should be allowed to "get on with the job," which the vast majority are prepared to do, but they should be assured of help and relief if they experience discomfort which distresses them. The cult of relaxation is valuable in such cases, and, while the patient should be allowed to move around, she should also be allowed to rest. A combination of activity alternating with rest will help labour to establish itself satisfactorily.

There are very few hospitals in the country to-day in which a prolonged first stage of labour can be adequately managed. The provision of first-stage rooms is lamentably inadequate. Comfortable rooms attractively furnished with comfortable chairs, and newspapers and magazines, are what is required. All too frequently the patient is placed in a common-room with other patients in more advanced stages of labour. The whole situation is macabre. How much more fortunate is the primigravida in the familiar surroundings of her own home.

When the patient shows signs of weariness she should immediately be given sedatives. I need hardly add that any form of oxytocic is definitely contraindicated at this stage. Where a mild sedative is required it is often wise to begin with gas-and-oxygen or gas, oxygen, and "trilene" from a "Portanaest" or some similar machine. The patient who is properly instructed in the use of this will experience considerable relief and will continue to have contractions. It is a common mistake to withhold the use of gas-and-oxygen until the beginning of the second stage, and equally I would suggest that it is a mistake to give the patient trilene too early. Trilene is much more powerful than gas-and-oxygen and is better reserved for later in labour. When gas-and-oxygen has been used for a reasonable time—and I would suggest that a couple of hours at this stage constitutes a reasonable time—pethidine may then be given; this is a valuable and safe sedative, and can usually be repeated until the desired effect is achieved. Morphine will always be regarded as a powerful sedative and one of the best at our disposal, especially when it is combined with a little hyoscine, but this should be used with caution. The proper time for the administration of morphine and hyoscine is at night. It is in the long watches of the night that courage fails, and it is then that morphine is most called for. The amount of morphine to be given in a protracted labour is limited, and it should therefore be

used when it is likely to be of the greatest advantage, which is usually at night.

Apart from sedatives, it is important also to emphasize that the patient should be allowed adequate nourishment in the first stage of labour. She should be encouraged to take her normal meals, as there is no likelihood of an impending anaesthetic. This maintains her strength and fortifies the glycogen reserve in her liver. It also engenders in the patient's mind the feeling that there cannot be very much wrong if she is taking her food normally. By the time she gets towards the end of the first stage, which is, I think, the most painful period of any labour, she should be given adequate sedation. At this time particular attention should be paid to the bladder. So much for the first stage in primigravidae.

The Second Stage: Timing Intervention

When the patient enters the second stage of labour with a difficult vertex presentation—that is to say, occipito-posterior or occipito-lateral—great obstetric judgment will require to be exercised; for at this stage intervention becomes possible, and the doctor must decide whether or not it should be undertaken. Opinion on this subject tends to be divided rather sharply into two schools—the ultra-conservative school which will allow almost unlimited time for long rotation to take place and for spontaneous delivery to be effected, and the ultra-radical school which will carry out what some of our American friends call prophylactic forceps delivery and extract the child as soon as the cervix is fully dilated.

Don't be afraid of the *via media*, because it is the road most often right, and, while in the last instance it is usually a matter for the doctor in charge, there are a number of points which would help him to form a correct judgment. If the first stage of labour has not been unduly prolonged, and if the patient's condition is good when she nears the second stage and the foetal heart is beating strongly, there is every reason to allow her sufficient time to deliver herself naturally. It is impossible to improve upon natural results in such cases. In contrast, there is the patient who has had a prolonged and exhausting first stage; it is then unusual to find that her expulsive efforts in the second are effective. In such cases the head will tend to lie in the mid-pelvic cavity and assume the position of deep transverse arrest. Where this arrest is allowed to persist over a number of hours the consequent moulding of the foetal head merely renders the ultimate forceps delivery more difficult, while the patient is less able to withstand such intervention.

I am not really suggesting that the patient's life is in any great danger, but there is no doubt that a degree of obstetric shock often follows a difficult forceps delivery in a patient who has been in labour for several days. Furthermore, to leave for a long time a patient whose baby is in the position of deep transverse arrest may result in a stillbirth, which is a tragic sequel to a protracted labour and likely to leave a permanent scar on the patient's mind, if not anywhere else. The late Dr. Eneas Mackenzie, one of the wisest and most experienced general-practitioner obstetricians, once said to me, "One of the reasons why doctors apply forceps is not because they are in a hurry, but because they do not like to see poor folk suffer," and, while modern analgesia has obviated much of this suffering, it cannot be used indefinitely in the second stage of labour without risk to the child. There is therefore a very definite place for intervention early in the second stage when the first stage has been prolonged, and correspondingly later in the second stage when the first stage has been normal.

The Emergency Call

Sometimes a doctor is called, as an emergency or for a second opinion, to see a patient with an occipito-posterior presentation in the second stage of labour, dystocia having already occurred, and he may find a tired and even exhausted mother and the prospect of a difficult forceps delivery. Adequate care in the first stage would have averted such a state of affairs, but when it does exist it must be overcome. One decision which has to be taken is when to intervene. Generally speaking, such cases are not suitable for domestic confinement, for the accoucheur will need a good anaesthetist, and at the completion of delivery a variety of urgent functions may require to be carried out simultaneously. The child may need resuscitation, an episiotomy may have to be repaired, and an atonic uterus may require attention on account of third-stage bleeding. It is unusual in domiciliary surroundings to have enough assistance to perform all these functions together satisfactorily.

It might not be inappropriate here to refer to some technical points in the delivery by forceps of the deep transverse arrest and of the persistent occipito-posterior, although I realize that in doing so I am entering a field of almost wild controversy. In the great majority of cases the experienced obstetric practitioner will find no difficulty in manually rotating the head into an anterior position, and this is especially so if the intervention has been started before moulding has become extreme.* It may be necessary to push the head fairly high up in the pelvis to effect this, but in a primigravida there is really little danger of such a procedure causing undue extension of the head or prolapse of the cord. He will then apply forceps and deliver slowly.

One has become accustomed to the advice that fundal pressure should be applied in the delivery of a breech to maintain flexion, so I think it is wise to have an assistant to apply such pressure in a forceps delivery, and for the same reason. Reasonable fundal pressure begun just before the forceps traction can be very helpful, but the whole procedure must be done slowly. There is a tendency to-day to hurry forceps deliveries quite unnecessarily.

In the cases in which rotation is impossible, owing either to very marked moulding or to slight cephalo-pelvic disproportion, the head should be delivered by the application of Kielland's forceps to the head in the transverse position, and in expert hands this gives first-class results. Equally, in inexperienced hands it causes extensive laceration of the pelvic floor.

Alternatively, forceps may be applied over the face and occiput (the actual application is more usually oblique), and moderate traction may be exerted until rotation occurs in the plane of the outlet, when the forceps are removed and reapplied. This is a time-honoured method of delivery, and a great deal of nonsense has been talked about its lethal effect upon the child. With fundal pressure and reasonable traction there will be less danger to the child from such a manoeuvre than might be anticipated, for the head has accommodated itself to the pelvis and is really being helped to "find its own way out." To the ardent apostle of Kielland's forceps I should say, If you have learned to use them, continue to do so. To those who prefer axis-traction forceps and are accustomed to their use, I would say the same. This is the art of obstetrics which must be acquired rather than taught, and if the best results are to be obtained the artist must be allowed to use the tools which he finds most natural to him. I would

suggest that proficiency in the use of both Kielland's and axis-traction forceps has much to commend it.

The Persistent Occipito-posterior

Where short rotation occurs and persistent occipito-posterior presentation results, this will often be diagnosed from the fact that the head fails to advance despite the strong expulsive contractions. In such cases the vulva frequently gapes, but the head, instead of coming on to the perineum as one might anticipate, remains well back in the pelvis. As soon as a diagnosis of persistent occipito-posterior presentation is made, delivery should be carried out by forceps, and in certain circumstances it is quite permissible, and indeed advisable, to deliver it as a face-to-pubis. I would suggest that the criteria for delivery as a face-to-pubis would be that the diagnosis has been late and gross moulding has occurred in the persistent occipito-posterior position, or that there is contraction of what has been called the ischio-pubic segment of the pelvis. This is, of course, the funnel-shaped or android pelvis of to-day. There is much more room for the biparietal diameter in the ilio-sacral segment, and delivery can be effected with less traction and trauma to the child with the head in the posterior position provided that an ample episiotomy is carried out.

An interesting comment upon this type of delivery is that on occasion an occipito-anterior or an occipito-lateral presentation may undergo rotation backwards into the hollow of the sacrum, where the outlet is slightly contracted. This was adequately described by Herman many years ago, and has been referred to again by Cameron and Hewitt amongst others. None the less, while it is permissible to deliver the baby face-to-pubis in the circumstances outlined, as a rule manual rotation of the head to an anterior position gives most satisfactory results, particularly in multiparous patients.

Delivery of the Occipito-posterior in a Multiparous Patient

In the multiparous patient a complication of the occipito-posterior position is occasionally encountered to which inadequate attention has been paid. Where the uterine contractions have been of poor quality the multipara may reach full dilatation with the head remaining high in the pelvic cavity. In such cases it may be necessary to attempt delivery on account of foetal distress or for some other reason. Where the degree of flexion of the head is poor, great difficulty may be encountered quite unexpectedly in that the head extends whenever traction is applied by forceps, with the result that the blades tend to slip; or, again, in such cases the head may suddenly recede in the course of rotation from the pelvic cavity and the assistant has difficulty in bringing it back into the pelvic brim. I have encountered prolapse of the cord in such cases, and even prolapse of a limb.

Where any such unanticipated complication arises there is much to be said for a manoeuvre which for no very good reason has now fallen into desuetude. I refer to internal version. I have carried out internal version myself in nine cases—in two of my private patients and seven of my hospital cases—and have been able to secure a live child. Had the attempt at delivery with forceps been continued it would have resulted in undue trauma to mother and child. The conditions which must necessarily exist for internal version are a good anaesthetic with reasonable laxity of the uterus and some liquor amnii in the cavity. It should not need to be emphasized, however, that this is not a procedure to be indulged in by the obstetric tyro, but it

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