some evidence that few uncircumcised men have cause to regret their state.

Conclusions

It has been shown that, since during the first few years of life the prepuce is still in process of developing, it is impossible at this period to determine in which infants the prepuce will attain normal retractability. In fact, only about 10% will fail to attain this by the age of 3 years. Of this 10% of 3-year-old boys, in most it will be found a simple matter to render the prepuce retractable by completing its separation from the glans by gentle manipulation. In a very few this may prove impossible and circumcision might then be considered a justifiable precaution. Higgins (1949), with long experience of paediatric urology, also concludes that circumcision should not be considered until "after the age of, say, 2 to 3 years."

The prepuce of the young infant should therefore be left in its natural state. As soon as it becomes retractable, which will generally occur some time between 9 months and 3 years, its toilet should be included in the routine of bath time, and soap and water applied to it in the same fashion as to other structures, such as the ears, which are customarily treated with special assiduousness on account of their propensity to retain dirt. As the boy grows up he should be taught to keep his prepuce clean himself, just as he is taught to wash his ears. If such a procedure became customary the circumcision of children would become an uncommon operation. This would result in the saving of about 16 children's lives lost from circumcision each year in this country, besides saving much parental anxiety and an appreciable amount of the time of doctors and nurses.

Summary

The development of the prepuce is incomplete in the newborn male child, and separation from the glans, rendering it retractable, does not usually occur until some time between 9 months and 3 years. True phimosis is extremely rare in infancy.

During the first year or two of life, when the infant is incontinent, the prepuce fulfils an essential function in protecting the glans. Its removal predisposes to meatal ulceration.

The many and varied reasons commonly advanced for circumcising infants are critically examined. None are convincing.

Though early circumcision will prevent penile cancer, there is reason to suppose that keeping the prepuce clean would have a like effect in preventing this disease.

In the light of these facts a conservative attitude towards the prepuce is proposed, and a routine for its hygiene is suggested. If adopted this would eliminate the vast majority of the tens of thousands of circumcision operations performed annually in this country, along with their yearly toll of some 16 child deaths.

My thanks are due to Dr. A. M. Barrett for pathological facilities.

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THE USE OF RADIOGRAPHS IN ASSESSING DISPROPORTION*

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What has radiology done to help the obstetrician with his problem-cases of disproportion? I do not doubt that some at this moment are muttering, "Nothing"; and perhaps a cynic is adding in ruder tones, "Less than nothing—it is a menace!" But I am equally sure that there are many others of a more sanguine disposition who take an opposite view; and one and all of us are, I hope, ready and willing to enter into a fair discussion concerning the merits of this new tool that has been put into our hands.

Why should there be any sharp difference of opinion: and why should there be, in some quarters, a distrust of radiography? Chiefly, I believe, it is because radiologists as a class have little first-hand knowledge of obstetrics and often fail to appreciate the intricacies of childbirth. Similarly, the obstetrician seldom has an understanding of the technical difficulties encountered in the x-ray room and often demands the impossible from the radiologist. Too often, therefore, an early enthusiasm gives place to a distrust or even frank disbelief regarding the value of radiology in assessing obstetrical disproportion. I must therefore first plead for the most intimate and genuine co-operation between obstetrician and radiologist if progress in this field is to be made.

No discussion on the topic of disproportion can escape the criticism that it deals with one aspect only of dystocia and ignores other factors of capital importance. No notice is taken, for example, of the force and frequency of the uterine contractions, of the adaptation and realignment of the soft tissues—particularly those of the lower uterine segment—of the mouldability of the baby's head, or of the "give" of the pelvic joints. Least of all does radiology measure the patient's psychology or fortitude, nor, as I jokingly add to my students, does it judge the character, size, and proximity of the mother-in-law! Yet of all the causes of dystocia, disproportion is the most important; and it is therefore right that it should be singled out for special consideration.

Development of Radiographic Pelvimetry and Cephalometry

Looking back over the development of obstetric science, we see an early recognition of the importance of pelvic measurement. William Smellie knew full well the meaning of the flattened pelvic brim and the ominous significance of a projecting sacral promontory. Baudelocque, Michaelis, and others developed this science; and by the end of the nineteenth century pelvimetry was recognized as an essential part of every obstetrical examination.

Now comes the paradox. In modern times a new method of obtaining this supposedly vital information—and of obtaining it with undreamed-of accuracy—has been placed in our hands. Yet contemporaneously with this wonderful development there has arisen a generation of obstetricians who maintain that exact pelvic measurement is, generally speaking, unnecessary and even misleading and declare that the many components collectively making for eutocia

*Paper read at the combined meeting of the Sections of Obstetrics and Gynaecology and Radiology at the Annual Meeting of the British Medical Association, Harrogate, 1949.

on the one hand or dystocia on the other are so complex and varied as to render useless any system of prognosis that is based on one factor or even one set of factors. While I acknowledge the complexity of the subject I do not share these extreme opinions, which seem a counsel of despair, and which, I suspect, are sometimes voiced with insufficient knowledge of the position now reached in obstetric science. And among the iconoclasts one can sometimes perceive an inconsistency, for in those very centres where radiology is viewed with distrust or even antagonism there are in use antenatal charts in which space is provided for pelvic measurements obtained by clinical means. To quote my own words used on a previous occasion, "Disproportion in its widest sense is chief among the causes of difficult childbirth, and here it is that radiology gives most help. If we trouble to take pelvic measurements at all we show our belief in their value, and, if we so believe, then surely it is right to strive for fuller knowledge and greater accuracy."

Possibly some of the opposition to radiography has come from the fact that methods of pelvimetry have been, in some cases, only doubtfully accurate. Here it may be useful to point out that an error in positioning the patient during radiological examination inevitably results in the pelvic size appearing *smaller* than it really is, while in like circumstances the foetal head appears *larger* than it really is. In consequence an entirely erroneous appearance of disproportion may easily be presented, and a forecast made that is belied by subsequent events. But still more important in this connexion is the surprisingly tardy appreciation of the fact that adequate pelvic measurement requires far more than a mere recording of the conjugata vera—important as that time-honoured measurement is. A small brim conjugate may mean little if the pelvis is generous in other dimensions; and, conversely, a generous brim conjugate is no talisman against dystocia if serious diminution of capacity is present in other respects. It follows that, to be efficient, radiological examination must include examination of the pelvis in more than one projection.

Pelvic Shape

And now a word about pelvic shape as distinct from details of pelvic size. There is nothing new in saying that the "mechanics" of labour are largely governed by pelvic shape. But this truism took on a new meaning when Caldwell and Moloy by their admirable work with the radiographic stereoscope distinguished in more precise fashion certain trends that occur in pelvic architecture, and linked those trends with peculiarities in the manner of descent of the head. For example, they (and Herbert Thoms before them) associated the occipito-posterior descent of the head and face to pubes delivery with a pelvis in which the antero-posterior diameter was equal to, or exceeded, the transverse. But space does not allow me to elaborate this topic. This only I would say in passing: any system of pelvimetry must make allowance for the influence of pelvic shape as well as pelvic size if it is to form a basis for obstetrical prognosis.

Radiographic Technique

I shall not here discuss radiological technique. A bewildering variety of methods of pelvimetry and cephalometry have been devised; and, so long as the method is reliable, its choice must be left to the discretion of the radiologist. In passing I may remark that there seems to be an irresistible fascination for the mechanically minded enthusiast to introduce new methods, or new modifications of standard methods. And here I accuse myself, for if this

is a sin I have a burden to bear. But such modifications as I have favoured have been directed to simplifying matters at the time of the examination, and I therefore deem my burden light.

Assessing Disproportion

I now come to the main topic—the methods of assessing disproportion. Let us start with the simplest of all: the radiologist views the radiograph and allows the general impression thus received to prompt him to an opinion regarding prognosis. This method—for lack of a better title let it be called the impressionistic method—has been developed to its fullest extent by Caldwell and Moloy and their followers (Caldwell, Moloy, and Swenson, 1939): and here I include Miss Meave Kenny, who has done excellent work on this line at the British Postgraduate Medical School (Kenny, 1944). By use of the Moloy stereoscope the relation of the foetal head to the maternal pelvis can be surveyed in three dimensions. Now, there is obviously much to be said in favour of this method, which, incidentally, enabled Caldwell and Moloy to break new ground and to study the influence of pelvic shape on the course of labour, to which reference has been made. I myself gladly acknowledge personal help from these workers and have made considerable use of their method. Nevertheless, it has disadvantages. It is exacting and time-consuming: moreover, not every observer has adequate stereoscopic vision. At the best the method is essentially impressionistic. Judgment is given on features rather than accurately measured or recordable findings; and obviously there is no certainty that different observers will agree on individual cases.

In 1935 Ball and Marchbanks, of New York, reported a method of estimating head volume and comparing it with pelvic capacity. Theoretically, it is probably the best of all methods, but the technical difficulties are formidable and few workers appear to have followed this line.

In this country, Nicholson, of Moreton-in-Marsh (Nicholson, 1938, 1943), developed a method of pelvimetry based on an original and ingenious method of utilizing parallax-shift measurements. He then evolved a method of measuring the available area at different pelvic levels, and from observations compiled in his own practice was able to assess the significance of various types and degrees of pelvic contraction. For example, a brim reduced to 90 sq. cm. was an indication, he believed, that a "level of uncertainty" had been reached. I much admire Nicholson's work, which, I would remind my listeners, was done as a side interest in a busy general practice. It has done good by focusing attention on the need for accurate measurement and providing, for the benefit of other workers, possible formulae by which the obstetrical value of the pelvis may be judged. Curiously, however, Nicholson has paid little heed to the size of the foetal head—a matter which, in my opinion, is almost as important as the computing of pelvic measurements; nor is it clear that he has sufficiently considered the variation of prognosis that derives from variation in pelvic shape.

In 1933 Thoms, of New Haven, described the construction of pelvic or, as I shall call them to avoid confusion, anatomical charts in which the outline of the pelvis was reduced to its true size and shape. This he did for both the brim outline (supero-inferior projection) and for the pelvic canal outline as seen in lateral profile. Some 12 years ago I was fortunate in being able to see Thoms's work at first hand, and was much impressed by its value. Soon afterwards I tried to add to the usefulness of Thoms's charts by superimposing on them an ellipse which

represented, as nearly as possible, the area that would be occupied by the particular foetal head that was to descend through that pelvis (Moir, 1941). This was done with regard to the pelvic brim and also the pelvis at the level of the ischial spines. A visual impression was thus conveyed of the difficulties (if any) that would be encountered during the descent of the head. This, I felt, was a welcome improvement on purely impressionistic methods of assessing disproportion.

Rohan Williams (1943; Williams and Phillips, 1946) has contributed notably in this field by developing the anatomical chart method in new ways, particularly with regard to the lateral profile charts. In place of a static ellipse drawn on the charts he employs a circular disk (or set of variously sized disks) which he passes back and forwards over the chart to help him to form an opinion regarding the space available for the head at the various levels. This method has given excellent results in his hands, and in a series of cases of clinically suspect abnormality he has been able to show a correct forecast of labour in 83%, and a "substantially correct" forecast in 90%, of assessable cases. (The second group includes those in which the forceps operation was used, but without signs of cephalo-pelvic disproportion during labour.)

I cannot here do more than mention the names of Peter Allen, of New Zealand, and Morris, of Edinburgh, both of whom have made valuable contributions to this subject and clarified certain obscure features regarding pelvic measurement.

To return now to my own work, this branched off on lines somewhat different from those just described. I early realized that the construction of the anatomical charts was a time-consuming occupation and that, when all was said and done, they resulted only in providing a visual impression of certain features which could also be expressed in simple figures. I therefore evolved a method which, it seemed, would still give a desirable visual impression but which would be quicker and easier to operate. Details have been published elsewhere (Moir, 1946, 1947, 1949). Briefly, three standard charts on graph paper were constructed—one for the pelvic brim, one for the pelvis at the level of the ischial spines, and one for the outlet. Each chart had the antero-posterior measurements indicated along its vertical edge and the transverse measurements along its horizontal edge. It was thus an easy matter to pin-point at will the main size and shape characteristics of any pelvis. Now, by reviewing and correlating a large number of previously observed obstetrical cases in which full radiological examination had been made, it was possible to indicate on each chart the level at which difficulty was encountered with reference to the degree of head size. The end result was the incorporation in the charts of a series of lines or graphs by which one could tell in any particular case whether head size would encroach to a significant degree on pelvic size, or, to use more familiar words, whether dystocia from cephalo-pelvic disproportion was likely (Fig. 1).

These charts have now been in use for nearly five years and I have found them of very real help in summing up the mechanical features of an obstetrical case. They can be prepared without any great expenditure of time or effort, and can be included in antenatal records and accompany the patient to the labour room.

Critics sometimes ask whether this use of radiography has increased the incidence of caesarean section. To this I can reply that radiographic study of the pelvis has oftener influenced me against that operation. For example, on

many occasions when pelvic contraction—even contraction of considerable degree—has been diagnosed by clinical

Charts Used in Cases of Suspected Cephalo-pelvic Disproportion (Measurements in Centimetres).—The chief pelvic measurements can be indicated by a "cross" made on each chart. If the cross lies above and to the right of the line representing the estimate of biparietal head size, mechanical difficulty is highly improbable; if it lies below and to the left, mechanical difficulty becomes probable and increases with the distance from the critical level. Forecast of difficulty is very accurate with regard to the brim chart. It is less accurate if based exclusively on findings in the cavity or outlet charts, for the reason that the lower pelvis may in some cases expand during labour.

means, the radiographic examination has shown that the foetal head was also small, and that while there was undoubted pelvic contraction there was no true disproportion. Indeed, it is quite surprising how often this is so: the small woman very often has the small baby. Occasionally, however, the charts reveal grave difficulty of which no adequate warning is given by clinical examination. In these cases I have hitherto usually adopted the policy of allowing a "trial of labour," for I have realized that the radiographic method has still to prove its worth. But this I can say with full assurance: the charts quickly "separate the sheep from the goats" (I trust this expression will not cause offence!), and show at once which patients are suitable for domiciliary delivery and which should be referred to hospital for careful supervision.

It is difficult to give statistics regarding the accuracy of the obstetric forecast, for there is, in practice, no uniformly applicable yardstick by which this can be judged. How is one to define, for example, what is meant by a difficult labour and what is meant by an easy labour? How is one to class the case in which there has been a long and obviously difficult labour but no evidence of cephalo-pelvic disproportion—for example, the primigravida with primary inertia followed, maybe, by a contraction ring? Again, what is one to say about the case in which an over-enthusiastic house-surgeon has applied forceps for indications that would generally be deemed inadequate? These and other difficulties in assessing results become obvious when statistics are being compiled; and no system of prognosis, however good in itself, can therefore give a forecast that approaches 100% accuracy. Nevertheless, having regard to these limitations, a strict analysis of 193 assessable cases of clinically suspect pelvic abnormality was attempted and gave the following results.

When easy delivery was indicated by the graphs the labour in 72% of cases was found to be short, spontaneous, and uneventful. This figure would be higher if borderline cases were included or allowance made for the "substantially correct" diagnosis as defined by Rohan Williams.

When difficult delivery was indicated by the graphs the labour in 86% of cases was found to be prolonged or to require operative assistance. When dystocia was indicated by contraction in the brim graph, as distinct from the cavity and outlet graphs, the accuracy was even higher.

These results were on an early series; with further experience a higher rate of correct forecast seems possible, and this, I hope, will be the subject of a future report.

Intra-partum Radiography

And now a brief note on intra-partum radiography. It is quite remarkable how little attention has hitherto been paid to this obvious use of the radiograph. By it the progress of labour can be observed, and much help given, for example, in the conduct of the "trial-labour" case. It will show whether the greatest diameter of the head has passed or has nearly passed through the narrowest part of the pelvis, and hence whether or not it is reasonable to subject the mother and the baby to further hours of "trial labour." One can only suppose that lack of radiographic facilities has been the reason for this failure to utilize a modern diagnostic method, and it seems to me that an obstetric hospital without radiographic facilities for the parturient woman is as much an anachronism as, say, a cardiological hospital without an electrocardiograph.

Conclusion

Finally, a word of warning. Let no one suppose that radiography provides a short cut to good obstetrics. The

clinical problems involved are sufficiently numerous and varied to make any such supposition quite untenable. But, on the other hand, he is a bold man who would brush aside the help that radiography can give. To ignore its aid and to trust exclusively to clinical judgment in sizing up the problems presented in a border-line case of disproportion is, to my mind, a policy reminiscent of the alleged behaviour of the ostrich on the approach of danger.

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GROWTH OF THE FOETAL BIPARIETAL DIAMETER DURING THE LAST FOUR WEEKS OF PREGNANCY*

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It has long been accepted that the foetal skull grows at a uniform rate during the last weeks of pregnancy, and this view is supported by the work of Scammon and Calkins (1929). They state that the foetal biparietal diameter increases by approximately 0.1 in. (2.5 mm.) a week during the last four weeks of pregnancy, and Reece (1935) based his method of estimating the age of the foetus on their growth curve of the biparietal diameter.

Three years ago the departments of radiology and obstetrics at the Newcastle General Hospital decided to try out a new method of cephalometry. In an attempt to check its accuracy by direct measurement of the foetal head after delivery the following course was adopted.

After each cephalo-pelvic estimate a copy of the radiologist's report, with the date of examination, was filed in a card index. A list of all patients examined, containing no other information than the expected dates of delivery, was kept by Dr. Ruth Fawcett, paediatric registrar to the maternity department, who then measured the biparietal diameter of each baby's head on the third day after delivery. This day was chosen because by that time it was considered that the effects of moulding would have disappeared (Chassar Moir, 1946). The measuring was done with a pair of engineer's calipers, and it was Dr. Fawcett's practice to measure each biparietal diameter three times, the mean of these three measurements being

*Read at a combined meeting of the Sections of Obstetrics and Gynaecology and Radiology at the Annual Meeting of the British Medical Association, Harrogate, 1949. The paper was based on a thesis presented for a degree of M.D. at the University of Durham, June, 1949, with the addition of fresh cases and material.