of treatment were free from gonococci and from pus cells. The child was discharged three days later.

Comment

It is not intended to make any comment meantime other than that, of three preparations—benzyl-sulphanilamide, sulphanilamide, and M. and B. 693, the first and second having been tried extensively in the Aberdeen clinic—the last is the swiftest in action. So far it would appear to be a highly efficient and comparatively safe drug in the doses which apparently suffice to deal with the gonococcus. But out of this very efficiency there may arise the necessity, for obvious reasons, of strict control in the sale and distribution of such a preparation. It is hoped that at some future date a more detailed report may be made on the use of M. and B. 693 in the treatment of gonorrhoea.

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X-RAY PELVIMETRY

A SIMPLE METHOD FOR MEASURING THE PELVIC BRIM

BY

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External pelvimetry is still practised by obstetricians and general practitioners, but probably more as a matter of routine than from the conviction that an accurate knowledge of the internal pelvic measurements will be gained. Even internal pelvimetry is unreliable. Besides, it is not easy to apply, and it is often painful or disagreeable to the patient.

In a recent article on the true conjugate and pelvimetry J. Howkins (1938) arrives at the conclusion that the clinical measurement of the true conjugate is either impossible in practice or inaccurate when measured in all but cases of severe pelvic contraction; that a genuine attempt to measure it in a primipara demands a full anaesthetic; that the location of the sacral promontory requires practice and skill, and is valueless, unless performed by one familiar with pelvic examination; and that the measurement, when truthfully obtained, is open to considerable experimental error, in addition to errors due to the particular anatomy of a given patient, such as the depth and inclination of the symphysis pubis.

It is mainly for the above reasons that radiologists have striven since the early days of the x-ray era to make use of radiography for measuring the pelvic brim. The first radiography of the pelvis (of a corpse) was performed in 1896 by Varnier and Chappuis, and required an exposure of three hours. In 1897, at the twelfth International Congress of Medicine in Moscow, Professor Budin showed an excellent radiograph of an oblique pelvis of Naegele: this required an exposure of three-quarters of an hour. At the same congress Professors Pinard and Varnier reported results of the radiological investigations of the female pelvis. "It is possible," they said, "accurately to diagnose in doubtful cases the symmetry or asymmetry of the pelvis, the site and degree

of the asymmetry, the presence or absence of atrophy of the sacrum or of sacro-iliac ankylosis." They estimated the various diameters of the pelvic brim by comparing the obtained radiograph with standard radiographs of dried pelves.

Since then the evolution of x-ray pelvimetry has followed a very devious and complicated path (Orley, 1933). Most ingenious devices and methods for measuring the pelvic brim have been invented, and then discarded because they were too complicated, too expensive, or unreliable. This paper deals with one method of x-ray pelvimetry only—namely, that which was originally suggested in 1897 by Albert, was rediscovered thirty years later by R. E. Roberts (1927) of Liverpool, and simplified by H. Thoms.

Description of Method

The technique described later differs somewhat from that suggested by Thoms. The principle, however, is the same. Briefly speaking, the method consists in placing the patient on the radiographic couch in such a way as to bring the plane of the pelvic brim parallel to the plane of the radiographic film. For this purpose the tip of the fourth lumbar spine is marked on the skin with a dermographic pencil or by a strip of adhesive plaster. The patient is then seated on the x-ray couch in a semi-reclining position, so adjusted that the tip of the spine of the fourth lumbar vertebra is at the same horizontal level as the upper border of the symphysis pubis. This is carried out in the following way: one leg of a pair of callipers is placed on the top of the x-ray couch in front of the symphysis pubis between the patient's thighs, and the callipers are spread until the tip of the other leg of the calliper is at the level of the upper border of the symphysis pubis. The inclination of the patient's spine is then so adjusted that the distance between the top of the couch and the skin mark corresponding to the tip of the fourth lumbar spine is equal to the spread of the callipers.

FIG. 1.—Diagram showing that when the tip of the spine of the fourth lumbar vertebra is at the same horizontal level as the upper border of the symphysis pubis the line which joins the two passes through the promontory.

Some workers dispense altogether with the marking of the tip of the fourth lumbar spine, and instead measure only the distance of the upper border of the symphysis pubis to the top of the table, placing the patient in such a way that her spine forms an angle of 57 degrees with the plane of the x-ray couch. The pelvic brim

should then be parallel with the top of the x-ray couch. A radiograph of the pelvis taken in this position shows the projection of the pelvic brim, slightly larger than natural size.

FIG. 2.—Diagrammatic representation of the antero-posterior diameter of the pelvic brim AB, of its radiographic projection ab, and of the central ray Cd.

The radiographic projection ab of the true conjugate diameter is larger than the actual diameter AB owing to the distortion of the radiographic image caused by the spread of the x-ray beam. It is obvious that any object placed in the imaginary plane of the pelvic brim would undergo the same degree of radiographic distortion as the brim itself. Therefore, if, after having radiographed the pelvic brim, we remove the patient from the x-ray couch and, leaving the tube in the same position, substitute for the imaginary plane of the pelvic brim a perforated sheet of lead supported on two adjustable supports, and give a flash exposure, we shall obtain on the x-ray film a number of black dots corresponding to the perforations in the sheet of lead. If these perforations were 1 cm. apart, the distance between each two adjoining dots on the film would correspond to 1 cm.—in other words, the distance between two adjoining dots on the film corresponds to a corrected centimetre, and any pelvic diameter can be read directly on the film by counting the number of corrected centimetres corresponding to this diameter.

The perforated lead sheet can be made at home. A sheet of lead 12 by 12 inches, and 2 mm. thick, is ruled out in square centimetres, and fine perforations are drilled at each intersection of the transverse and vertical lines. The sheet is then mounted on a piece of plywood in order to keep it firm. A flash exposure given through it results in a number of small black dots on the film.

FIG. 3.—The perforated sheet of lead.

For measuring the distance between the tip of the fourth lumbar spine (or of the upper border of the symphysis

pubis) and the top of the x-ray couch a pair of ordinary internal callipers are used. These can be obtained from any ironmonger for a few shillings.

FIG. 4.—The callipers.

The adjustable supports on which the perforated lead sheet rests can also be easily made by a local mechanic. Roughly speaking, each support consists of an iron base 3 by 4 inches, and about half an inch thick, from the centre of which rises an iron rod about 8 inches long. On this rod a horizontally placed piece of angle-iron slides, by means of a collar provided with a set-screw.

FIG. 5.—Adjustable supports for the sheet of lead.

After the pelvis has been exposed the distance between the horizontal piece of angle-iron of each support and the top of the table is adjusted to correspond to the spread of the callipers, and the perforated sheet of lead is placed on the horizontal angle-irons in the imaginary plane of the pelvic brim. By using a focus-film distance of 110 cm., and by centring the tube over the inner border of the symphysis pubis, the maximum possible error in the measurements is reduced to about 3 mm. for true conjugates of over 10 cm. wide. For smaller diameters the error is still smaller.

Commentary

The method is extremely simple, and can be carried out even with small x-ray plants, as radiographic speed is not essential; a Potter-Bucky diaphragm, however, is indispensable. The output of the plant may be as low as 10 mA, and provided the penetration is adequate (somewhere in the neighbourhood of 90 kV) serviceable radiographs can be obtained with exposures of thirty to forty seconds. In advanced pregnancy longer exposures may be required.

As, with the patient sitting, the thickness of the tissues is much greater behind than in front of the abdomen, the region of the pubis tends to be too dark on the radiograph. This can easily be remedied by shielding, during part of the exposure, the anterior half of the abdomen by means of a sheet of lead which is kept slightly moving in order to prevent it casting a sharp shadow on the film.

X-ray pelvimetry can be carried out even during actual labour. Where the head is in the pelvic brim the radiograph also shows the relative sizes of the head and brim. A number of obstetricians apply x-ray pelvimetry as a routine in all primiparae. The expense and trouble are small in comparison with the saving of lives which might otherwise be lost through unnecessary or too-long-delayed Caesarean section in cases of suspected contracted pelvis, which constitutes the most important and most frequent indication for Caesarean section.

FIG. 6.—Mrs. M., aged 28. Had Pott's disease of spine at age of 16. A flat pelvis was diagnosed, and first child was delivered by Caesarean section. Now wants another child, but not unless it were possible *per vias naturales*. X-ray pelvimetry shows: A.-P. diameter 12 cm., transverse diameter 12½ cm.; slight asymmetry of pelvis. She was advised that there would be no need for Caesarean section for the next child.

The mortality from this operation according to a statistical analysis based on 3,686 cases (Banister, 1935) is 6.6 per cent., as compared with a gross puerperal mortality of 0.45 per cent. In other words, the mortality from Caesarean section is roughly fifteen times greater than the average mortality following childbirth. But, apart from this, x-ray pelvimetry, carried out as a routine, brings in an element of reassurance to both patient and doctor, a factor of no small importance in primiparae.

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R. Debré, M. Lamy, M. Mignon, and J. J. Welti (*Presse méd.*, 1938, 46, 1011), who record two illustrative cases in a boy aged 11 and a girl aged 8, state that whooping-cough is not merely characterized by a slight catarrh of the upper respiratory tract but is accompanied by a pulmonary lesion. In other words, whooping-cough is a disease of the lungs and runs a subacute course more often than is generally supposed. The pulmonary lesions explain the frequency of certain findings even in the mildest attacks, especially the presence of fever, certain auscultatory signs, and the long duration of the disease, as well as the frequency and importance of radiological changes in the lung. On the right side the usual appearance is that of a roughly triangular shadow in the sub-hilar region, while on the left the cardiac shadow is blurred. These changes, which are frequent in mild attacks and almost constant in severe whooping-cough, may be mistaken for tuberculosis or abscess of the lung, and diagnosis may not be possible without the assistance of lipiodol.

Clinical Memoranda

Pneumococcal Meningitis treated with Sulphanilamide: Recovery

The number of recorded cases of pneumococcal meningitis which have recovered is still so small that the following case in which recovery followed treatment with sulphanilamide appears worth reporting.

CASE RECORD

A boy aged 5 years was admitted to the Royal Hospital, Wolverhampton, on April 1, 1938, complaining of right-sided earache for one week; there was no history of previous ear disease. An acute otitis media was found. Myringotomy was performed, and this was followed by a profuse discharge of pus. The condition subsided, and the child was discharged on April 9.

He was readmitted on April 14, complaining of severe frontal headache for two days and vomiting the previous day. On examination he was pale, listless, and very drowsy; temperature 101° F., pulse 130. There was slight neck stiffness, Kernig's sign was positive, and photophobia was present. The right ear-drum was retracted; there was no ear discharge and no mastoid tenderness. The left ear was apparently normal.

Lumbar puncture was performed and 20 c.cm. of turbid fluid withdrawn; in the absence of a bacteriological diagnosis 10 c.cm. of anti-meningococcal serum was given intrathecally; laboratory examination revealed a purulent fluid; films showed abundant pus cells and Gram-positive diplococci. Cultures yielded a pure growth of pneumococci. Globulin was found in excess; protein amounted to 0.24 mg. per cent., chlorides to 0.66 per cent., and sugar to 0.018 per cent. Oral treatment with sulphanilamide was immediately started, one tablet being given four-hourly. Lumbar puncture was repeated once daily on the 15th, 16th, and 17th. On each occasion pneumococci were grown on culture from the cerebrospinal fluid, but the turbidity appeared to be decreasing. Cell counts were not made because of clot formation in the cerebrospinal fluid.

On the 16th—that is, the third day of treatment—the temperature fell by crisis to 97.6° F. The child was no longer drowsy and was playing with his toys. On the 18th cyanosis was just becoming evident and the sulphanilamide was discontinued. Dosage to this point was twenty-one tablets (10.5 grammes). The temperature rose sharply to 101.5° F. on the 20th, with recurrence of neck stiffness and drowsiness. Lumbar puncture yielded a clear fluid which was sterile on culture. The sulphanilamide was restarted—one tablet being given four-hourly for three days, to the total of twelve tablets (6 grammes)—stopped as the cyanosis had become intense, and then, after an interval of two days, given for a further three days to a total for the last course of thirteen tablets (6.5 grammes).

The laboratory reports on the cerebrospinal fluids obtained by subsequent lumbar punctures are as follows:

April 24.—Clear colourless fluid; cells 5 per c.mm. Films show lymphocytes only; globulin in excess; protein, 0.07 mg. per cent.; chlorides, 0.73 per cent.; sugar, 0.043 per cent. No growth on culture.

April 27.—Clear colourless fluid; cells, 2 per c.mm.; globulin in excess; no growth on culture.

April 29.—Clear colourless fluid; cells, 2 per c.mm., globulin in excess; no growth on culture.

May 5.—Clear colourless fluid; cells, 2 per c.mm., all lymphocytes; no excess of globulin; no growth on culture.

The temperature fell on the 21st after discontinuance of the sulphanilamide and, except for an occasional rise to 99° F., thereafter remained normal. In retrospect it appears that the