

REVIVAL OF DIRECT INTERNAL PELVIMETRY *

by

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I must naturally commence with reasons for the word revival. The word signifies that Direct Internal Pelvimetry has been in operation in the past. Succeeding on the recognition of the pelvic curve by Levret, it was Smellie who in 1754 devised the method of measuring the diagonal conjugate, and described its importance in obstructed labour and contracted pelvis. Incidentally, I may mention this Clinical Internal Pelvimetry is still in use today. This then aroused general interest in internal pelvimetry and a variety of internal pelvimeters were devised. Eastman, in the Obstetrical Gynaecological Survey of June 1948, refers to a book by Skutsch in which these pelvimeters were described and published in 1887 and reproduces some seventy-three illustrations covering full eight pages in the above reference. At a glance, through these eight pages of illustrations, one is quite convinced about the interest evinced in internal pelvimetry and pelvimeter design. Eastman writes, "The greatest admiration not only for inventive genius but also for the fortitude of the women who submit-

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ted to their use" as a remark and he goes on to comment on their intricacy and impracticality. Then to trace the further history of pelvimetry in the various changes it underwent to modern times a few further historical facts have to be mentioned. In 1775, Baudeloque introduced the external conjugate, and other external measurements followed, which still to-date are being taught to the undergraduate. In 1900, X-ray pelvimetry was introduced and by 1920 it established its unquestioned superiority over the easier external measurements as compared with the previous methods of obtaining internal measurement; because here in X-ray pelvimetry we have a method of taking the internal measurements. X-ray pelvimetry displaced external pelvimetry on the grounds that the latter had no relationship to the internal measurements; though, it was just because of the reverse belief that it in turn had displaced the then cumbersome internal pelvimetry and internal pelvimeters. However, outlet measurements are still conducted by pelvimeters like one designed by Williams (American Journal of Surgery, 1915) and by Thoms (S.G.O., June 1919). Also, Greenhill refers in his Obstetric text book to an inter-

nal pelvimeter which can be used to measure the inter-ischial-spine distance, and Samuel Hanson for the same purpose had devised a recto-vaginal pelvimeter in 1938. This already shows how direct internal pelvimetry is still being used even more recently upto ischial-spine level and in the American Journal of Obstetrics & Gynaecology, September 1957, he goes all out for the revival of 1938 pelvimeter with the intention of minimising the exposure of antenatal patients to X-rays.

It is this radiation hazard which I have just referred to that is causing the revival of direct internal pelvimetry. With the advent of the atom bomb all nations have become conscious of radiation hazards and these have been referred to in the Social Medicine studies by Alice Stuart *et al* in Britain (B.M.J., 1957). The U.N. Scientific Committee have in clear terms issued a statement on the responsibility of the medical profession in the use of X-ray and other ionising radiations. The Committee for Medical Research in Britain, about the same time in 1956, calls attention to the same point and, again in 1958, another U.N. Committee report on radiation among other things mentions the dangers of the use of X-rays. I have personally had the privilege of hearing a research worker in Oxford demonstrating that all X-rays are damaging, however little or more in degree, and that there is no such thing as stimulatory dose of X-rays, which many of us still believe in. The damage to the germinal cells in the gonads is the most for any given dose of X-rays. An X-ray pelvimetry may deliver to the mother 2.5 to 3r and Thoms' brim view alone

delivers to the foetal gonads interestingly enough, 2r, as they are closer to the tube in a cephalic presentation than the brim of the maternal pelvis in that position. The risk of lukaemia in children who, as foetuses, were exposed to X-rays, has been calculated to be 1 in 8,000 and is not thought to be so great as to throw away the benefits of X-ray pelvimetry. Nevertheless, obstetricians all over the world have lessened the number of X-rays taken in X-ray pelvimetry and some even satisfy themselves with only the lateral view. Rohan Williams is one of them but later, in the Lancet of November 1958, he comments that the lateral view alone has its short comings. The greater danger of X-rays when it occurs lies in the irreversable mutations that can arise by the breaking of hydrogen bond in the DNA.

Besides the dangers of X-rays there is the cost of the plant and the rest of the equipment of the department, a separate specialist, the radiographers and other assistants and the not always a readily available pelvimetry. Samuel Hanson also refers to the fact that mild errors in position, etc. can give rise to sizable inaccuracy in X-ray pelvimetric measurements. And then lastly to comment on external pelvimetry, the external measurements have no bearing on the internal ones and the only internal measurement, that is the diagonal conjugate and the conjugate vera obtained therefrom, can vary from 0.1 to 3.1 cm. as shown by X-ray pelvimetry by Kaltrieder (1952).

All these above mentioned facts naturally have an impact on the mind of an obstetrician. It was all these facts that were brought to bear on my

mind when I was in London in 1957 and 1958 and it made me to look for a way out of these difficulties. I naturally thought the way out lay in the way back to Direct Internal Pelvimetry, because after all we still rely on our clinical judgment and that is why we pay so much attention to the pelvic assessment, done specially in the case of every primigravida at the 36th week when among other things a diagonal conjugate measurement is attempted to be taken. It therefore occurred to me, by pure accident at one of these clinical assessments I was conducting, whether I could find an answer in the affirmative to each of the following questions I asked to myself:

Q. 1. Can the whole of the posterior surface of the symphysis be felt by the left index finger, all the time the tip of the right middle finger was at the promontory and similarly at any point below in the middle line of sacrum down till the tip? (In other words, the index finger of the left hand was being used in the reversed direction).

A. Yes. The result was I could under the circumstances stated, feel the whole of the posterior surface of symphysis with the left index finger and in doing so no further discomfort was experienced by the patient than while measuring for the diagonal conjugate.

Q. 2. If the ischial spine can be felt per vaginam as also the area of the bone towards its base by the right index finger, how high is it possible to further reach up into the pelvis on the side wall through the right lateral fornix?

A. It was found that the right index finger in the vagina after feeling

the ischial spine and the adjacent area of the bone near its base, could reach about 1 to 1½" higher on the side wall to very near the brim in the shallower pelvis.

Q. 3. While (2) was being tried is it simultaneously possible to do the same on the left side with the left index finger introduced through the anus and rectum?

A. Yes. The same palpation of bony points was simultaneously possible on the left side as described in the question and to reach as high. The discomfort caused to the patient was even less and practically negligible as compared with (1), precisely because neither the vagina nor the rectum was in the slightest being stretched, but only each was being moved to its respective side by the respective finger.

There was the answer how to a great extent the loss caused by omitting X-ray pelvimetry could be reasonably bridged, viz. by direct internal pelvimetry with internal pelvimeters. The design of such pelvimeters was already in mind, and that is why the unorthodox clinical pelvimetry just described to answer the three questions was performed. This I did while I was in Lewisham Hospital, London, in February 1948, while I was working with the consultant Mr. Gunn and the Senior Registrar Mr. Rees. In April 1958 while in the same hospital with the cooperation of Mr. Paterson, the hospital Engineer, the foreman Mr. . . . and Mr. Pope, one of the workmen, I cut out of aluminium sheeting and assembled two pairs of proto-type internal pelvimeters which I tried on a patient in that hospital.

The instruments are being exhi-

bited at this Congress and the description is not very difficult. If the reader has followed the manipulations carried out by me as described above in the three questions and answers, it is very simple. The internal pelvimeter one A.P. is designed by making the internal arms follow each of the fingers and being assembled on a joint below and the arms prolonged outwards carried further to work as a scale and pointer for direct reading of measurements on a previously calibrated scales. With this pelvimeter and question (1) before one's mind, it is easy to imagine and not so difficult to measure the obstetric conjugate, A.P. diameter from the tip of the sacrum to the closest point on the posterior lower surface of the symphysis, and similarly a measurement mid-way, though this may not be as accurate. The pelvimeter of the transverse measurement from Questions 2 and 3 has to be a recto-vaginal. Here again it is even easier to see how an accurate measurement of the transverse diameter can be obtained and similarly above and below though not as accurately. The arms of this pelvimeter have to be detachable so that they can be assembled after introduction. The rectal arm is bent upwards to meet the vaginal arm, in order to accommodate the depth of the perineum. By August 1958, Down Brothers of London prepared for me, at my instructions and directions, the improved pilot model which is also on exhibition. These pelvimeters do bear a resemblance to the older ones but they are smoother. The most important improvement features are the internal ends which fit like a hood on each finger and

there is a window on the maximum external convexity through which the same finger can refeel the bony point identified before, which gives correct application and therefore correct reading. This feature does not exist in any other pelvimeter devised up-to-date, and it is most important because it replaces the eye where the eye cannot see. The shallowness of hood allows any size of finger tip to fit in. The hood being small and smooth is not difficult at all to introduce and withdraw which may not be the case with the rings (and 3 different sets of sizes at that) which are presented in Samuel Hanson's recto-vaginal pelvimeter. This latter pelvimeter is used recto-vaginally for both, A.P. as well as transverse measurements, but I feel it is more difficult to take A.P. measurements recto-vaginally than just vaginally because the promontory is more directly and closely accessible through the vagina than through the anus and rectum. Dr. Shirodkar, the President of this Congress, has seen the Samuel Hanson's pelvimeter exhibited in Montreal in June 1958, and I had the privilege of showing him my pilot instruments in Bombay in March 1959, though I had shown him only the photographs of the prototype in London while he was passing to and fro through London in June 1958. His comment would be most valuable.

Now, let us take stock of the information that will be available to the obstetrician without having recourse to X-ray pelvimetry. In the clinical assessment there are the diagonal conjugate, the hollow of the sacrum curved or flat, the breadth of the

sacro-sciatic notch, the ischial spines and their character, the nature of the anterior quadrant (quadrants as per "Modern Obstetrics" by Stern Burnett), the sub-pubic angle, the direction of the rami whether sloping backwards or not. At the outlet, one has the transverse diameter, the posterior sagittal and the Morris's disc fitting method under the pubic arch. It will be seen from this list that the obstetrician is surer of the outlet than mid-canal, because measurements higher up in the canal are not available.

Now, with the use of these pelvimeters one can get the antero-posterior measurement at the brim at mid-cavity and at the lower end of the sacrum. This naturally obviates the lateral X-ray picture. Further, one has the transverse measurement above the level of the ischial spines at the level of ischial spine and below that level up to the outlet. This obviates the straight A.P. picture and gives an idea of the converging or diverging or parallel side walls; similarly as the previous set of measurements would also supply the same information in regard to antero-posterior walls. It is true that by omitting the Thom's brim view one loses the most important information, viz. the shape of the inlet, but this is to some extent made up by the anterior tour of the examining fingers during the clinical assessment, when the experienced obstetrician will be able to judge the roundedness or the beaking of the anterior quadrant. Furthermore, it will be also possible with the recto-vaginal transverse pelvimeter to measure the breadth of the sacro-sciatic notch. This mea-

surement may throw some light on the posterior sagittal at that level coupled with the information regarding the hollow of the sacrum obtained during the clinical assessment, as also the actual measurement of the posterior sagittal at the outlet. From the foregone list of assessment and measurements it is possible at least, to mostly do without X-ray pelvimetry because of the little more information in measurements obtained by the use of these pelvimeters. Of course, the question of trial labour is still there and it still has to be decided whether a particular head will engage in a particular brim, but having once entered the pelvis we have also to be fairly certain that this head will emerge through the canal and outlet. It is only in this latter that these pelvimeters are useful and in avoiding, to a great extent, difficulty in the mid-cavity and outlet. With their use in conjunction with clinical assessment the errors in the canal and outlet will be practically ruled out and will be only minor. They will also be rare because it is common experience that a well engaged head generally does not unduly give trouble at levels below; so much so that some are inclined to neglect minor degrees of contraction in mid-cavity and outlet. Say for instance, this minor degree has inadvertently occurred in spite of all the care proposed, we have still the operation of symphysiotomy which can come to our rescue. I would prefer this to what is called trial of forceps and subsequent caesarean section if necessary and for another thing this latter is extremely unlikely if the above mentioned programme

of assessment and measurement is done.

That these measurements can be taken I have satisfied myself and there is the authority of Samuel Hanson who from 1938 to 1957 has conducted ten thousand cases with internal measurements obtained with his pelvimeter. Now, therefore what has to be done in the future is that these assessments and measurements should be utilised in giving a forecast

in cases of suspect pelvis and the forecast should be checked up against what really happens. Then we will have an assessment of the utility of Direct Internal Pelvimetry with internal pelvimeters. There is no urgency as X-rays are still in vogue though minimised, but it would be better to consider the alternative method not just because of the dangers of X-rays but because also of the cost and a separate specialisation therein involved.

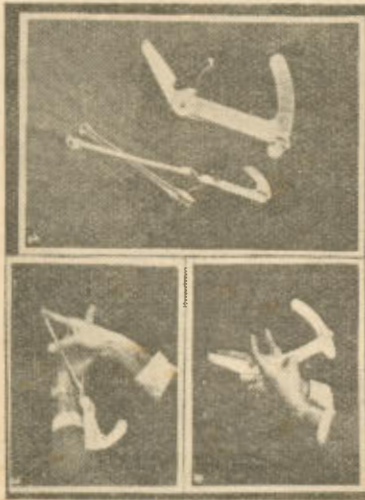


Fig. 1

1. Inner end of the pubic side of Pelvimeter A.P.1 showing the position of window in the maximum curvature of the hood contacting the pubic surface.
2. The sacral end of the Pelvimeter I.A.P. showing the window in the maximum curvature contacting the promontory etc.
3. & 4. Are the inner side and outer side of inner end of Pelvimeter II transverse showing the position of the window on maximum curvature that comes in contact with the Ischial spin, or side wall of the pelvis.

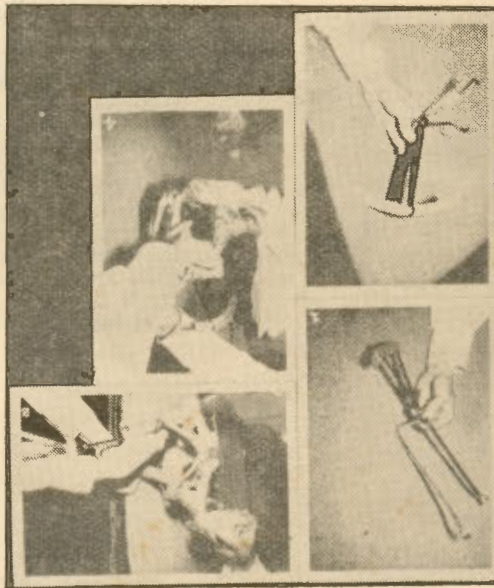


Fig. 2

Note: These are the proto-type of Internal Pelvimeter 1 A. P. and Internal Pelvimeter II Transverse, the two arms of the latter are coupled with a Butter-fly nut.

2. Shows Pelvimeter 1 A.P. with hands in position, as while in use.
3. Shows Inter Pelvimeter II transverse as though in use. The left hand fore-finger is through the rectum while the right finger is through the Vagina.

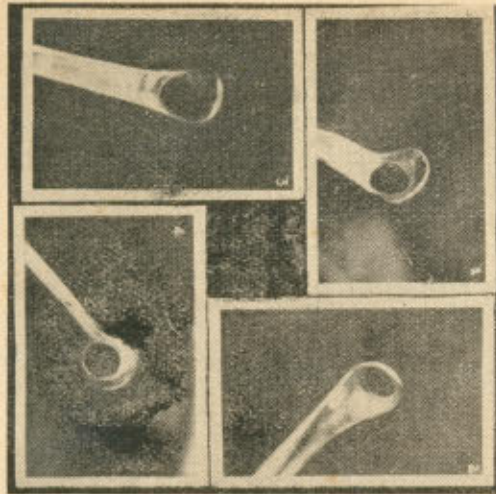


Fig. 3

- 3 & 1 shows the corresponding pilot instruments.
4. Oblique view take to show the instrument in position measuring the Obstetric Conjugate in a pelvis.
 2. Shows Pelvimeter II Transverse measuring the transverse diameter at the level of the Ischial spines.

Note the distance between the right thumb and ischial tuberosity similiary on the left side between the ischial tuberosity and the external left middle finger. These approximately show the distance by which transverse measurement at higher level can be taken.