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THE POSSIBILITIES OF X-RAY IN PREGNANCY

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FROM an historical point of view our first attention has been called to the X-ray in cases of pregnancy by Dr. P. O'Donnell, who has done a great deal of experimental work for the surgeon, Dr. J. B. Murphy, at Mercy Hospital, Chicago.

At that early date—1910—they were able to show the possibilities of the X-ray as a means of assisting the obstetrician in his work. A series of plates were shown from the fourth or fifth month to the time of delivery. We are informed excellent results were obtained, in that one secured a very good idea of the formation and position of the fetus in the maternal pelvis.

In those days it was indeed a difficult matter to secure good results for the reason that the apparatus used was very much inferior to that which is used today and required a much longer exposure, and as a result there were many more secondary scattered rays than we encounter today. Then, too, they did not have the quality of plates or films that we are now able to secure at the present time. However, we are told that intensifying screens were used, which, of course, shortened the period of exposure.

Five years after Dr. O'Donnell's work, Tousey, of New York City, reported that an X-ray diagnosis of pregnancy and of extra-uterine gestation could be made. He said a radiograph of the pelvis would be of much service in either of these conditions. What is found is apt to be a shadow of the fetal mass rather than shadows of different bones.

Lichenstein describes a case of extra-uterine pregnancy with mumification of the fetus. The diagnosis was made by means of a radiograph taken with a medium soft tube without a diaphragm and an exposure of one and three-quarters minutes. The maternal pelvis showed sharply, but the lumbar vertebrae were not so distinct. Over the right rim of the pelvis two fetal extremities were seen, one being a part of the thigh and the other, at an angle with this, being the leg. The ribs showed as a striped area on the other side of the mother's pelvis. A pelvis presentation was diagnosed which was verified at term.

Many roentgenologists have found that the roentgen ray is valuable in the estimation of Cesarean section, deformed pelvic region, in the diagnosis of twins at the fifth month, and in estimating the age of the fetus. The entire fetus has been shown on radiographic plates and films.

In flat pelvic deformities and some oblique, especially those in which an exostosis is shown, engagement will not occur, whereas in other oblique deformities engagement will occur, and these are all shown in radiographic films.

* Considerable experimental work has been done showing various foreign bodies in the generative tract, as, for instance, pessaries and hydrostatic bags. A case, in which the bag of waters had been broken, causing a dry labor, hydrostatic bag was used, in which the head was raised and then delivered. The hydrostatic bag and head were plainly seen on the film. Various presentations have been diagnosed, as, for example, occiput post, which proved to be as diagnosed.

Today we have a great advantage in that we have available the double inten-

sifying screen and the duplitized film, which shortens the period of exposure ten times. This means, of course, nine-tenths elimination of the scattering or secondary rays. Recently Dr. Potter, of this city (Chicago), perfected the Bucky diaphragm. The Bucky diaphragm is an apparatus which absolutely excludes scattered or secondary radiation, enabling us to secure sharp outline of the deeper structure of the body, as at the moment we are able to secure of the hand and foot, without this device.

The announcement and the demonstration of the Victor model of the Potter-Bucky diaphragm at recent medical and roentgen societies created a great impression, and it is in response to the many manifestations of interest that Victor engineers with Dr. Potter presented some of their experiences which had been gained in their extensive experimental work. Working models were made and tested, the latest one of which we will make an attempt to describe. Strips of type metal $\frac{5}{8}$ inch wide, 1-50 inch thick and two feet long are mounted on a form which is shaped so as to resemble a section of the shell of a cylinder. All metal strips are parallel and spaced by wooden strips about 1-6 inch thick. This makes the strips with the spacers run about five to the inch. The curve put into the complex or diaphragm is such that the rays from a tube target twenty-eight inches above pass through the spaces, without impinging on the sides of the strips—just the edges. Consequently the radiation from the focal spot passes through the patient and then through the top support, continuing on through the grid. The plate or film immediately under the grid records the radiographic image.

The function of the grid is to intercept scattered radiation issuing from every part of the patient in all directions other than that which we might call the normal or principal ray issuing from the focal spot of the X-ray tube. The primary ray which records the shadow passes through the grid between two lead strips uninter-

rupted. This process goes on for each and every particle of matter radiographed and results in the obliteration of a general fog common to the ordinary radiograph, giving a crystal-like clearness and contrast to the radiograph such as can not be equaled by any other method up to the present time, especially on large plates and heavy parts such as the pelvis and spine.

Then the quality of the work with the use of the Victor-Potter-Bucky diaphragm is dependent on the fineness of the grid, the purpose of which is to intercept the fog-producing secondary rays. The fineness of grid is most essential to high quality radiographs, because the finer the grid the less possibility will there be of shadows cast upon the plate to mar the radiograph. Then the thinner and narrower the metal strips the wider will be the range of focal distances, ranging from 20 to 35 inches. The average distance is usually 28 inches from the plate or film.

Some of the distinctive features, then, of this new apparatus may be summed up as follows:

1. Fineness of grid.
2. Minimum time factor.
3. Minimum scattered radiation.
4. Improved motive power.
5. Exposure indicator.

In my judgment I believe that, with the Victor model of the Potter-Bucky diaphragm, radiographs of the mother being taken will illustrate to the obstetrician the exact conditions that he will meet in his work of delivery.