

THE DANGER OF MALFORMATION OF FETUS IN
ROENTGEN-RAY TREATMENT DURING
PREGNANCY*

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SINCE roentgen rays have been employed with increasing frequency in the diagnosis of pregnancy and in the treatment of pathologic conditions during pregnancy, the question of possible damage to the fetus caused by irradiation has attained considerable interest.

It is rational to group the cases reported according to whether irradiation has been used on the maternal ovary before conception or on the uterus during various stages of pregnancy. This report is concerned with a case of the second group.

Of twenty-one of the reported cases in this group (collected by Zappert¹) eleven showed some sort of damage to the fetus, while ten fetuses were born normal.

The case described here is of special value, since the fetus was born dead and a postmortem examination revealed interesting findings.

The mother, Bertha W., was twenty-four years of age. There is no history of alcoholism, cretinism, or malformations in the family. When a child, at the age of eleven months, she was brought to Dr. R. W. Hardon, to whom I am indebted for his notes on the patient. At that time the child was very poorly nourished and suffered from obstinate constipation. The facial expression was idiotic. The hair covered the forehead to the eyebrows, the tongue protruded and was enormously enlarged and there was great distention of the abdomen. Dr. Hardon began treatment with thyroid extract at that time, later tinctura iodi internally. Ten days after the thyroid treatment was instituted the baby had natural stools. Then the hair on the head all came out and for six weeks the child was entirely bald. Gradually the hair grew again and occupied the normal area. The tongue receded gradually. At fifteen months she began to walk. At the age of six years she was sent to school. At that time she was of about normal height and weight. She went to grammar school until the age of fifteen and got along fairly well, though her speech was at no time perfect.

It is not known when she began to menstruate, but the menses were normal.

In 1920 she married a man with whom she lived six months. As she had neither libido nor voluptas and did not become pregnant, the man left her. On October 5, 1924, she claims to have had a single cohabitation with a man about whose person and ancestry we have no information. The menstruation, which until then had been regular, disappeared after this cohabitation. In November, 1924, she had a copious hemorrhage for which she consulted a dispensary and was treated with hydrastis and ergot. However, the bleeding continued for two months and in January, 1925, she was sent to the x-ray department of the Postgraduate Hospital.

I am indebted to Dr. B. C. Cushway for the record of her roentgen-ray treatments, given on January 29, February 2, 5, 9, and 12. Three treatments were

*Read at a Meeting of the St. Louis Gynecological Society, October, 1925.

¹Quoted by Kraul: Zentralbl. f. Gynak., 1925, No. 35.

given over one field, two over two fields. The fields were six by four inches. The treatments were given at sixteen inches skin distance with 0.25 mm. copper filter. After this treatment, the hemorrhage stopped. She again felt quite well.

May 26, 1925, she was sent to the x-ray department again for diagnosis, and the picture showed a fetus in the uterus. This picture shows no malformation.

July 21, 1925, the membranes ruptured. The woman came to the hospital soon afterward. Labor lasted twenty-four hours at the hospital and terminated spontaneously. The fetus was born dead in head presentation. The placenta was said to have been intact. The woman made a good recovery. She menstruated regularly again and worked, addressing envelopes. Thyroid treatment has to be administered constantly. If she is without it, she suffers from severe mental depression.

The dead fetus was placed in 2 per cent formalin without being opened and was sent to me in this condition in October last. It presented a hydrocephalus 44 cm. in greatest circumference. The right arm consisted of upper arm and part of the hand without any trace of forearm. The hand had three fingers, no thumb. The roentgen-ray examination of the arm showed bone in the three fingers, no trace of forearm and apparently normal humerus. No other bony malformations except extremely thin bones of the calvarium were visible.

The finger nails protruded beyond the finger tips.

In order to decide whether the irradiation during pregnancy had anything to do with the malformation of the fetus these external findings were decided to be insufficient. A more complete examination of the fetus was carried out and gave the following findings:

On opening the skull external and internal hydrocephalus was seen, but the brain was so decomposed and pultaceous that it could not be sectioned. No thyroid gland was found. The thymus extended from the middle of the pericardium almost to the chin.

The cecum with a small appendix was in the left side of the abdomen, and the colon ascendens curved to the right. The entire colon up to the middle of the transverse colon was entirely movable, with a long mesentery attached to the left of the spinal column. The duodenum was enormously distended to the size of the stomach, and was adherent to the upper border of the colon transversum. It was 27 mm. wide on its anterior aspect. The small intestine was normal except that its mesentery joined that of the colon without attachment to the right posterior abdominal wall. The colon was full of meconium up to the cecum. Meconium escaped on pressure from the anus. The duodenum communicated with the jejunum by an extremely fine opening through which only a very fine probe could be passed. The pylorus was open. The gall bladder was located in a deep cleft of the undersurface of the liver, but its entire undersurface could be made visible by separation of the edges of this recessus in the liver.

When the movable colon ascendens was turned upward, the entire right posterior abdominal wall lay bare. The right ovary with its rudimentary tube lay exactly parallel to the spinal column. The entire length of the tube from its fimbriated end to the internal inguinal ring was 3.5 cm. The ovary itself was 20 mm. long and 4 mm. wide. The tube at its upper extremity showed two apparent fimbriated ends; its lower end terminated in a fine thread at the internal inguinal ring from which a very fine whitish cord descended towards the pelvis, but disappeared entirely before reaching the pelvis proper. The left adnexa were seen close to the internal inguinal ring and the ovary was placed at an angle of about 45 degrees to the body axis. It was also 4 mm. wide, but only 8 mm. long and slightly curved with the concavity towards the spinal column. A left tube with a fimbriated end extended about 3 mm. above the upper pole of the ovary, then continued down to the internal ring as a fine thread and from here towards the pelvis as a whitish

filament about 2 mm. wide which terminated under the peritoneum before attaining the pelvis.

There was no uterus and no vagina.—Between the bladder and the rectum there was a slight whitish transverse elevation of the peritoneum of the culdesac, but no lumen could be found in this fold. Rectum and bladder were in contact lower down with only a little connective tissue between. The external genital organs were those of a normal fetus.

The left kidney and ureter were normal. The bladder and urethra were normal. *There was no trace of right ureter or kidney or adrenal gland.*

Microscopic examination was attempted, but, owing to the poor preservation of the specimen, gave little help except to demonstrate primordial ova in the right ovary, but no lumen could be demonstrated in the right tube.

CONCLUSIONS

While there might be some question whether or not the bony malformations had been caused by the roentgen treatment during gestation, there is not likely to be any doubt about the malformations described in the abdomen.

As the fetus was approximately mature and the last radiation treatment was given 159 days before the birth of the fetus, it is evident that such conditions as absence of right adrenal, kidney, and ureter and absence of uterus and vagina must be due to defects of formation antedating the treatment applied when the fetus was about 109 to 121 days old.

I have found no other reports of postmortem examinations of fetus born malformed after roentgen-ray treatment during gestation. For the determination of the connection between roentgen ray and malformation of the fetus further anatomic investigations appear desirable.

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