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Therapeutic Abortion Followed by X-ray Sterilization and Resumption of Normal Menstruation After Three Years with Birth of Two Normal Children

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IN 1935 Rubenfeld and Maggio¹ noted that the permanency of radiation sterilization of the female depended in the main on the age of the woman at the time irradiation was administered. The younger the patient, the shorter the period of postirradiation amenorrhea.

It is because of this variability of permanency following radiation sterilization that this method of treatment has not been employed as often as it should. As Gauss² properly stated, the crux of radiation sterilization is the establishment of a sufficiently high focal roentgen dose. Failure of sterilization with subsequent pregnancy may occur because one fails to recognize that a latent period is required following completion of therapy for permanent amenorrhea to be established, and if this is not observed, impregnation may occur.

Whether irradiation increases the possibility of genetic damage to offspring of women who become pregnant following x-ray sterilization is still not definitely proved. Muller,³ however, says that "the damaging of future generations caused by the application of radiation in the gonads is not a controversial question. The only question is how much damage is caused by a given dose." Up to the present, however, no one has been able to demonstrate in the progeny of properly, therapeutically irradiated women the occurrence of genetic abnormalities which are definitely compa-

rable to the genetic injuries noted in experimental animals after irradiation. The Committee on Atomic Casualties of the National Research Council⁴ in 1947 reported that in Hiroshima and Nagasaki no adverse genetic effects were noted in the progeny of women who survived irradiation from the atomic bomb explosion, even though the "r" irradiation received by these women was very much greater than the therapeutic x-ray dose in usual practice.

Whether a woman who resumes normal menstruation after a period of irradiation-induced amenorrhea will, if she again conceives, bear a perfectly normal child is unfortunately still a controversial question. However, as yet no one has shown any substantiated evidence that abnormal offspring have been born to women who conceived following irradiation-induced amenorrhea and resumption of normal menstruation. In 1947 Pfahler⁵ reported a case which, following irradiation for a fibroid, remained amenorrheic for only six months, and yet, following resumption of normal menstruation, conceived and gave birth to a normal female child; the latter, Pfahler reported, was still a healthy woman at age twenty.

It is well known that the permanency of radiation-induced amenorrhea depends to a great extent on the amount and quality of the x-rays used and the proximity to the menopause period when it is

THERAPEUTIC ABORTION FOLLOWED BY X-RAY STERILIZATION

administered. Such sterilization, of course, might at times be only of limited lasting effect, and subsequent possibility of pregnancy cannot be lightly disregarded, especially if conception were to follow immediately or closely after irradiation. Should a long period elapse following irradiation and before conception takes place, however, the likelihood of an abnormal offspring being born is very slight. The following case is illustrative.

Case Report

Mrs. F. P., aged twenty-seven, a professional dancer, was referred on August 23, 1946, for x-ray treatment for spinal arthritis. She was a well-nourished, medium-sized woman. She walked with a stooped-over position of the back, and motion at the hips was extremely painful. She wore an orthopedic back brace. Her menstruation had begun at eleven years of age and appeared regularly at twenty-eight-day intervals. She was married in 1942 at the age of twenty-three and a half. Contraceptives were used for about four years. There was nothing significant in her past history except that she had fallen down stairs in 1936 at the age of seventeen. A sacroiliac injury was diagnosed at that time with pain radiating down the thighs and up along the spine. Rest gave some relief, but pains occurred intermittently and were worse at night. In January, 1946, she conceived and shortly thereafter began to suffer with more severe pains in the lower back and both hips. This prevented her continuing her work as a dancer. Pain and distress increased with the progress of the pregnancy.

Roentgen examination revealed the following: "Lumbar spine—marginal scattering, lipping, and bridging between the twelfth dorsal and first lumbar vertebrae. There is a transitional fifth lumbar vertebra with an anomalous development of the lower sacral segments. A slight left lateral rotary curvature of the lumbar spine is noted." Following the necessary consultation, therapeutic interruption of the pregnancy was advised and carried out March, 1946, when she was two and one-half months pregnant.

Failing to respond to the usual medical procedures following this abortion and pain and distress continuing, although menstruation occurred normally, Mrs. P. was referred for x-ray therapy because there was ample evidence of the efficiency of such therapeutics in the treatment of arthritis.

Before instituting x-ray therapy the patient was told that sterilization would in all probability follow the administration of x-ray therapy, that this might be permanent, and that she might not again be able to have a child. The husband was also informed of these possibilities. Her last period occurred in August, 1946, at the time of this examination.

The patient accepted the terms for treatment, and it was carried out according to the following plan. High-voltage x-rays were employed with the following factors: 200 kilovolts, 0.5 mm. copper plus 1 mm. aluminum filter; 50 cm. distance through 10 by 15-cm. fields. The rays were directed

through the anterior and posterior pelvic fields and the dorsolumbar spine and the sacroiliac areas. The dose, measured in air, was 1,200 r to each of the pelvic areas and 2,000 r to the spine. Irradiation was given during the period August to November, 1946. She responded well insofar as relief of pain in the spine was concerned, and ovarian sterilization appeared to be definitely accomplished for she did not menstruate after the last period, which had occurred on November 1, 1946.

She continued to improve and resumed her work. For three years she remained amenorrheic. In May, 1950, she applied to an adoption agency for a child. This apparently was not forthcoming, but earnestly desiring a child, she inquired of me regarding the possibility of stimulating the resumption of menstruation with a chance for pregnancy. In my reply I stated that I doubted my ability to accomplish this feat. Two months later, however, to my surprise, on July 12, 1950, Mrs. P. notified me that she again had started menstruating and already had had her second regular period. She continued to function normally, and on October 31, 1950, she notified me she was two and one-half months pregnant.

The question then arose as to the advisability of her bearing this child because of the possibility of latent genetic damage. She received both favorable and unfavorable advice. Eventually she stated she would abide by my counsel. I suggested that inasmuch as she had had no irradiation since 1946, I doubted if any latent harm was still present in her ovaries; also because she was no longer appreciatively suffering from her arthritic condition, she should carry through her pregnancy. She accepted my guidance and on March 31, 1951, was delivered without difficulty of a perfectly normal baby girl.

On May 28, 1953, she again complained of severe back pain and distress in breathing. Menstruation had been irregular since the birth of her child. In December, 1952, she experienced annoying flushes and went to her doctor who gave her hormone injections with relief, but the menstruation was two weeks late. X-ray of the chest on May 15, 1953, showed no additional abnormalities, and the arthritic condition previously noted was still present. She had a period on May 24, which lasted till May 28, 1953. X-ray therapy was advised and administered on May 28, and June 4, 11, and 18, 1953, to the dorsal spine area. Treatment gave definite relief, and she continued to function normally and regularly. Her first child was progressing normally.

She again conceived and on September 23, 1954, gave birth to a perfectly normal baby boy. Both children, the girl now two and one-half years and the boy five months old, are in excellent health.

Comment

There have been many statements regarding the genetic effects of irradiation. Unfortunately these expressions of possible dire effects of x-rays have been employed in a too general manner. The amount and quality of irradiation, the time of

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administration, the area treated, the purpose for which it is used, and the age of the patient all play an important role in the subsequent genetic influences.

When irradiation is properly employed for the treatment of female amenorrhea and sterility,⁶ abnormal genetic effects on the subsequent second and third generation offspring of such irradiated females have not been demonstrated in humans.

When irradiation is employed for suppression of menstruation and for sterilization, depending on the dose given and the age of the woman, such subsequent amenorrhea may or may not be permanent. If menstrual function is again restored and if pregnancy occurs, that is, at some time a long period after irradiation, such pregnancy should produce a normal, perfect child. This is in accord with the findings of Neel and his coworkers⁷ who investigated the effects of the atomic bombs on progeny of exposed Japanese women. They state, "There is no indication from this study of any unusual sensitivity of human genes to irradiation." They also stated that their present extensive data failed to confirm the statement of Bugher (1932)

that there was some evidence that gross malformations of parents were slightly more frequent among children of parents exposed to irradiation than children of control parents.

Summary

A case is reported in which three years of acquired amenorrhea followed x-ray therapy; normal menstruation again resumed, and the patient became pregnant and gave birth to two normal, perfect children.

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