

## X-RAY OBSERVATIONS ON STERILITY AFTER LIPIODOL INJECTIONS

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### INTRODUCTION

The use of iodized oil in recent years in gynecological conditions has brought to light many new conditions that heretofore had to go unrecognized, except by subjecting the patient to a surgical operation.

By means of injection of the iodized oil, many pathological conditions are clearly demonstrated. The use of the oil, being antiseptic in character, is also thought to have some beneficial therapeutic action in certain types of inflammation of the genital tract, and again, the oil, being injected under a moderate amount of pressure, aids in dilating a narrow tubal lumen, and overcoming a moderate amount of contraction and spasticity.

The substance used in our investigations, was a 40 per cent iodine preparation, firmly bound in poppyseed oil. The preparation is marketed as "Lipiodol." Iodopin, used by some investigators, is darker in color, and is iodized, sesame oil. The lipidol is yellowish, transparent in color, and has the appearance of olive oil. It is a definite chemical compound, not merely a solution of iodine in oil. As a result, it is non-toxic and non-caustic. The ordinary tests have failed to reveal the presence of iodine in the urine following the injections. It is very impervious to Roentgen rays.

In order to render the cavity of the uterus and Fallopian tubes opaque to the Roentgen rays, various substances were used. Cary [1] used a solution of Collargol as the opaque medium for this purpose. Kennedy [2] employed a 10 per cent solution of sodium bromide, and Mocguot [3] used a suspension of bismuth as a means of demonstrating the shape of the uterine cavity. (None of these solutions produced a clear deep shadow.)

The use of iodized oil, however, dates back only to 1922, when Forrestier [4] reported the use of a 40 per cent combination of iodine with poppyseed oil.

Accurate knowledge of the condition of the Fallopian tubes is necessary for the complete examination of every sterile woman, as by far the most common cause of sterility in women is found to be in the Fallopian tubes. It is estimated by many gynecologists to account for as high as 45 per cent of the cases.

### TECHNIC

The patients and instruments are prepared as for operation. The cervix of uterus is caught with a tenaculum forceps, after insertion of a bivalve speculum. The canal is thoroughly cleansed with mercurochrome, and the mucous in the cervical canal previously removed with hydrogen peroxide.

A 10 cubic centimeter Luer syringe is used. The Ultzman-Keyes nozzle, consisting of a long canula, with rubber diaphragm about three centimeters from tip, fits close to cervix, and prevents the escape of lipiodol into vagina.

Gentle pressure is made, until the patient complains of slight uterine colic. The pressure is then released for a moment, and reapplied until the same reaction occurs. An X-ray picture is then taken, which is repeated in five minutes, and at times, a third picture taken, preceded by a hypodermic of atropine, if necessary, to overcome a possible spasticity. An interval of five minutes is allowed between each Roentgenogram, to give time for overcoming this possible spasticity.

### USES OF LIPIODOL IN THE DIAGNOSIS OF STERILITY

According to Heuser [5], lipiodol has been used as a means of making an early diagnosis of pregnancy, which is often hard to determine when only a period or two have been missed.

Heuser's method consists of diagnosing pregnancy by means of intra-uterine injection of lipiodol, subsequent Roentgenization depending on the fact that when the gravid condition exists the uterus is already occupied and cannot be filled by the oil; whereas, when the uterus is empty, the oil permeates the entire cavity. According to this investigator, the injection of the oil does not terminate the pregnancy.

By means of the injection of the oil, and the subsequent Roentgen ray study, it is possible to outline the contour and patency of the lumen of the Fallopian tubes, and thus diagnose the location of the obstruction in cases of sterility due to this cause.

Cases of ovarian cyst have been reported by Stein and Arens [6], in which, after the injection of the iodized oil, the Roentgenogram

clearly showed the silhouette of the ovarian growth, in the shadow of the fundus.

Injection of lipiodol is of great benefit in determining the solution of the problem, when the patient says "I have had a pelvic operation, but I do not know what for, nor what was removed." She returns to find out whether she can become pregnant.

The injection of iodized oil, and subsequent Roentgenography, helps to determine the presence of submucous tumors of uterus, as demonstrated in one of our cases.

The presence of malpositions of uterus, as anterior displacement and deviation to either side, is clearly brought out by a study of Roentgenogram, after lipiodol injection into the uterine cavity.

Patients with leucorrhea have noticed an improvement of this condition following iodized oil injections, this factor being due, possibly, to the antiseptic action of the oil.

Our series, consisting of thirty cases, has been in line with the experience of other investigations, that injection of the oil is a harmless procedure, and when carefully performed, always results in some beneficial action.

The escape of the oil into the peritoneal cavity through the tubes, as indicated by the Roentgenogram examination, is proof of the patency of the tubes. This is called the "spill."

The exact mode in which the iodized oil is absorbed, and its ultimate fate in the body, has not been determined, although it is apparent that the absorption is probably by way of the lymph stream.

*Case 1.* C. B., aged 30. Married 5 years. Complained of primary sterility; normal menstrual history. Lipiodol injection performed, and condition found as in figure 1. Normal appearing uterus, Fallopian tubes, and ampullae. There is a normal amount of "spill", or evidence of some of the iodized oil having entered the pelvic cavity. This patient shortly after became pregnant, indicating that the injection of the iodized oil was a determining factor.

*Case 2.* E. C., aged 40. Married 10 years. Complained of primary sterility. No history of pelvic infection obtained from patient, after repeated consultations. On physical examination, the uterus appeared to be smaller than normal, the adnexia not showing any evidence of gross palpable pathology. On operation, all the pelvic organs were found firmly matted down with dense adhesions, which extended upwards, involving the small intestines. The proximal portion of tube was separated from adhesions, and severed, so as to leave it open for possible entrance of ovum. On account of the extensive mass of adhesions, a complete plastic operation was not deemed advisable. A later consultation with the mother of the patient, brought out the information that at the age of 14 the patient had been confined to bed for two weeks with a pelvic disturbance, which no doubt accounted for the pathology present.

*Case 3.* U. B., aged 30. Married 5 years. Complained of sterility. Patient had an ectopic pregnancy on right side three years ago, at which time the right tube was removed, and since, she has been unable to become pregnant. This explains the absence of the Fallopian tube on the right side. The deviation of the uterus to that side is evidently brought about by adhesions at site of old pathological condition, and subsequent operation.

*Case 4.* O. L., aged 33. Married 4 years. Complained of primary sterility. X-ray findings indicated a non-patent right tube, and a normal left adnexia. The uterus deviated to right, associated with a partial blockage of right tubes, suggesting old adhesions pulling the uterus to the right. This patient subsequently became pregnant, and gave birth to a normal baby with normal labor.

*Case 5.* S. J., aged 40. Married 10 years. Complained of menorrhagia and sterility. The X-ray determination in this case was repeated, on account of the absence of the presence of the oil in the uterine cavity, but the same result was obtained. On operation, the uterine cavity was found completely occluded by a sessile submucous fibroid.

*Case 6.* P. L., aged 34. Married 6 years. Complained of primary sterility. The patient received an injection of lipiodol, and was subjected to a Roentgenological examination. The findings are shown in figure 6.

*Case 7.* E. F., aged 22. Married 3 years. Complained of dysmenorrhea and sterility. The patient was given an injection of iodized oil, and a pelvic Roentgenogram was made, as shown in figure 7.

*Case 8.* D. R., aged 35. Married 7 years. Complained of primary sterility. The patient received an injection of lipiodol on two occasions, with the same results as shown in figure 8. Patient was advised to submit to an operation for resection or dilatation of portion of Fallopian tube, but to date has not had the operation performed.

## RESULTS

In our series, we had three cases, who had been married for periods ranging from three to five years, and were unable to become pregnant. All of them become pregnant a short time after the lipiodol injections. This, we believe, has some direct bearing, as a result of the test, possibly by the antiseptic properties of the oil, or the dilatation of the tubes.

In one case, we were able to diagnose the presence of an intra-uterine tumor, which caused a menorrhagia. This condition was confirmed by operation with removal of the tumor.

Other cases that had lipiodol injections and Roentgenography showed obstruction at various points along the course of the tube and malposition of the uterus.

## CONCLUSIONS

1. Roentgenological visualization of the uterus and Fallopian tubes, after the intra-uterine injection of iodized oil, furnishes a valuable means of exact gynecological diagnosis.

2. In case of sterility, the procedure gives us information as to whether the tubes are patent or not, and also localizes the site of occlusion.



3. The technic is simple, but strict aseptic precautions must be taken.

4. Properly performed, the test outlines the uterus and the narrow portions of the Fallopian tubes with great distinctness.

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#### EXPLANATION OF FIGURES

FIG. 1. X-ray appearance in normal subject, after injection of lipiodol. U—triangular area shows cavity of a normal uterus; T—normal narrow canal of isthmus of tube; A—tortuous and somewhat distended ampullae of tubes; S—"spill" representing lipiodol that has escaped into pelvic cavity; K—Shadow of the Ultzman-Keyes nozzle of speculum in vagina. This uterosalpingogram was obtained by injection of 6 cc. of iodized oil.

FIG. 2. X-ray appearances after injection of iodized oil. No evidence of any lipiodol having entered either Fallopian tube, indicating complete obstruction of both tubes. This pathological condition was confirmed at operation, which showed both tubes to be completely matted down in pelvis by adhesions.

FIG. 3. X-ray appearances in Case 3, after injection of iodized oil. The body of the uterus is well visualized by the oil. The uterus is markedly enlarged, and tilted to right. The adnexa on left side are unusually distinct. The Fallopian tube is well marked out on the left side; ampullae is markedly dilated; there is no evidence of any tube on right side.

FIG. 4. X-ray appearances in Case 4, after injection of lipiodol. The right Fallopian tube, half the length of the one on the left, which terminates in the ampullae, is somewhat tortuous; some of the lipiodol escaped through the ampullae into the pelvic cavity.

FIG. 5. X-ray appearances in Case 5, after injection of lipiodol. The region of uterus is indicated by a few small linear lines; there is no evidence of any of the iodized oil having entered the tubes or peritoneal cavity.

FIG. 6. X-ray appearances in Case 6, after injection of lipiodol. T—isthmus of Fallopian tubes; A—distended tortuous ampullae, indicative of hydrosalpinx of Fallopian tubes. Some of the oil escaped into the peritoneal cavity.

FIG. 7. X-ray appearances in Case 7, after injection of iodized oil. On the right, the oil has reached the ampullary portion of the tube; on the left, the tube is of smaller size, and ends in a dilated ampullae beneath the uterus.

FIG. 8. X-ray examination in Case 8, after injection of iodized oil. The tube on the left is about 2 centimeters long, ending blindly; on the right, a trifle longer, but showing a very small ampullae, and no evidence of a "spill."

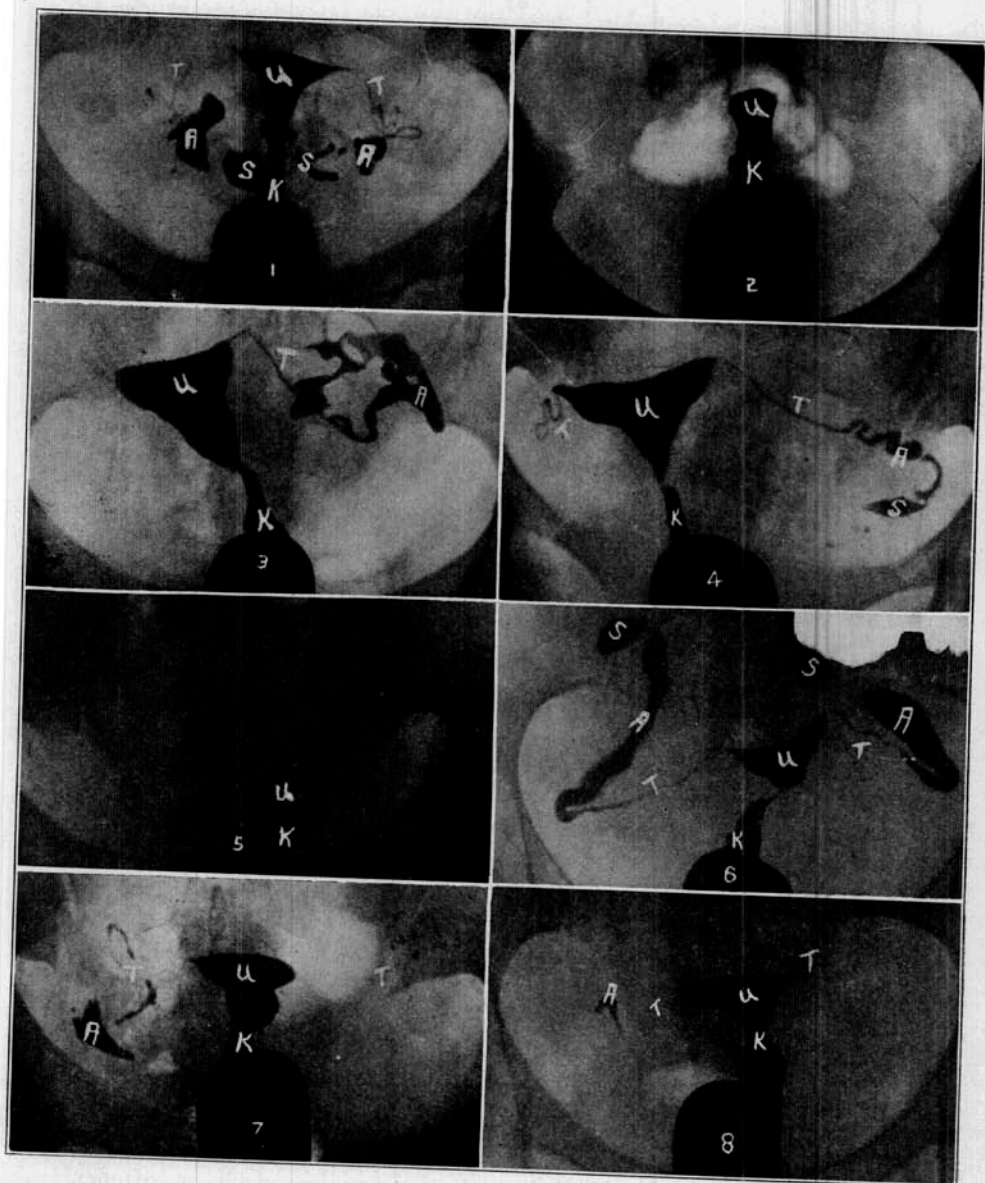


PLATE I.