HYSTEROSALPINGOGRAPHY IN INFERTILITY

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INTRODUCTION

THE FALLOPIAN TUBES were first visualised radiologically as far back as 1909 by Nemenow and by Rindfleisch (quoted from Gillespie, 1965). The use of an iodized oil as a contrast medium was reported by Sicard and Forrestier in 1922. In 1926 Beclere in France, and Rubin and Bendick in the United States were the first investigators to report the use of lipiodol for the determination of tubal patency.

Hysterosalpingography has a dual purpose, to demonstrate any abnormalities congenital or otherwise of the uterus and tubes and also to act as a therapeutic measure. White and Green-Armytage stated that it was of unquestionable therapeutic value probably by virtue of the medium used with its small nascent iodine content.

The purpose of this study was to assess the number of conceptions following this procedure in cases of infertility, and also to compare the effects of Salpix (Ortho) and Lipiodol (May and Baker).

SELECTION OF CASES

Five hundred patients who had attended the infertility clinics were sent a reply paid letter requesting the patient to fill out a questionnaire (Table I). All these patients were involuntarily infertile for at least two years. Hysterosalpingography is carried out as part of the routine investigation of infertility.

| Name:                  | Age:                  |
|------------------------|-----------------------|
| Years married:         |                       |
| No. of children before X-ray | None/None (number) |
| Past History: Abdominal operations (e.g. appendicitis) | |
| How soon did you become pregnant after the X-ray (hysterosalpingogram)? | |
| Circle where appropriate: | Not at all |
|                          | 1 month               |
|                          | 3 months              |
|                          | 6 months              |
|                          | 1 year                |
|                          | 2 years               |
| Did you have any symptoms following the X-ray? | Yes/No |
| If so was the X-ray painful? | If so, where? |
|                          | Shoulder             |
|                          | Chest                |
|                          | Abdomen              |
|                          | Back                 |
| Did you feel faint/weak/nausea? | Yes/No |
| Did it upset your menstrual cycle: | Yes/No. |


**Materials**

There are basically two types of contrast media in use for hysterosalpingography, one a water soluble material, for example Salpix, and the other an oily medium, for example Lipiodol.

Salpix was introduced in 1953 and consists of 53 per cent sodium acetrizoate with poly-vinyl pyrrolidine (P.V.P.) as a carrier medium. It has advantages over oily media as do other water soluble materials in that it does not cause emboli, has a quicker rate of absorption from the peritoneal cavity and also gives a better demonstration of uterine mucosal relief (Gillespie, 1965). Salpix however can cause abdominal pain (Griffiths, 1969) lasting up to two days (Sheach, 1959), and if peritoneal irritation does occur more severe reactions may be encountered than with oily media.

Lipiodol is a poppy-seed oil containing organically bound iodine. The main criticisms of its use are: the occasional intravasation into uterine veins and the occurrence of oil emboli; retention of medium in the fallopian tubes stimulating a foreign body reaction with granulomatous inflammation and iodine idiosyncrasy. The advantages of Lipiodol are: the contrast in the X-rays is superior; the delayed absorption gives a better 24 hour picture and may be a factor in maintaining tubal patency for a longer period of time. Gillespie (1965) reports a much better conception rate with Lipiodol than with water soluble media.

**Technique**

The test was carried out between the 7th and 12th day of the patient’s menstrual cycle. This is considered important for three reasons (Cron, 1965). Firstly, restoration or improvement of tubal patency several days before ovulation enhances the possibility of pregnancy. Secondly, it is unlikely that an early pregnancy will be disturbed and thirdly, the danger of embolism appears to be less at this time.

The procedure was generally performed on an out-patient basis without sedation. The patient reported to the radiology department having fasted for six hours. The patient was placed on the radiology couch in the dorsal position. The vulva and vagina were washed with "Savlon" and a bivalve vaginal speculum inserted. The cervix was grasped with a tenaculum forceps and a Leech-Wilkinson cannula inserted into the cervix. By exerting pressure on the cannula and counter-traction on the forceps, a watertight junction was obtained with the cervix. Five to eight ml. of normal Salpix or Lipiodol was slowly injected without undue pressure while the uterus and fallopian tubes were being screened. In an occasional patient as much as 15 ml. was used. Care was taken that the contrast media filled the cannula before it was injected into the uterine cavity since air bubbles may produce an artefact. One or sometimes two X-rays were taken at some time during the procedure to demonstrate any abnormality or free spill from the fallopian tubes. If there was any doubt about spill a 24 hour film was taken.

Over the past 5 to 10 years hysterosalpingography has been improved by the use of image intensification and it is possible to record the process of the filling of the uterus and tubes with intraperitoneal spill if it occurs, or to take spot X-rays.
RESULTS

Two hundred and forty-eight patients (49 per cent) out of the five hundred replied. Eighty-three per cent of the patients were between 20 and 30 years of age and the periods of infertility varied from two to five years. Of the total 248 patients, 82 (33 per cent) were pregnant 2 years after the procedure. Table II illustrates the time interval between hysterosalpingography and conception. Fifty-four per cent conceived within three months and 29 per cent between three and six months. It can be concluded that 83 per cent of the patients who became pregnant did so within six months of hysterosalpingography.

Of the primary infertility group of 202 women 27 per cent became pregnant, whereas in the secondary infertility group of 46 subjects 59 per cent became pregnant. A higher pregnancy rate following hystersalpingography in secondary compared with primary infertility is well known (Cron, 1965; Geary et al., 1969).

| Number | Percentage |
|--------|------------|
| 0-3 Months | 44 | 54 |
| 3-6 Months | 24 | 29 |
| 6-12 Months | 10 | 12 |
| 1-2 Years | 4 | 5 |

The selection of patients may have affected the results of this study. It could be argued that a higher percentage of non-pregnant patients would reply to the questionnaire in the hope that something could be done for them. However, if this was in fact the case, one would not have expected such a high percentage of success in the secondary infertility group.

The contrast media used made no difference to the number becoming pregnant in this study. This is in contrast to the findings of Gillespie (1965); using Lipiodol in 1958, 41 per cent of patients conceived within one year of hysterosalpingography, changing to a water soluble contrast medium only 27 per cent conceived; then changing back to Lipiodol again the conception rate returned to 44 per cent.

Salpix caused a higher incidence of nausea and abdominal pain than did the Lipiodol (Table III). A series of 52 patients given Salpix, Griffiths (1969) reported that 33 experienced abdominal pain, 2 nausea, 6 faintness and 3 collapsed. In the same paper, patients who were given Urografln (another water soluble medium) had an even higher incidence of side effects.

|    | Total | Pregnant | Nausea | Pain |
|----|-------|----------|--------|------|
| Salpix | 60 | 20 (33%) | 12 (20%) | 36 (60%) |
| Lipiodol | 188 | 62 (33%) | 4 (2%) | 42 (24%) |

248 | 82 (33%) | 16 (6%) | 78 (31%) |
There were 37 (15 per cent) abnormal hysterosalpingograms; the results are shown in Table IV. The principal abnormality was unilateral blockage. No tubes were demonstrated in three patients, Paracervical isoxsuprine or inhalation of amyl nitrate was not used in these patients in an attempt to counteract tubal spasm should it have existed. It is interesting to note that only four patients with one patent tube became pregnant in the whole series.

**TABLE IV**

*Abnormal hysterosalpingography findings*

| Description                          | Count (Percentage) |
|--------------------------------------|--------------------|
| One tube only outlined               | 19 (8%)            |
| Bilateral hydrosalpingx              | 7 (3%)             |
| Filling defect in uterine cavity (fibroids) | 5 (2%)           |
| No tubes outlined                    | 3 (1%)             |
| Bicornate uterus                     | 3 (1%)             |
| Unicornate uterus                    | 1 (0.25%)          |
|                                      | **38 (15%)**       |

**DISCUSSION**

The advantages of hysterosalpingography in established tubal patency are well recognised and its value in diagnosing congenital abnormalities of the uterus cannot be surpassed. In this small series some 15 per cent of abnormalities have been found.

Before an evaluation of the effectiveness of any therapy can be made a reasonably accurate knowledge of the behaviour of untreated infertile couples should be acquired. It has been found by many workers (Weir and Weir, 1961; Saulton, 1960), that ten per cent of all couples arrive at the end of their reproductive life without any children, whilst Buxton and Southam (1955) reported an impressively large series of patients attending an infertility clinic who had a 15 to 19 per cent conception rate. The available medical literature on hysterosalpingography indicates variation in the conception rate following this procedure (18–75 per cent). Many factors account for this discrepancy: (i) the duration of infertility prior to hysterosalpingography; (ii) the length of time after the procedure to the time of conception; (iii) whether other forms of treatment were used simultaneously or preceded hysterosalpingography.

It is suggested that the therapeutic effect of hysterosalpingography acts by causing mechanical clearing of the tubes by dislodging mucous or breaking down fine adhesions. Robins and Shapira (1931) demonstrated the release of tubal adhesions by the injection of Lipiodol in a post mortem specimen. Other possibilities are: (i) bacteriostatic action upon the mucous membranes of the uterus and tubes; (ii) stimulation of ciliary activity of the tubal epithelium; (iii) the iodine may stimulate the activity and longevity of the spermatozoa; (iv) a more favourable environment may be established for the ascent and penetration of the spermatozoa; and (v) iodine may have fibrinolytic value in reducing the oedema of the tubal wall.
The results in this series using either Lipiodol or Salpix are significant and it is our contention that hysterosalpingography plays an important role in the treatment of infertility. This opinion is shared by many workers (Weir et al., 1961; Green-Armytage, 1943; Cron, 1965). Many factors must be evaluated in treating infertility and more than one factor may be involved. Hysterosalpingography is not the panacea for all infertile females, it is however useful in excluding tubal and uterine factors and, as pregnancy occurs within three months in 50 per cent, the possibility of a therapeutic effect must exist.

**SUMMARY**

Two hundred and forty-eight hysterosalpingograms have been reviewed. The primary indication for the test was infertility. There was an overall pregnancy rate of 33 per cent. The pregnancy rate of the primary infertility group was 27 per cent and 59 per cent in the second secondary infertility group. Of the patients who became pregnant 83 per cent did so within six months. There was no difference in the percentage becoming pregnant following the use of Salpix or Lipiodol. Uterine or tubal abnormalities were found in 15 per cent of the cases. It is suggested that hysterosalpingography has a therapeutic effect in overcoming the tubal factor in infertility.

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