

# EXPERIMENTS ON TUBAL BLOCKING FOR STERILISATION WITHOUT LAPAROTOMY

by

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The essential channels for transmission of the sperm on its way to meet the ovum are the two fallopian tubes. Blockage of the tube by inflammatory processes or even by inspissated mucus is one of the commonest causes of sterility in women. Many of the cases are cured by a simple utero-tubal insufflation. It is, however, significant that such sterile women, unless suffering from gross damage to the ovary by tubo-ovarian abscess, do not suffer from any constitutional symptoms or menstrual derangement. On the other hand, operative closure of the tubes, besides the hazards of a laparotomy, is known to produce some menstrual derangement and constitutional symptoms in about 30% of cases.

The author is attempting for the last five years to simulate blockage of the tubes by introducing different substances through a uterine cannula as in hysterosalpingography. Although blockage could be produced with different materials without adversely affecting the endometrium, it could not be safely predicted that such blockage would be complete. As a result, chances of failure and production of ectopic pregnancy

could not be guaranteed against. Recently, an effective and sure method of complete blockage has been devised. It is the author's duty and proud privilege to inform the Gynaecological Congress about the results of the experiment.

## *Material and Methods*

The subjects chosen were those cases waiting for hysterectomy for non-malignant pathology without gross deformity of the uterus and whose fallopian tubes were found patent by insufflation test. A few cases were seeking sterilisation alone and their uteri were not removed. The material was injected at a higher pressure and then the uterine contents were drained out and finally washed out under a lower pressure with saline or other solvents. After 2-3 weeks hysterosalpingectomy or salpingectomy was done and the uterus and the tubes were studied histologically.

## *The Experiments*

Before starting the series of experiments, the effect of small foreign bodies on the peritoneal cavity was studied. Six small plastic beads of about 1.5 mm. diameter were introduced through a trocar and cannula into the pouch of Douglas, in a patient waiting for hysterectomy. Seven days later the hysterectomy was performed. All the plastic beads

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were found clumped together in the mesosalpinx area of either side near the fimbriated ends. They were covered over with serous lining but there was no inflammatory reaction in the adjoining tissues.

In the first series of cases, during 1964, eight patients were injected with minute foreign bodies like chalk dust or marble dust and chemical irritants like, quinine 5% and urethane 2%, suspended in a solution of either commercial gum or polyvinylpyrrolidone solution. The effect of foreign bodies was to produce indrawing of the fimbriae and attempt at closure of the abdominal end but complete microscopic closure could not be demonstrated, perhaps because the examinations were made after 7-10 days which was too early for fibrosis to occur. The commercial gum produced urticaria in one case and therefore it was substituted by P.V.P. solution. The chemical irritants were found to cause mild inflammatory reaction in the tubal mucosa and partial and complete block in one case at least. This is shown in microphotographs. The endometrium did not show any adverse tissue reaction except in one case which showed acanthosis. This was probably a pre-existing condition.

During the next phase of the experiment attempts were made to introduce small bits of plastic sponges suspended in thick solution of P.V.P. (polyvinylpyrrolidone). In the five cases studied most of the foreign bodies got clogged up in the syringes and only occasionally a few small bits entered the tube. Such attempts were then given up as they were

found uncertain in their results.

Subsequently, during 1966 and early 1967, chemicals like gentian violet, sodium morrhuate and mineral particles like Bentonite and also chalk dust were used. In five cases studied with these substances, gentian violet 1/250 produced hydrosalpinx as seen in Fig. 2. In other cases microscopic closure could not be shown but mild inflammatory reaction was present in the tubal mucosa.

Meanwhile, a silicon plastic material of thick viscous nature was obtained which solidifies after mixing with a catalyst. Several animal experiments were done in isolated female rabbits with this and also with gentian violet and sodium morrhuate. The materials could not be injected per vaginam as their cervical openings were too narrow and the vagina got ballooned up. In every case, therefore, laparotomy had to be done and injections were made directly into the uterus from where the materials flowed into the oviducts. Out of seven animals there were two deaths during anaesthesia. Others survived. Two of them survived two laparotomies. The silicon plastic entered the oviducts and passed into all the crevices and solidified inside, blocking the ducts completely. In two animals, which were studied six weeks after the injection of the plastic material, no adverse tissue reaction was found either in the uterus or the tubes. However, due to shrinkage of the tissue during fixing process, the plastic material could not be sectioned in situ but separately sectioned for demonstration. Small spilled out solidified bits were found on peritoneal surface without any

visceral adhesions. Fig. 3 shows the plastic in the uterus and the tubes. results are summarised in the following table.

TABLE 1

Serial Number	Date of plastic instillation.	Date of operation.	Result	Remarks
1.	20-6-67 4-5 c.c. of liquid plastic.	20-6-67 Total Hysterectomy and salpingectomy.	The plastic was found solidified in the tubes. Uterus was empty.	Demonstrates possibility <sup>3</sup> of successful instillation. No peritoneal spilling.
2.	3-7-67 4.5 c.c. of liquid plastic.	10-7-67 Salpingectomy.	Plastic failed to enter the tubes. Uterus—No abnormality.	The insufflation was doubtfully positive at 200 mm. pressure.
3.	21-7-67 7 c.c. of plastic.	21-7-67 E. C. of cervix & salpingectomy.	Plastic found in both tubes with slight peritoneal spilling.	The plastic did not solidify for 2 hours as the catalyst was ineffective due to storage after autoclaving.
4.	25-7-67 6 c.c. plastic.	25-7-67 Removal of tube and small ovarian cyst of right side and salpingectomy	Plastic found inside both the tubes upto $\frac{1}{2}$ " near the abdominal ostium.	No spilling. No difficulty in installation in spite of the small tumours.
5.	29-8-67 6 c.c. of plastic with 30% Barium sulphate.	29-8-67 E. C. of cervix	X'ray shows plastic in the tubes. A few minute shadows in the uterus.	Patient being followed up.
6.	1-9-67 7 c.c. of plastic with 30% Barium sulphate.	1-9-67 Repair of complete perineal tear.	X'ray on 8-9-67 Small quantity of plastic entered the tubes. Uterus—empty.	Insufflation was positive at 180 mm pressure and plastic was too thick with Barium sulphate.
7.	22-9-67 8 c.c. Plastic with 30% Barium sulphate.	22-9-67 Salpingectomy.	Material did not enter the tubes.	The cervix had old tear and due to loose fitting of cannula the material flowed back through cervix.
8.	29-9-67 7 c.c. of plastic with 30% Barium sulphate	29-9-67 Pelvic floor repair.	X'ray on 7-10-67 No material in the tubes or uterus.	The material was too thick with 30% Barium and did not enter the tubes.
9.	5-10-67 8 c.c. of plastic with 15% Barium sulphate.	20-10-67 Salpingectomy.	X'ray on 7-10-67 faint shadow of material found in tubes. Material found in tubes during salpingectomy.	Shadow was faint with 15% Barium Defective solidification due to old catalyst.
10.	26-10-67 8 c.c. of plastic with 15% Barium sulphate.	26-10-67 Salpingectomy.	Material found inside both tubes—very slight spilling in abdomen.	



### Discussion

The above results show that materials can be pushed into the unblocked fallopian tubes 'blind folded' through a suitable uterine cannula. The uterine cavity can be emptied out by washing out through a double channelled cannula with a suitable solvent under a lower pressure. The uterine wall can very well withstand the irritation and trauma by virtue of its mucoid secretion and the property of periodic shedding.

So far, some of the chemical irritants were found to produce blockage of the tube, but it is not possible to predict at this stage whether such blockage will be complete and permanent. As a result, occurrence of failure of sterilisation effect and chances of ectopic pregnancy cannot be guarded against. However, the author believes that some easily available chemical may be found which will form an effective precipitate within the tubes. Further experiments with the help of chemists may solve the problem.

Foreign bodies could not be effectively introduced so far within the tubes due to technical difficulties.

The latest liquid plastic material used in animal and human experiments shows the prospect of achieving success. Provided the material is available at a reasonably low cost, there is no reason why it should not replace laparotomy for causing tubal block. Moreover, by this method chances of pregnancy may be re-established by doing a laparotomy and pulling out the solidified thread of soft plastic.

In the very near future the author

expects to present a large number of reports of trials with these plastic materials.

The tubal block has not been attempted before by this route. Some useful criticisms by Prof. C. L. Mukherjee helped in advancing the experiment towards success. Shubeck (1965) attempted to separate the two walls of the uterine cavity by using a liquid plastic which solidified in the uterine cavity in the form of a mould in an attempt to replace the plastic loops. However, there were more expulsions of the moulds than the loops. H. Pitkin Roy (1966) tried via the intra-abdominal route injection of sodium morrhuate into the tubes during operation of ligation of the tubes in an attempt to prevent occurrence of hydrosalpinx following ligation operations.

Some difficulties are being encountered with the plastic. The liquid plastic so far used is too viscous and it gets more thick after addition of barium sulphate in 30% strength and caused two failures. There is a diluent fluid, "Medical fluid 360" which can be used to diminish the viscosity of this plastic material. This material has been used in human body and animals without any deleterious effects. I have also used it in animal experiments without prejudicial effect. Unfortunately, due to technical reason of not obtaining license under the Food and Drug Act of America, it has been banned for human use. I am also under international oath of affidavit not to use it on human subjects till the said license is obtained by the manufacturers.

The other difficulties are with the



catalyst. It has got to be diluted 1 in 40 in order to allow a working time of 20-25 minutes but it rapidly loses its potency after autoclaving and that also depends on time and pressure in autoclaving. This can only be solved by having each sample freshly autoclaved under lower pressure for a short time within 24 hours of instillation. It would be preferable to manufacture and pack it sterile and use without autoclaving.

Use of a disposable plastic syringe with large bore nozzle with arrangement for fitting plastic cannula of different sizes may solve many of the difficulties but this requires funds and a conjoint effort and a large series of human and animal experiments.

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#### *References*

1. Rakshit, B.: Transactions of the Medical College Reunion, January '65, Calcutta, Published in January, 1966.
2. Rakshit, B.: Transactions of the International Seminar on Modern Contraceptive Devices held in Bombay, July 1965, (In the press).
3. Roy, M. and Pitkin, M. D.: *Obst. & Gynec.* 28: 680, 1966.
4. Shubeck, Frank: *Obst. & Gynec.* 25: 5, 1965.

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*Figs. on Art Paper V*