EFFECT OF INTRAUTERINE SILK THREAD SUTURE ON FERTILITY OF FEMALE RATS

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A plastic intrauterine loop is being investigated as an antifertility agent in women. This method of fertility control is cheap and convenient. A model possibly having a similar mechanism of action can be produced by inserting a silk thread into one uterine horn of the rat. The procedure prevents implantation in the treated horn but not in the control horn. This study confirms the results of Doyle and Margolis (1) and throws, additional light, on the mechanism by which a uterine foreign body interrupts pregnancy in rat.

MATERIALS AND METHODS

Rats were used in these experiments. Cycling, female rats were operated during diestrous under ether anaesthesia. A ventral, midline incision was made and a silk thread (size 3-0) was inserted, through the muscular layer into the lumen at one end and taken out at the other end of the horn. The two ends were loosely tied. The abdominal wall was sutured. After about 2 weeks these rats in early estrous were kept for mating with the male rats of known fertility. Pregnancy was confirmed by the presence of spermatozoa in the vaginal smear next morning. This was taken as day 1 of pregnancy.

In 10 of these pregnant rats, laparotomy was performed on day 10 to check the number of implantation sites in each horn.

Fifteen mated rats were killed on day 3, 4 and 5 (5 on each day) and ova were flushed from the oviducts and uterine horn with a 25 gauge needle attached to 1 ml syringe.

Ten mated rats were killed on day 4 and 5. Tissue was taken from the ovarian, middle and cervical end of the uterus and fixed in 10 percent formalin and was embedded in paraffin. Sections were stained with hematoxylin and eosin and others with toluidine blue.

Four mated rats were killed on day 4. The uterus was taken out, the two horns separated and trimmed of fat and connective tissue, thread was removed, the horn slit open longitudinally, blotted and weighed. These were kept in the oven till the weight became constant.

Nine mated rats were killed on day 4 and 5, the uterus was taken out, the two horns were separated and the histamine content of each horn was estimated by the method of Kremzner and Wilson (4). Recovery experiments were done by adding histamine base to the tissue extract. Recovery was 96.6—108.0 percent.

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RESULTS AND DISCUSSION

Laparotomy on day 10 revealed that there were no implantation sites in the horn with the thread while the control horn had 4-6 implantation sites confirming the observation of Doyle and Margolis (1).

Ova were recovered on day 3 and 4 from both horns but on day 5 no ova was recovered from the threaded horn but could be recovered from the control horn confirming (1 and 2). This shows that the fertilization occurs normally, but, on day 5 the ova are either expelled or destroyed in the threaded horn.

It was noted that the horn having the thread was much thicker than the control horn (Table 1). This finding is contrary to Karr *et al* (3) who state that the device causes no weight change. It was considered important to find if this increase in size is due to the increase in water content or is it a general hypertrophy. There was no change in percentage water content (Table 2), showing that it is general hypertrophy of the uterine muscle.

TABLE I

Percentage increase in wet weight in the uterine horn with thread

S. No.	*Body weight*	*Wt. of the horn with thread (mg)*	*Wt. of the horn with no thread (mg)*	*Difference weight in two horn*	*Percentage increase in weight*
1	250.0	338.0	181.8	156.2	85.9
2	255	370.0	222.5	147.5	66.2
3	260	288.0	172.5	115.5	67.3
4	270	398.5	173.5	225.0	129.8
5	280	380.0	184.5	195.5	106.0

TABLE 2

Water content of pregnant rat uterus (day 4), thread in one horn.

Number of animals	*Mean body weight (gm)*	*Horn with thread*			*Horn without thread*		
		Mean wt(mg) of horn ±S.D.	*Percent solid ±S.D.*	*Percent water*	*Mean wt(mg) of horn ±S.D.*	*Percent solid*	*Percent water*
4	258±6	332±41	17.40±1.1	82.70	192±27	17.27±1.74	82.73

$$S.D. = \sqrt{\frac{\Sigma d^2}{n-1}}$$

Histological studies showed the presence of a few leucocytes in heamotoxlin, eosin stained slides. There was an increase in the mast cell count in the horn having the thread.

As histamine is involved in the tissue growth it was considered important to measure the histamine content of each horn. The estimations were done on day 4 and 5 as it is on day 5 that ova are not recovered. Histamine content of the threaded horn was much more than the control horn (Table 3).

TABLE 3

Histamine content of the pregnant rat uterus—thread in one horn

Pregnancy day	No. of animals	Mean body wt. (gm) ±S.D.	Horn with thread			Horn without thread		
			Mean wt of the horn in mg.±S.D.	Mean histamine ug/horn±S.D.	Contents ug/g±S.D.	Mean wt of the horn in mg.±S.D.	Mean histamine ug/horn±S.D.	Content ug/g ±S.D.
4	5	277±7	551±97	0.86±.27	1.89±.29	207±29	.37±.07	1.79±.21
5	5	265±0	407±48	0.64±.15	1.57±.37	209±33	.27±.02	1.31±.18

$$S.D. = \sqrt{\frac{\Sigma d2}{n-1}}$$

It is quite possible that histamine is in some way involved in the destruction or expulsion of the ova.

SUMMARY

The effect has been studied of an intrauterine silk thread on the fertility of female rats.

An intrauterine suture in the lumen prevents implantation after successful mating, in the horn in which it is placed. Fertilization of the ova occurs but these are not recovered on day 5.

There is an increase in the weight of the horn having the suture. There is no effect on the percentage water content.

Number of mast cells is increased in the horn with thread. Histamine content per horn is increased.

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