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REGIONAL DIFFERENCES WITH RESPECT TO BLASTOCYST SURVIVAL AND IMPLANTATION EFFECTED BY LOCATION OF LIGATURES IN SEVERAL REGIONS OF THE RAT UTERUS

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Summary. Surgical silk thread sutures were placed in different sites along the antimesometrial wall of the uterine horns of Long Evans female rats. Fertilization was not affected significantly in any rat. A suture placed in the middle of the horn completely prevented pregnancy, whereas sutures at the ovarian or cervical ends of the horns did not affect pregnancy. The results indicate that the location of the suture is important for the complete prevention of pregnancy.

An intra-uterine suture prevents implantation of the blastocyst, thereby interrupting pregnancy in the rat (Doyle & Margolis, 1963). Sutures placed in two different locations of the uterine horn effectively prevented pregnancy (Speilberger & Olewine, 1966). Parr, Schaedler & Hirsch (1967) reported that in germ-free rats an IUD placed in the ovarian end of the uterus was more effective in interfering with pregnancy than one placed in the cervical end. The present study was undertaken to determine and compare the effectiveness of such sutures when placed singly in different regions of the uterine horn.

Fifty Long Evans female rats weighing 150 to 250 g were used. They were fed Purina Laboratory Chow, given unrationed water, and maintained on a constant 12-hr light schedule. Vaginal smears were checked every day by the lavage method with saline; only those animals that showed regular cycles were used.

The animals were divided into five equal groups. Sutures were placed at the ovarian end of both uterine horns (Group 1); in the middle of both horns (Group 2); at the cervical end of both horns (Group 3); and through the cervix, involving the lumen of both horns (Group 4); the animals in Group 5, without sutures, served as controls. Surgical silk thread (Ethicon O) was inserted with a straight atraumatic needle, and the sutures were placed along the antimesometrial border of the uterine horns. The needle penetrated into the lumen of the uterus and the thread was pulled through and loosely knotted to form a suture. The length of the thread inside the lumen was constant.

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One week after operation, each animal was paired with a fertile male. Mating was confirmed by the finding of spermatozoa in the vaginal smear and the presence of a copulation plug in the cage. The day spermatozoa were observed was designated Day 1 of pregnancy. Five animals from each group were killed on the 5th day of pregnancy; the uteri were flushed with 0·9% saline and the number of ova recovered was noted. The remaining animals were killed on Day 14; the uterine contents were examined, and the number of implantation sites was noted.

TABLE 1

EFFECT OF LOCATION OF INTRA-UTERINE SUTURES ON EARLY PREGNANCY IN THE RAT

Group	*Location of suture*	*Mean no. corpora lutea*	*Mean no. ova recovered*
1	Ovarian end *	15·6	11·8 ± 0·4
2	Middle*	8·9	6·9 ± 0·3
3	Cervical end*	15·8	12·0 ± 0·3
4	In cervix	14·5	12·6 ± 0·6
5	None	17·4	12·5 ± 0·9

Each group contained five animals which were examined on Day 5 of pregnancy.

± = Standard error of the mean.
* Of both uterine horns.

TABLE 2

EFFECT OF LOCATION OF INTRA-UTERINE SUTURES ON THE NUMBER OF CONCEPTUSES IN THE RAT

Group	*Location of suture*	*Mean no. corpora lutea*	*Mean no. of implantations*
1	Ovarian end*	11·9	9·8 ± 0·6
2	Middle*	6·7	0
3	Cervical end*	11·8	9·2 ± 0·3
4	In cervix	10·4	6·8 ± 0·5
5	None	15·8	10·1 ± 0·8

Each group contained five animals which were examined on Day 14 of pregnancy.

± = Standard error of the mean.
* Of both uterine horns.

The effects exerted by intra-uterine sutures during the first 5 days of pregnancy are summarized in Table 1. Fertilization was not affected significantly in any rat, ova at the blastocyst stage being recovered from all Groups. The lowest number of fertilized ova recovered was from the animals with sutures in the middle of the horns. Doyle & Margolis (1964) reported that the thread does not affect ovulation. In this study, the control animals had a greater number of corpora lutea than the animals with sutures in the middle of the uterine horns. In Table 2, are presented the effects of intra-uterine sutures on implantation, as determined on Day 14. No evidence of implantation was found

in uteri containing sutures in the middle of each horn. There were no significant differences in the number of conceptuses in the uterine horns with sutures at the ovarian end, at the cervical end or in the controls. To some extent this is in agreement with the observations of Havránek, Dyková & Tichý (1967), who found implantation in horns with sutures. But it contrasts with their findings in so far as they found some implantations when the sutures were in the middle of the horn. Speilberger & Olewine (1966) reported disruption of pregnancy in rats possessing a suture in the cervix involving the lumen of both uterine horns. In our experience, this type of suture did not completely prevent pregnancy, but implantations were fewer in these rats than in the controls. A suture in the cervix did not interfere with sperm transport, which was evident by recovery of blastocysts from these animals on the 5th day after mating.

The prevention of pregnancy due to the location of an intra-uterine suture is difficult to explain. Recently Batta & Chaudhury (1968) suggested that an intra-uterine device exerts its antifertility effect by release of a pharmacologically active agent which inhibits implantation. But they did not consider whether the release of such a substance might be dependent on the location of the uterine device. Our data demonstrate, however, that the location of the intra-uterine suture is important for the complete prevention of pregnancy.

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