

The Relation between the Position and Length of Uterus and Pregnancy Rate in IVF and Embryo Transfer Treatment Cycles

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Background: Embryo transfer has received little clinical attention and has been the most inefficient step in in-vitro fertilization (IVF). Recent reports have suggested that an awareness of the position and length of the uterus during embryo transfer might be helpful in improving pregnancy rate.

Objectives: The main objective of the present study was to determine the relation between the length and position of the uterus during embryo transfer and pregnancy rate.

Materials and Methods: Patients were randomly allocated to two groups. In case group A (n=40) length of uterus was measured at the day of oocytes collection and the position of uterus was determined. In the control group, Group B, (n=40) the length and position of uterus were not investigated. The embryo transfer catheter was advanced to 5 mm from uterine fundus based on the previously determined cavity length in group A. The embryo transfer procedures (IVF/ICSI) at 48 hours after oocytes collection was done. The outcome of the treatment cycle in two groups was investigated. Data analysis was performed by using chi-square, fisher-exact and ANOVA tests. The statistical significant was defined ($P \leq 0.05$).

Results: There were no significant differences in the mean age (28.5 ± 4.4 , 27.8 ± 6.2), and duration of infertility (7 ± 3.4 , 8.7 ± 5.4). The pregnancy rate was not significantly different with respect to position and length of uterus. The pregnancy rate in case groups was 25% and in control group was 22.5%, the difference was not significant ($P = 0.792$). In both groups, there were ectopic pregnancy and in fact the incidence of ectopic pregnancy, per reported clinical pregnancy, was highest in group A (14.9%) in comparison with group B (1.8%).

Conclusion: The pregnancy rate was not significantly different in the two groups. Misdirecting the embryo transfer can not be avoided by an accurate knowledge of the position or length of uterine at the time of oocytes retrieval. Further studies are required to evaluate the role of length and position of uterus related to the pregnancy rate.

Key words: Position, Length, Uterus, Embryo transfer, Pregnancy rate

Introduction

The embryo transfer procedure is the last decisive step of IVF. Embryo transfer is the most inefficient step in IVF provoking bleeding or uterine contractions. Thus until very recently, this technique has received little attention (Fryman et al., 2004).

Embryo transfer is an essential step in IVF and ICSI. Factors which appear to influence implantation rates are: contamination of the

catheter tip with cervical bacteria, stimulation of uterine contraction during the procedure, the type of catheter, ultrasound guidance during the transfer and the position of the embryos in the uterine cavity (Levi Setti *et al.*, 2003). Numerous attempts to improve the technique of embryo transfer have been described including the need for a gentle and a non-traumatic technique (Vaught *et al.*, 1987) such as performing a trial transfer before the actual procedure, removing the cervical mucus prior to embryo transfer, avoiding the use of a tenaculum, using specific catheters, depositing the embryos near the uterine fundus, using a fibrin sealant, as well as determination of the position and length of

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uterus (Lesny *et al.*, 1998; Waterstone *et al.*, 1991).

The embryos' fate in the uterine cavity is beyond our control and not much is known about the location of the embryo after transfer or how much they move before implantation occurs (Englert *et al.*, 1982). An awareness of the position and length of the uterus has been reported to lead to possible improvement in the clinical pregnancy rates in patients undergoing IVF/ICSI cycles (Egbase *et al.*, 1997). However, there is debate in the literature on the optimal site within the uterine cavity to deposit the embryos, whether in the lower uterine cavity (Waterstone *et al.*, 1991), mid-cavity (Agarwal *et al.*, 1997; Vaught *et al.*, 1987), or 5mm from the fundus. This study examined the influence of the position and length of uterus on pregnancy rate, when embryos are routinely deposited 5mm from the fundus in an otherwise classical transcervical embryo transfer procedure (Agarwal *et al.*, 1997).

Material and Methods

This was a retrospective, randomized controlled trial study of 80 infertile women attending IVF/ICSI Embryo transfer in the period of September to December 2003 at the IVF research center, Yazd Medical University, Iran.

Inclusion criteria were age ≤ 38 and normal uterus on hysterosalpingography (HSG), hysteroscopy and/or pelvic vaginal ultrasonography.

Ovarian stimulation protocol:

Controlled ovarian stimulation was achieved using a long down-regulation protocol followed by HMG stimulation (Pergonal, Menopure, Humegon, Organon; Wittland, Germany).

Monitoring was effected by serial ultrasonography and HCG (Profasi, Serono; Germany) 10,000 IU was administered by IM injection when the leading follicle reached 18 mm in diameter, as described elsewhere. Oocyte retrieval was performed 36 hours later through the transvaginal ultrasound-guided route.

Embryos were transferred 48 hours after retrieval. 100 mg/progesterone IM was administered daily to provide the luteal phase support. The serum β -HCG concentration was measured 2 weeks after embryo transfer. Clinical pregnancy was defined as the observation of a fetus with a pulsing heart at 8 weeks after ET.

All patients received gonadotropin releasing hormone (GnRH, Buserlin, Hoechst, Germany)

analog administered in the previous mid-luteal phase to achieve pituitary desensitization.

The patients were randomly allocated into two groups. With group A (n=40), the length and position of the uterus was determined by using steril speculum and hystrometer and was recorded. In the control group B (n = 40), the length and position of uterus were not investigated.

Trans cervical intra uterine embryo transfer in 15-25ml of culture medium (Albomin Bayer, Corporation, U.S.A), was performed on all patients 48 hours after oocyte retrieval by using a labotect embryo replacement catheter (Labotect GmbH/72 h, Gottingen, Germany). This catheter was marked with 1 cm graduation allowing the clinician to advance it to 5mm from the uterine fundus based on the previously determined length of the uterine cavity from the external cervical OS.

Thus, the embryos were routinely deposited 5mm from the fundus irrespective of the length of the uterine cavity. The entire embryos transfer procedure was performed in the modified lithotomy position and patients with anteverted uterine had half-full bladder prior to the embryo transfer. Then the clinical pregnancy rate was evaluated in both groups.

Statistical analysis

Data analysis was performed by using chi-square, fisher-exact and ANOVA tests. The statistical significant was defined at $P \leq 0.05$. The pregnancy rate was compared according to the length and position of the uterus in group A and then in both groups as a whole.

Results

There were no significant differences in the mean age, duration of infertility and clinical pregnancy in both groups.

The mean age and duration of infertility in the study group (A) and control group (B) were 28.5 ± 4.4 , 27.8 ± 2.2 and 7 ± 3.4 , 8.7 ± 5.4 respectively. There were no significant differences. In 14 (35%) women in group A, the uterus was retroverted and in 26 (65%) the uterus was anteverted.

The clinical pregnancy rate was marginally higher in the women with anteverted uteri (15% versus 10%), but the difference was not statistically significant (Table I) ($P = 0.764$).

The incidence of difficult transfer was similar in both uterine positions.

In group A (the study group) the mean length of uterine cavity in pregnant women was 7.9 ± 0.8 and

Table I. Age, duration of infertility and clinical pregnancy rate in relation to the uterus position

| | Study group (A) | | Control group (B) |
|--------------------|-------------------|--------------------|-------------------|
| | Anteverted (n=26) | Retroverted (n=14) | (n=40) |
| Age | 28.5±4.4 | 28.4±4.8 | 27.8±6.2 |
| Duration | 7.00±3.4 | 7.05±3.9 | 8.7±5.4 |
| Clinical pregnancy | 15% | 10% | 22.5% |

P.Value= 0.764

Table II. Pregnancy rate in study and control group

| | Nonpreg. | Preg. | Total | Test | P-value |
|-----------------|----------|-------|-------|------------|---------|
| Study group A | 75% | 25% | 40 | Chi-square | 0.792 |
| Control group B | 77.5% | 22.5% | 40 | Chi-square | 0.792 |

No significance

Table III. Pregnancy rate in relation to the uterus length.

| | Group A | |
|---------------------------------|---------------------------|-----------------------------|
| | Uterus length <7cm n=8 | Uterus length 7-9cm n=32 |
| Clinical pregnancy per patients | 7.9±08 | 7.9±08 |

P.Value=0.687

in non-pregnant women was 7.8±0.5. The clinical pregnancy rate in relation to the uterine length was not statistically significant ($P= 0.687$) (Table III). There were no ectopic pregnancies (EP) in both groups.

The pregnancy rate in group A was 25% and in group B was 22.5% but the difference was not statistically significant (table II).

Discussion

According to the results of the study, the pregnancy rate was marginally higher in the study group (A) than the control group (B), but the difference was not statistically significance.

There were no ectopic pregnancies in both groups while some of the patients had uterine length <7cm. Thus the results do not support Lesly *et al* study (1999) in that they found statistically significant higher ectopic pregnancy in patients with small uterine cavity <7cm compared with patients with normal uterine cavity lengths. They suggest that ectopic pregnancy may be related to the size of the uterine cavity but is not necessarily exclusive of the clinical technique of placing the embryos 5 mm from the fundus in IVF-embryo transfer as previously suggested (Yovich and *et al.*, 1985; Nazav *et al.*, 1993). However their study is probably the first report in the medical literature implicating the size of the uterine cavity in the etiology of ectopic pregnancy. Difficult embryo transfer probably increases the

odds ratio for ectopic pregnancy in IVF-embryo transfer, but not the size of the uterus. In regard to the position of the uterus, the results of our study indicate that the patients with retroverted uterus had lower pregnancy rate compared with anteverted uterus (10% versus 15%) which was not statistically significant. Thus we conclude that the position of uterus (anteverted or retroverted) does not adversely affect implantation or clinical pregnancy rate.

Further studies are required to examine the in-depth role of position and length of the uterus or any mechanisms in relation to pregnancy rate.

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