Article

Appropriate timing of uterine cavity length measurement positively affects assisted reproduction cycle outcome

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Abstract

An appropriate and easy embryo transfer has a direct impact on pregnancy rates. Proper evaluation of the uterocervical axis and uterine depth are necessary for suitable embryo transfer. The aim of this study was to assess the appropriate time for cervical axis evaluation and uterine measurement. A total of 124 patients undergoing IVF treatment were included in the study. They were divided equally into two groups. In group I (62 women), uterine cavity depth was measured and the uterocervical axis was determined on day 2 or 3 of the menstrual cycle, and in group II (62 women) at the time of oocyte retrieval. There was a statistically significant difference in clinical pregnancy rates between the two groups ($P < 0.005$). Thirty-four women became pregnant in group I (64.2%) versus 19 women in group II (35.8%). In conclusion, uterine cavity measurement is necessary for suitable embryo transfer. It seems that the time of measurement significantly affects clinical pregnancy rate in IVF cycles. The best time for uterine measurement is on day 2 or 3 of menstruation.

Keywords: pregnancy, uterine cavity depth, uterine measurement, uterocervical axis

Introduction

Pregnancy rates in IVF cycles are dependent upon multiple factors that include embryo quality (Scott et al., 1991), endometrial receptivity (Prapas et al., 1998) and application of easy and effective techniques for embryo transfer (Nabi et al., 1997). It is important to perform a precise evaluation of the uterine cavity before transferring the embryo in order to ensure proper embryo replacement. Performing uterine measurement and cervicouterine axis determination before IVF cycles improves the pregnancy rate (Mansout et al., 1990). This procedure can be done before stimulation of the ovary or just prior to transferring the actual embryo (Sharif et al., 1998). It also helps to reveal any unanticipated difficulties in entering the uterine cavity, such as an anatomical distortion or fibroid of the cervix. This study focuses on the appropriate time for measurement of uterine cavity length, since this subject is given little attention and published data on the subject are minimal. The aim of this study was to evaluate the impact of the timing of uterine cavity measurement on pregnancy rates in assisted reproduction cycles.

Materials and methods

The present study was a prospective randomized controlled trial that included a total of 124 consecutive infertile patients who were candidates for IVF/ICSI. Embryo transfers were performed during the period from February 2007 to December 2007 at Royan Reproductive Centre. Couples with infertile men and women evaluated as normal were...
selected. Institutional ethics committee approval was obtained for the treatment procedure in accordance with the Helsinki Declaration. Each patient signed a written fully informed consent statement before inclusion in the study.

Of 124 women, 62 were randomly allocated for uterine measurement on day 2 or 3 of their menstrual cycle (group I) and the remainder were allocated for uterine measurement at the time of oocyte retrieval (group II). Randomization was performed by using computer-generated random numbers.

For ovarian stimulation, all patients received 21 days of oral contraceptive pills from day 2 or 3 of their menstrual cycles, which was followed by busereline 500 μg (Superfact; Aventis Pharma Deutshlan, Frankfurt, Germany) via subcutaneous injection starting on day 21 of their menstrual cycles. Down-regulation was confirmed by linear endometrial ultrasonography and suppressed ovaries by serum oestradiol concentration <50 pg/ml. On day 2 or 3 of menstruation, patients were placed in lithotomy position and a bivalve vaginal speculum was introduced. After exposing the cervix, an intrauterine catheter with 1 cm graduation on the outer sheath fitted with an inner flexible steel styllet (Casmed, Surrey, UK) was gently introduced through the external os to reach the uterine fundus. Measurement of the uterine cavity length from the external cervical os to the fundus, as well as determination of the cervicouterine axis, was performed on the day 2 or 3 of menstruation for group I. The same procedure was performed at the time of oocyte retrieval (group II).

Transvaginal oocyte retrieval was performed 3536 h after the human chorionic gonadotrophin (HCG; Choriomon; IBSA) trigger (10,000 IU) injection. IVF with or without ICSI was performed. Embryo quality was assessed by the scoring system of Veeck et al. (1998). The embryos were routinely deposited 1 cm from the fundus 2 or 3 days after oocyte retrieval using a soft Wallace embryo replacement catheter (Marlow, Willoughby, UK) without ultrason guidance. All embryo transfer procedures were performed by one embryologist. None of the patients needed cervical dilation or tenaculum grasping.

Clinical pregnancy rates were determined by identifying a gestational sac with embryonic/fetal heart activity at 67 weeks of gestation by means of transvaginal ultrasonography. Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) Version 13.0 (SPSS Inc., IL, USA). Data were analysed by t-test and χ² or Fisher’s exact test. A P-value <0.05 was considered statistically significant. Results were expressed as means ± SD unless otherwise specified.

Results

A total of 124 normal fertile women with male factor infertility were enrolled in the study; half of them were allocated for uterine cavity measurement on the second or third day of the menstrual cycle (group I) and the other half were randomly allocated for uterine measurement at the time of oocyte retrieval (group II). The clinical data of these cycles are summarized in Table 1. There were no statistically significant differences between the mean age of the patients and the mean number of the oocytes retrieved. The mean number of embryos transferred and embryo quality were similar in the compared groups.

There was a statistically significant difference in the pregnancy rates of the two groups. Clinical pregnancy rate was 34/62 (54.8%) in group I and 19/62 (30.6%) in group II (P < 0.005) (Table 1).

Discussion

Depositing embryos in the uterine mid-fundal area is found to be important for improving pregnancy rates. Some authors report a significant increase in pregnancy rates by changing the catheter’s position (Waterstone et al., 1991; Naaktgeboren et al., 1997). In order to avoid depositing the embryo close to the uterine fundus, placing the embryo 6 cm from the cervix (without tracing position of fundus) can improve pregnancy rates (Naaktgeboren et al., 1998). Other studies have routinely placed the embryo approximately 0.5 cm below the fundus (Diedrich et al., 1989). Therefore, it is important to perform uterine cavity evaluation before IVF cycles in order to ensure the proper placement of embryos.

Some authors show that performing a dummy embryo transfer before IVF cycles improves pregnancy rates (Mansour et al., 1990). Mock transfer can be performed before the stimulation cycle or just prior to actual embryo transfer (Sharif et al., 1995). Similarly, the present study showed that the time of mock embryo transfer or uterine measurement is important, and performing the procedure near the time of embryo transfer decreases pregnancy rates.

Another study compared mock embryo transfer at the time of oocyte retrieval with mock embryo transfer before the IVF cycle and concluded that performing mock embryo transfer at the time of oocyte retrieval does not have a negative effect on the endometrium and pregnancy rates (Katariya et al., 2007). However, the methodology of this study was different from the present work, as it was a retrospective study and there was no control over potential factors on implantation such as the cause of infertility.

It seems that measurement at the time of oocyte retrieval causes a release of oxytocin with uterine contractions. It is demonstrated by Leong et al., that touching the fundus with a catheter will cause junctional zone contractions that could reduce the chances of pregnancy (Leong et al., 1986). He also observed that the uterus responds with contractions of opposing or strong random patterns in the fundal area when stimulation occurs in the uterine fundus or even in the uterine cervix. Perhaps these findings are in agreement with the present study.
It is reported that the human uterus is characterized by a large number of mast cells. These mast cells are especially numerous in the inner part of the myometrium and are closely associated with bundles of smooth muscle cells (Mori et al., 1997). They are able to release inflammatory reaction mediators such as histamine, serotonin and prostaglandin. It seems that uterine cavity measurement at time of oocyte retrieval causes the release of these inflammatory reaction mediators and may have a negative impact on pregnancy rates in IVF cycles.

Previous studies have shown that a significant number of patients with retroverted uterus will convert to an antverted position (Henne and Milki, 2004). Ultrasonographic guidance during embryo transfer (Sallam and Sadek, 2003) and recommendation for a full bladder may prevent misdirecting the embryo transfer catheter and therefore decrease the difficulty of embryo transfer. In the present study, abdominal ultrasound guided embryo transfer was not used and patients did not present for embryo transfer with full bladders. These factors may have lead to a lower pregnancy rate in the second group.

In conclusion, knowing the uterine cavity length and cervicouterine axis is necessary for proper and easy embryo transfer. However, it seems that the time of measurement is critical and improper timing causes a decrease in the pregnancy rates.

References


Mansour RT, Aboulghar MA, Serour G 1990 Dummy embryo transfer a technique that minimizes the problems of embryo transfer and improves the pregnancy rate in human IVF. Fertility and Sterility 59, 678–681.


Naaktgeboren N, Dieben S, Heijnsbroek I et al. 1998 Embryo transfer easier said than done. Fertility and Sterility 70, S352.


Sharif K, Afnan M, Lashen H et al. 1998 Is bed rest following embryo transfer necessary? Fertility and Sterility 69, 478–481.


Mansour RT, Aboulghar MA, Serour G 1990 Dummy embryo transfer a technique that minimizes the problems of embryo transfer and improves the pregnancy rate in human IVF. Fertility and Sterility 59, 678–681.


Naaktgeboren N, Dieben S, Heijnsbroek I et al. 1998 Embryo transfer easier said than done. Fertility and Sterility 70, S352.


Sharif K, Afnan M, Lashen H et al. 1998 Is bed rest following embryo transfer necessary? Fertility and Sterility 69, 478–481.

