CME

Ultrasonographic-guided embryo transfer does not enhance pregnancy rates compared with embryo transfer based on previous uterine length measurement

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Objective: To compare pregnancy rates (PRs) after ultrasound-guided embryo transfer and embryo transfer based on ultrasonographic length measurement.
Design: Prospective intervention group combined with retrospective control group.
Setting: University fertility clinic.
Patient(s): Patients undergoing IVF and intracytoplasmic sperm injection.
Intervention(s): Transabdominal ultrasonographic guidance at embryo transfer.
Main Outcome Measure(s): Pregnancy and implantation rates.
Result(s): In 367 ultrasound-guided embryo transfers clinical PR, ongoing PR, and implantation rate were 35.1%, 31.1%, and 24.3%, respectively. In 363 embryo transfers based on previous ultrasonographic length measurement, the rates were 33.9%, 29.5%, and 24.2%, respectively. There were no statistical significant differences between the groups.
Conclusion(s): Ultrasonographic guidance does not show any benefit in terms of PR and implantation rate compared to previous ultrasonographic length measurement, an other precise and atraumatic transfer technique. (Fertil Steril® 2006;86:867–72. ©2006 by American Society for Reproductive Medicine.)

Key Words: In vitro fertilization, ultrasonographic guidance, embryo transfer

Embryo transfer is a very important, final step in IVF and intracytoplasmic sperm injection (ICSI) treatment. About 85% of all couples undergoing IVF or ICSI treatment reach this stage, but only one-third of them achieve ongoing pregnancy. The pregnancy rate (PR) after embryo transfer is dependent on multiple factors such as embryo quality (1–3), endometrial receptivity (4), and the technique of the transfer itself. Uterine contractions (5, 6), presence of blood on the catheter (7–10), bacterial contamination of the catheter (11), retained embryos (10), difficulty of transfer (5, 12), and the type of the catheter (13–17), all influence the success rate of the IVF/ICSI treatment.

The embryo transfer can be performed in three ways: [1] "blind" (clinical touch); [2] based on information on the length of the uterus (obtained by previous ultrasonographic measurement or mock transfer); and [3] guided by abdominal ultrasonography. Transabdominal ultrasonographic guidance during embryo transfer is one of the factors that may influence the outcome of the treatment (18–25). During blind catheter insertion the catheter tip inadvertently touches the fundus of the uterus in 17.4% of cases (26), which increases the frequency of uterine contractions (5) and may lead to a reduced PR (6, 27).

Several investigators found higher PRs after ultrasound-guided embryo transfer compared to blind embryo transfer (19, 21, 23), whereas others did not find significantly higher PRs after ultrasound-guided embryo transfer compared to blind embryo transfer (18, 20, 22). Coroleu et al. (28) found that the depth of the catheter influences PR and implantation rate. The highest PR and implantation rate were found when the tip of the catheter was placed 1.5–2 cm below the fundus.

Before introduction of ultrasound-guided embryo transfer in our clinic, we measured the length of the uterine cavity (fundus to external os) by transvaginal ultrasonography at the beginning of the treatment in all patients. Based on this measurement, at embryo transfer the tip of the catheter was placed 1.5–2 cm below the fundus, as described by Coroleu et al. (28).

Most studies analyzing the effect of ultrasonographic guidance at embryo transfer compared this with clinical touch embryo transfer. To our best knowledge, there are no publications comparing ultrasound-guided embryo transfer to embryo transfer based on a previous ultrasonographic length measurement of the uterus. With this present study we wanted to compare PRs of embryo transfer with ultrasono-

Received November 23, 2005; revised and accepted March 14, 2006.
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graphic guidance to PRs of embryo transfer based on the ultrasonographic length measurement of the uterus.

MATERIALS AND METHODS

Because the use of ultrasound guidance was the subject of this investigation the decision was made to include all consecutive patients undergoing a fresh embryo transfer after IVF or ICSI treatment during the period of November 2004 to February 2005. If the patient had undergone another transfer within this period, only the first transfer would be included. Patients undergoing embryo transfer after cryopreservation were excluded. Data were collected prospectively.

Stimulation Protocol

Stimulation protocols and IVF procedures were performed as previously described by Goverde (29) and Rooseboom (1) and their colleagues. In summary, patients ≤38 years of age or with previous good response in a IVF or ICSI treatment underwent controlled ovarian hyperstimulation (COH) with a long protocol with GnRH agonist (GnRH-a) (Decapeptyl; Ferring, Copenhagen, Denmark) and gonadotropins (Gonal F; Serono, Geneva, Switzerland or Puregon; Organon, Oss, the Netherlands). In women >38 years of age or with a previous poor response, a short GnRH-a protocol was applied.

Ovarian response was monitored by vaginal ultrasonography and serum E_2 determinations. Human chorionic gonadotropin (Pregnyl; Organon) 10.000 IU s.c. was administered when there was ≥1 follicle ≥18 mm and ≥3 follicles ≥16 mm. Ultrasound-directed oocyte retrieval was performed 36 hours later. Embryo transfer was generally executed on day 3 after oocyte retrieval. If ≤2 embryos were available, the transfer was performed on day 2 after oocyte retrieval. In consultation between physician and the couple, a maximum of 2 embryos was transferred.

Embryo Selection and Embryo Transfer

Directly before the transfer procedure, the embryo development and morphology score were determined and the best embryo(s) was/were selected. Each embryo was scored, 1 to 4, according to its symmetry and the extent of fragmentation of the blastomeres (13, 30), an optimal quality embryo received a score of 1.

Patients were instructed to come to the clinic with moderate bladder filling (last toilet visit 1.5–2 hours before embryo transfer). The patient was positioned in lithotomy position and the cervix was exposed using a bivalve speculum. The mucus in the cervical canal was removed with a cotton swab. The outer catheter of the Cook catheter (Cook Ireland Ltd, Limerick, Ireland) was positioned under guidance of abdominal ultrasonography. Then the inner catheter was loaded with the embryos by the three-drop technique, in which an air bubble separates the drop of medium containing the embryo(s) from a preceeding and following drop of medium (13), and was inserted through the outer catheter.

The inner catheter was positioned at 1.5–2 cm under ultrasonographic guidance. Then the embryo(s) were slowly released into the uterine cavity. The catheter was slowly removed and checked with a stereomicroscope to ensure that there were no retained embryos. Embryo transfers were considered difficult when an obturator was required.

Embryo transfer was performed by one of six experienced physicians. Although ongoing PRs do vary among individual physicians, these differences are not statistically significant (31).

Outcome

A serum pregnancy test was performed 14–16 days after oocyte retrieval. Pregnancies were monitored by transvaginal ultrasonography at 6, 9, and 12 weeks of gestational age. An ongoing pregnancy was defined as an intrauterine pregnancy with fetal cardiac activity 70 days after oocyte retrieval.

Control Group

Results of the ultrasound-guided transfer were compared to a retrospective control group, consisting of patients who had a fresh embryo transfer after IVF/ICSI in the 4-month period (July–October 2004) before introduction of ultrasound-guided embryo transfer. All consecutive patients were included. Patients undergoing embryo transfer after cryopreservation were excluded, as well as patients that were already in the ultrasound-guidance group. The length of the uterus was measured (from fundus to the external cervical os) at the start of the treatment cycle on a sagittal view by transvaginal ultrasonography (Fig. 1).

Treatment procedure, embryo selection, and embryo transfer were performed as described previously. The same type of catheter (Cook) was used. There had not been staff turnover or other changes in the procedures. The only difference between the groups was that in the control group the embryo transfer was performed without ultrasonographic guidance. In this control group the inner catheter was positioned at 1.5–2.0 cm based on a previous ultrasonographic length measurement of the uterus, therefore it avoided touching the fundus.

The study was approved by the institutional review board of the Department of Obstetrics and Gynaecology of the Free University Medical Center, Amsterdam, the Netherlands.

Statistical Analysis

Statistical analysis was performed using SPSS 11.5 software for Windows (SPSS Inc. Chicago, IL). Data were compared by the unpaired *t*-test or χ^2 analysis where appropriate.

RESULTS

A total of 367 embryo transfers in 367 patients were performed under ultrasonographic guidance. The clinical out-