

# The Role of Uterine Straightening by Passive Bladder Distension Before Embryo Transfer in IVF Cycles

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**Purpose:** The present study investigated the effect of bladder distension on in vitro fertilization and embryo transfer (IVF-ET) results.

**Methods:** The study comprised 796 patients after successful transvaginal oocyte pickup and IVF, who, on the basis of bladder filling for ET, were divided into two groups. In group E, 385 patients underwent ET with an empty bladder, and in group F, 411 patients underwent ET with a full bladder.

**Results:** Sixty-four pregnancies were achieved in group E (16.6%), compared to 110 pregnancies in group F (26.8%,  $P = 0.006$ ). A similar pregnancy loss rate was observed in both groups, 13 in group E (20.3%) and 29 in group F (26.4%;  $P = NS$ ).

**Conclusions:** A significantly higher pregnancy rate was achieved with routine bladder distension before ET, probably attributable to the smooth and easy insertion of the ET catheter.

**KEY WORDS:** in vitro fertilization; embryo transfer; bladder; pregnancy.

## INTRODUCTION

Atraumatic embryo transfer (ET) is one of many factors affecting the results of IVF. Bleeding and uterine cramps during and after ET are not infrequent and may be the cause of embryo expulsion via the cervix or tubes (1). Insertion of the ET cannula is easier and seems to be less traumatic in a straight uterus than in an anteverted uterus. Straightening an anteroflexed uterus can be achieved by pulling the cervix with a tenaculum, but also by passive filling of the bladder

with urine, which is not traumatic (2). In the present study we evaluated the effect of a distended bladder for embryo transfer on IVF results.

## MATERIALS AND METHODS

### Patients

The study population comprised 796 patients with an anteverted uterus, sequentially undergoing ET after successful oocyte pickup (OPU) and IVF in our department. Patients were divided into two groups by the bladder filling for the ET procedure. In group E, comprising 385 patients, ET was performed with an empty bladder, and in group F, comprising 411 patients, ET was performed with a full bladder. Both groups had a similar age (mean of 33.2 years and range of 24 to 42 years in group E and mean of 33.4 years and range of 25 to 43 years in group F) and a similar mean duration of infertility (7.1 years in group E, 7.0 years in group F). The incidence of primary and secondary infertility was similar in both groups (47.1 and 52.9 vs 45.9 and 54.1%, respectively). A similar distribution of infertility causes was noted in groups E and F, respectively: mechanical factor, 50.3 vs 52.5%; unexplained infertility, 19.9 vs 20.9%; male factor, 28.9 vs 24.2%; and endometriosis, 1.0 vs 2.4%. All patients included had conventional IVF.

### IVF Protocol

All patients underwent screening pelvic transvaginal ultrasonography (TVS) on the 21st day of the cycle prior to the initiation of treatment, to exclude ovarian cysts. Patients were then treated with GnRH agonist (GnRH-a; Decapeptyl; Ferring, Germany), 0.5 mg subcutaneously, daily for 14 days prior to the initiation

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of controlled ovarian hyperstimulation (COH) with hMG. GnRH-a was then continued at the same dose until hCG was administered. hMG (Pergonal; Teva, Petah-Tikva, Israel) was administered at an initial dose of 3 ampoules per day and changed according to the ovarian response monitored every 1–3 days by measurements of serum  $E_2$  and P and follicular size on TVS. When the leading follicles reached a mean diameter of 20 mm, with serum  $E_2$  higher than 500 pg/ml (conversion factor to SI units, 3.671), 10,000 IU of hCG (Pregnyl; Organon; Oss, The Netherlands) were administered. Thirty-six hours later, OPU under TVS guidance was performed, using a 17-gauge needle (Cook, USA). Oocyte insemination and culture were performed as described previously (3).

### Embryo Transfer

We have used fixed alternate days for the two methods and transfers were done by a small group of experienced operators. Group E patients were asked to drink 1000 ml of water 1 hr prior to ET, which was performed when the bladder was demonstrated sonographically to be properly distended (Fig. 1B). No trial ET was

performed prior to the actual ET; and sonography was not routinely used during ET but was applied in very few cases when cervical stenosis made it necessary to introduce a metal obturator prior to ET. No premedication or anesthesia was used for ET. A 3-French Tom-Cat catheter (Sherwood, St. Louis, MO, USA) was used in all ET, and embryos were placed in the uterine cavity about 1 cm from the fundus.

The luteal phase was supported with intramuscular P, 50 mg daily. Serum  $E_2$  and P levels were monitored every 4 days and intramuscular hCG, 2500 IU, was added whenever a marked drop in the serum  $E_2$  and P levels was noted.

### Statistical Analysis

Student's *t* test, chi-square test, and stepwise logistic regression were used, when appropriate, for statistical analysis.

### RESULTS

Both groups were comparable in terms of the mean  $E_2$  and P levels on hCG day, number of oocytes collected, cleavage rates, and number of embryos transferred (Table I). There were 174 clinical pregnancies, for a total pregnancy rate of 22.6%. Sixty-four pregnancies were achieved in group E (16.6%), compared to 110 pregnancies in group F (26.8%). This difference was statistically significant ( $P = 0.006$ ). A similar pregnancy loss rate was observed in both groups, 13 in group E (20.3%) and 29 in group F (26.4%) ( $P = NS$ ).

### DISCUSSION

A traumatic insertion of the ET catheter has long been recognized as a cause of endometrial bleeding and uterine contractions, possibly responsible for the expulsion of embryos from the uterine cavity (1). The normal anatomy of the pelvis in most women comprises an anteverted uterus that forms an angle between the uterine cavity axis and that of the cervical canal and the vagina (Fig. 1A). This often makes it difficult for the transfer catheter to pass smoothly into the uterine cavity (2). Uterine straightening may be achieved by the use of a tenaculum or passively by bladder filling, as observed on abdominal ultrasonography of the pelvis. However, no comparative evaluation of the role of uterine straightening by bladder distension on

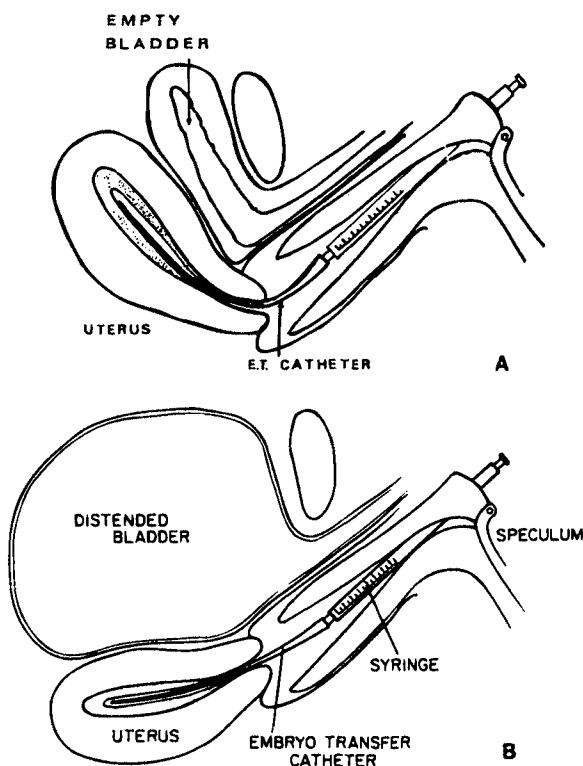


Fig. 1. Schematic representation of embryo transfer (A) in an anteverted uterus with an empty bladder and (B) in a straightened uterus with a distended bladder.

**Table I.** Comparison of Laboratory Data and Results Between the Empty- and the Full-Bladder Groups<sup>a</sup>

	Total	Empty bladder	Full bladder	P
E <sub>2</sub> on hCG day (pg/ml)	1282 ± 562	1299 ± 583	1211 ± 498	NS
P on hCG day (ng/ml)	1.04 ± 0.81	1.11 ± 0.85	1.02 ± 0.84	NS
No. oocytes recovered	9.2 ± 5.5	9.0 ± 5.5	9.3 ± 5.2	NS
Fertilization rate (%)	60.7	64.1	58.2	NS
No. embryos transferred	3.4 ± 1.4	3.5 ± 1.1	2 ± 1.3	NS
Pregnancy rate(%)	22.6	16.6	26.8	0.006
Pregnancy loss rate(%)	24.1	20.3	26.4	NS

<sup>a</sup>Values are means ± SD. NS, = not significant.

the success of IVF-ET was undertaken. Two studies have addressed the issue of bladder filling before ET. Sundstrom *et al.* (2) were the first to claim that ET with a filled bladder is easy and reliable and causes little discomfort to women. However, theirs was a small and uncontrolled study of 14 ETs with a full bladder compared retrospectively to 14 ETs with empty bladder. In a randomized study in 66 women with bladder filling, compared to 76 women with empty bladders, Mitchell *et al.* (4) found no significant differences in difficulties encountered at embryo transfer or in the chance for pregnancy. Yet these authors asked their patients to drink only 250 ml of fluid before ET, a quantity that can hardly be expected to cause bladder distension in the average patient. Based on our experience in pelvic sonography, we considered the intake of 1000 ml of fluid before ET proper for group F. The full bladder also enabled easy ultrasonic measurement of the uterine cavity depth and the monitoring of some difficult ETs due to cervical stenosis without having to use a tenaculum and force the internal os.

Bladder filling emerged clearly from the stepwise logistic regression analysis as a major determinant of IVF-ET results, and among the factors influencing the chance of pregnancy, it was found to be the second determinant after the individual fertilization rate ( $P < 0.001$ ).

In conclusion, a higher pregnancy rate was achieved with routine bladder distension before ET, probably attributable to the smooth and easy insertion of the ET catheter.

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