

Transcervical Tubal Embryo-Stage Transfer (TC-TEST)

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Ultrasound-guided transcervical tubal cannulation (TC-TEST) was used to replace embryos to the fallopian tubes in 17 women whose fallopian tubes were inaccessible by the abdominal route but where at least one tube was shown to be freely patent on a preliminary hysterosalpingogram investigation. In two further cases, the fallopian tubes proved impossible to cannulate, and along with two instances where difficulty was experienced, a common underlying feature was an arcuate or septate configuration of the uterus. Three pregnancies ensued (17%) in cases where the procedure was free of difficulty and the transfers were demonstrably intratubal: two went to term and the third resulted in an ectopic pregnancy. The procedure has so far not shown a benefit over conventional IVF-ET and probably should be avoided in women with any type of tubal disorder.

KEY WORDS: in vitro fertilization; tubal transfer; embryo transfer; ectopic pregnancy; tubal disease; uterine configuration.

INTRODUCTION

In recent years, the introduction of tubal transfer techniques such as gamete intrafallopian transfer (GIFT) (1), pronuclear-stage tubal transfer (PROST), and TEST (2) has increased the treatment options for assisted reproduction. In particular, the latter two procedures allow the laboratory to establish the occurrence of fertilization (of particular value in male-factor infertility) and to select, on morphological criteria, the best embryos for replacement. Furthermore, the trend toward transvaginal ultrasound-directed recovery of oocytes has reduced the complexity of all in vitro fertilization

(IVF)-related procedures by minimizing anesthetic requirements and enabling many of the procedures to be performed on an outpatient or day-care basis. However, all the tubal transfer methods have so far required inpatient management for a laparoscopic (1,2) or minilaparotomy (1) approach to transfer.

In 1987 and 1988 we explored methods to reduce the need for general anesthesia and hospitalization by using a transcervical tubal cannulation technique under ultrasound control, as previously described by Jansen and Anderson for tubal inseminations (3). We specifically opted for this approach rather than the more conventional IVF-embryo transfer (ET), as our experience at that time strongly suggested that the tubal environment might offer an improved chance of pregnancy in such cases where there was at least one patent fallopian tube, even though this might be inaccessible by the abdominal route (4).

MATERIALS AND METHODS

Cases selected were those who would normally be considered for TEST (repeated GIFT failures, ovum donation transfers, and male-factor infertility) but where there was an additional problem of pelvic adhesions limiting laparoscopic access to the pelvis and mobility of the fallopian tube. In addition, cases usually treated by IVF-ET were also included if a patent fallopian tube was demonstrable (e.g., previous tubal microsurgery). While in some cases one tube was absent or blocked, the tube chosen to receive embryo transfer was shown to be patent on a preliminary hysterosalpingogram study which also detailed the uterine configuration. Embryo transfers were performed using the Jansen-Anderson intratubal transfer set (K-JITS-1000; William A. Cook Australia Pty. Ltd., Brisbane, Qld.).

The procedure entails the insertion of an intra-

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uterine guiding cannula which is a 5.5-French gauge opaque Teflon cannula, 29 cm long, with a curved, tapering guide tip. A malleable obturator is inserted into the cannula to create an appropriate anteverted or retroverted curve which, on extraction, allows the cannula to "point" to the left or right cornual region according to its natural memory. This requires inserting the obturator while holding the cannula in a lateral curve so that it temporarily acts against the natural curve. Once the cannula is positioned and confirmed by transvaginal ultrasound (5.0-MHz probe, General Electric RT 3000, GE Medical Systems, Milwaukee, WI), the embryo-laden Teflon catheter, 35 cm in length with a 3-French gauge (FG) diameter tapering to a 2-FG tip, is introduced and pushed into the interstitial tubal segment to a total distance of 4 cm beyond the cannula. If successful the cannula position will be maintained during the catheter insertion; however, if the cannula attempts to extrude via the cervix, its tip must be repositioned to fit snugly into the cornual region thus allowing successful cannulation by the catheter. The embryos are transferred in 20 μ l culture medium containing 10% deactivated maternal serum. The egress of fluid into the tube can usually be detected by the ultrasound probe and visualized on the screen. The normal protocol was for a maximum of four PN oocytes or embryos to be transferred. However, five women had five to seven embryos transferred because of their advanced age, overall poor quality of their embryos, or previous repeated failures (≥ 4) following IVF or GIFT procedures. This practice ceased after mid-1988 following the recognition of a high prevalence of high-order multiple pregnancies and our current protocol strictly limits oocyte and embryo transfers to a maximum of three in all procedures.

Patients were free to choose between no anesthesia (premedication only with oral Temazepam) or a short-acting intravenous anesthetic involving the intermittent use of Propofol.

RESULTS

During a series of 818 oocyte recoveries for IVF-related procedures performed at the PIVET Medical Centre over an 18-month period to mid-1988, trans-cervical TEST (TC-TEST) was attempted on 19 occasions, with 17 successful cannulations for 15 women. Three pregnancies ensued and these have now completed their course. A summary of all the

cases having successful cannulation and their treatment outcomes is presented in Table I.

Seven women had no anesthesia (apart from premedication) and reported minimal discomfort. However, almost all could recognize when their fallopian tube was cannulated by a sensation of mild discomfort localized to the ipsilateral iliac fossa region. This usually matched the operator's confidence concerning tubal cannulation which was denoted by a sense of smooth entry as the catheter was advanced and the guiding cannula maintained its position at the cornual region. In 13 of the 15 women transfer was easily accomplished but in two cases it was difficult. There were two further cases in which cannulation proved impossible and the procedure reverted to intrauterine transfer. Both of those cases had an arcuate uterine configuration and this was a similar finding for the two cases where difficulty was experienced in achieving tubal cannulation. However, no difficulty was experienced in four other women who had an arcuate uterus.

The first successful pregnancy was achieved in a 33-year-old woman who had previously had one child by IVF and whose infertility problem related to extensive peritubal adhesions, secondary to two previous ovarian cystectomies during adolescence. She had two four-cell embryos transferred to each fallopian tube. In September 1988 she delivered a healthy male infant weighing 4050 g by spontaneous vaginal delivery.

The second pregnancy was achieved in a 36-year-old woman who also had a previous salpingectomy for a left tubal ectopic and was subsequently shown to have peritubal adhesions around her remaining tube. She had four previous failures by IVF treatments. At her first unsuccessful attempt at TC-TEST, two four-cell embryos were transferred to her remaining right fallopian tube. On the second attempt in June 1988 five embryos were transferred. She subsequently delivered healthy quadruplet infants (three males weighing 1465, 1420, and 1505 g, respectively and one female weighing 1145 g) at 31 weeks in January 1989, all of whom are thriving.

The third pregnancy occurred in a 34-year-old woman who had a previous history of salpingectomy for ectopic pregnancy and was known to have partial agglutination of the fimbria of her remaining (left) fallopian tube. A total of seven embryos were transferred to this tube, but of these only four were judged of good quality (rating better than 2 on a 4-point scale). Subsequently a tubal ectopic preg-

Table I. Summary of Procedures and Outcomes^a

Case no.	Age	Years infertile	Etiology	Uterine configuration	Date of procedure	Embryo details	Transfer details	Outcome
1	32	7	Previous TMS, MF	Arcuate	Nov. 87	4 × PN	R tube only	Not pregnant
2	33	3	Previous TMS, MF	Normal	Dec. 87	4 × 2-cell	2 to each tube	1 male infant delivered
3	38	8	Previous TMS	Arcuate	Jan. 88	1 × 5-cell 1 × 6-cell	Difficult transfer to L tube. Uterus levorotated	Not pregnant
4	41	9	Previous TMS, extensive PID	Normal	Jan. 88	4 × PN	2 to each tube	Not pregnant
5	26	2	Tubal adhesions	Normal	Jan. 88	5 × 4-cell	R tube only	Not pregnant
6	41	6	Tubal adhesions	Normal	Jan. 88	4 × PN	R tube only	Not pregnant
7	30	4	Previous TMS	Arcuate	Feb. 88	2 × 2-cell	Failed. Reverted to uterine transfer	Not pregnant
8	30	3	Previous TMS	Arcuate	Feb. 88	2 × 2-cell	Difficult transfer probably intrauterine	Not pregnant
9	36	4	Tubal adhesions	Normal	Feb. 88	3 × PN	1 to R 2 to L tube	Not pregnant
9a	36	5	Tubal adhesions	Normal	Mar. 88	2 × 4-cell	R tube only	Not pregnant
9b	36	5	Tubal adhesions	Normal	Jun. 88	3 × 4-cell 2 × 6-cell	R tube only	1 female, 3 male infants delivered
10	35	7	Tubal adhesions	Normal	Mar. 88	2 × 2-cell 1 × 4-cell	R tube only	Not pregnant
11	36	9	Previous TMS; grade III endom.	Arcuate	Mar. 88	3 × 2-cell	L tube only	Not pregnant
12	28	5	Previous TMS	Arcuate	Apr. 88	2 × 2-cell 1 × PN	R tube only	Not pregnant
13	40	10	Previous TMS	Arcuate	Apr. 88	2 × 6-cell 4 × 4-cell	L tube only	Not pregnant
14	40	6	Tubal adhesions, MF	Normal	Apr. 88	2 × 2-cell 1 × 3-cell 3 × 4-cell	L tube only	Not pregnant
15	28	6	Tubal adhesions	Septate uterus	Apr. 88	4 × 4-cell	Failed. Reverted to uterine transfer	Not pregnant
16	34	12	Previous TMS	Normal	May 88	6 × 4-cell 1 × 8-cell	L tube only	Ectopic pregnancy
17	39	3	Previous TMS	Normal	Aug. 88	(a) 1 × 2-cell 1 × 6-cell (b) 1 × 4-cell 1 × 6-cell	(a) To R tube (b) To L tube	Not pregnant

^a TMS, tubal microsurgery; PID, pelvic inflammatory disease; PN, pronuclear stage; MF, oligo/asthenospermia ± antisperm antibodies.

nancy was diagnosed, necessitating salpingectomy of her remaining fallopian tube.

DISCUSSION

The overall pregnancy rate of 17.6% per completed transfer cycle for all TC-TEST attempts was

less than the 33% rate (224/689) for all other IVF-related procedures during that period. In more than half the cases, the transcervical cannulation technique proved very easy to perform usually without major anesthesia, and ultrasound visualization of the cannulation procedure was clear. However, other cases proved difficult, with two cases being

reported as very difficult, and in a further two women the attempts were abandoned, reverting to intrauterine placement of the embryos. Difficulty may well be related to the underlying configuration of the uterine cavity; in particular, the T-shaped arcuate uterus appears to be less favorable for the Jansen-Anderson catheter as currently designed. This possibly relates to difficulty in negotiating the internal shoulder of the arcuate uterus before the internal os can be reached. No pregnancies were achieved among the six women who had an arcuate uterine configuration. Where cannulation was not achieved embryos were simply placed in the fundal region of the uterine cavity as for conventional IVF-ET. However, this may be unfavorable for such embryos, as the cavity has been disturbed by the earlier cannulation procedure. Our further experience with the use of tubal transfer techniques in cases with known underlying tubal disorders indicates that such cases have a high risk of ectopic pregnancy (5) and should no longer be considered for either laparoscopic or TC-TEST procedures. While we believe the TC-TEST procedure has potential patient benefits in terms of cost, safety, and minimization of anesthetic procedures, our experience here is not encouraging and we would now recommend that such cases be treated by conventional IVF-ET. In fact over the past 2 years our further experience has been that the results of conventional IVF-ET procedures are improving and that implantation rates of uterine transfers have risen (e.g., 49 pregnancy sacs arose from IVF-ET after 462 embryos were transferred during 1989;

10.6%). This compares with laparoscopic TEST results during the same period in which 46 pregnancy sacs resulted following the transfer of 380 embryos (12.1%; no significant difference). The implantation rate for TEST in this period was lower than the previous year (5) and the variables underlying this fall have yet to be identified. The findings do question the value of tubal transfers, although we are still exploring this in relationship to male-factor infertility as well as ovum donation and postcryopreservation transfers.

Despite the experiences described, it may still be worth continuing to explore improvements in methodology for TC-TEST, for example, by the use of endoscopically directed cannulation, particularly in cases of male-factor infertility and where there is no associated tubal disorder in the female partner.

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