Cervical dilatation with hygroscopic rods prior to ovarian stimulation facilitates embryo transfer

Paul Serhal¹, Domenico Massimo Ranieri, Iffat Khadum and Rami Antoine Wakim

The Assisted Conception Unit, University College London Hospitals, 25 Grafton Way, London WC1E 6DB, UK

¹To whom correspondence should be addressed. E-mail: paul.serhal@uclh.org

BACKGROUND: Embryo transfer is a critical factor affecting the success of IVF—the ease of embryo transfer has a direct impact on the success rate. The aim of this study was to assess the value of cervical dilatation with hygroscopic cervical rods (Dilapan-S) in patients with difficult embryo transfer.

METHODS: Fifty-four patients undergoing IVF treatment, who either failed to conceive after previous difficult embryo transfer or were noted to have difficult mock embryo transfer were retrospectively included in the study. In this way the patients acted as control for themselves. The Dilapan-S rods were placed intracervically and left for 4 h prior to starting gonadotrophin stimulation as an outpatient procedure.

RESULTS: Of the 54 patients who originally had difficult embryo transfer, 43 patients (79.5%) had subsequent easy embryo transfer. Thirty patients managed to conceive, giving a clinical pregnancy rate of 55%.

CONCLUSIONS: Cervical dilatation using hygroscopic dilators facilitates difficult embryo transfer and helps to improve the pregnancy rate.

Key words: difficult embryo transfer/Dilapan-S/IVF

Introduction

It is well established that embryo transfer is a critical factor affecting the outcome of IVF (Lass et al., 1999; Schoolcraft et al., 2001). The technique and ease of embryo transfer have a direct impact on the pregnancy rate, irrespective of quality of embryos available for transfer (Karande et al., 1999). Many factors have been shown to affect the embryo transfer technique and its outcome. These include the experience and dexterity of the clinician (Karande et al., 1999; Hearns-Stokes et al., 2000), the catheter type (Schoolcraft et al., 2001), the placement of the catheter tip in the mid-fundal area (Rosenlund et al., 1996) and the presence of cervical stenosis (Mansour and Aboulghar, 2002).

A mock embryo transfer has been shown to reduce the problems encountered during the actual embryo transfer (Mansour et al., 1990; Knutzen et al., 1992). It enables clinicians to exclude the presence of cervical stenosis or acute angulation, as well as allowing the assessment of the direction of the uterus and the length of the uterine cavity (Egbase et al., 2000).

Several studies have reported significant reduction in pregnancy rates as a result of technically difficult embryo transfer (Leeton et al., 1982; Englert et al., 1986; Diedrich et al., 1989; Visser et al., 1993; Goudas et al., 1998; Wood et al., 2000).

We report the first series of 54 patients with a history of previous difficult embryo transfer or difficult mock embryo transfer who underwent cervical dilatation using hygroscopic cervical rods (Dilapan-S) as an outpatient procedure prior to starting gonadotrophin stimulation. The aim of this study was to assess the value of cervical dilatation with hygroscopic cervical rods (Dilapan-S) in patients with difficult embryo transfer.

Materials and methods

From June 2000 to May 2002, 54 IVF patients aged 36.8 ± 5.6 years who either failed to conceive after previous difficult embryo transfer or were noted to have a difficult mock embryo transfer were included in the study.

This study could not have been carried out in a randomized case-control manner, as it would have been unethical to ignore our prior experience with difficult embryo transfer. On the other hand, this group of patients acted as self-controls. The mock embryo transfer was undertaken using the Edwards–Wallace catheter (Wallace, Colchester, UK) under ultrasound control in the month prior to starting stimulation with gonadotrophins. When difficulty was encountered, a tenaculum was used to straighten the cervical canal and the Wallace malleable stylet was used in order to negotiate the internal os. If difficulty was encountered while introducing the hard Wallace catheter, the patient was counselled about the possibility of having a difficult mock embryo transfer and was offered the option of having a Dilapan-S (FEMA International, BV, Winssen, The Netherlands) insertion on day 4–5 of her next period.

The embryo transfer was performed on day 3 after vaginal egg collection. All our embryo transfers are carried out under ultrasound control with full bladder. The Wallace catheter was used in all cases and embryos were deposited in the middle of the uterine cavity.
Our embryo transfer grading is as follows: grade 1, easy; grade 2a, difficulty in negotiating the cervical canal with or without blood on the catheter, and the necessity to use a malleable stylet; grade 2b, as 2a plus necessity to use a tenaculum; grade 3, inability to negotiate the internal os.

The causes of infertility were as follows: tubal, nine (16.5%); unexplained, 13 (24%); male factor, 16 (29.6%); endometriosis, two (3.7%); ovulatory dysfunction, one (1.8%); and multifactorial, one (2.4%). Of the 54 patients, 39 underwent IVF/ICSI (72.2%), four underwent frozen-thawed embryo transfer (7.4%) and 11 were ovum recipients (20.3%).

The long GnRH agonist down-regulation regime was used for ovarian stimulation. Buserelin acetate nasal spray (Hoechst Marion Roussel, Uxbridge, UK) was started in the mid-luteal phase of the preceding menstrual cycle. Cervical dilatation with Dilapan-S was undertaken on day 4 or 5 of the period immediately before starting the gonadotrophin stimulation.

The technique of Dilapan-S insertion was as follows: patients were asked to have a full bladder and were given a 100 mg Diclofenac sodium suppository (Geigy, Surrey, UK) rectally 1 h before the procedure. The vagina was cleansed with an antiseptic solution. The cervix was identified and the upper lip was held with a tenaculum for stabilization of the cervix and straightening of the cervical canal. The hygroscopic rod was moistened with sterile water or saline to lubricate the surface prior to insertion. A 3 × 55 mm diameter Dilapan-S rod was then grasped at the handle and gradually inserted into the cervical canal under ultrasound control until it traversed the external and internal os. It was then left in situ for 4 h. To remove the Dilapan-S rod, the handle was grasped with forceps and a steady downward traction was applied in line with the long axis of the device. Extra care was taken during the removal as pulling on the marker string or twisting the device during removal may cause the device to break. An antibiotic was given to cover the procedure.

Ovarian stimulation was started on the same day using HMG (Menogon, Ferring, UK). Ovarian response was monitored using serial vaginal ultrasound scanning and serum estradiol assessment. HCG (Choragon, Ferring, UK) was administered 36 h prior to egg collection. The luteal phase was supported with progesterone vaginal pessaries 400 mg twice a day for 16 days (Cyclogest, Shire, UK). Clinical pregnancies were defined by ultrasound confirmation of an intrauterine gestational sac and fetal heart activity.

Results

Dilapan-S insertion was considered easy in 42 patients, difficult in 11 and not possible in one patient. The procedure was well tolerated. Eight patients complained of cramping lower abdominal pain while the Dilapan-S rod was in situ. A total of 43 out of 54 patients (79.6%) who originally had grade 2a, 2b or grade 3 transfers had subsequent easy (grade 1) embryo transfer after the use of Dilapan-S. Of the 37 patients who originally had a grade 2a transfer, Dilapan-S insertion did not improve the subsequent embryo transfer grading in nine (16.5%). Embryo transfer grading did not improve in one patient out of 10 (10%) who originally had a grade 2b embryo transfer. Of the seven patients who originally had a grade 3 transfer, only one patient (1.8%) showed no improvement in the subsequent embryo transfer grading despite using the Dilapan-S rod (Table I).

This study included 54 patients. Two patients had oocytes that failed to fertilize. Thirty patients had a positive pregnancy test. The clinical pregnancy rate was 57.7%, the implantation rate was 24.4% and the miscarriage rate was 8.5%.

Discussion

Meticulous embryo transfer technique is essential to IVF success (Meldrum et al., 1987). Difficult embryo transfer, blood and mucus on the catheter, uterine contractions, expulsion and retained embryos have all been associated with problematic and unsuccessful embryo transfers. Mansour et al. (1990) showed that difficult embryo transfers had a significantly lower pregnancy rate and implantation rate (4% and 1%, respectively) compared with easy transfers (20.4% and 6.7%, respectively).

A variety of techniques has been proposed to overcome difficult embryo transfer. These include the use of full bladder to straighten out the uterine cavity (Sundstrom et al., 1984; Sharif et al., 1995), together with the use of ultrasound-guided transfer technique to visualize the position of the catheter (Coroleu et al., 2000). Ultrasonographic guidance has many potential advantages: it facilitates the placement of catheters; avoids touching the fundus; confirms that the catheter is beyond the internal os in cases of elongated cervical canal; and helps in avoiding disruption and trauma of the endometrium. Other techniques include the use of volsellum to straighten the utero-cervical angle (Lesny et al., 1999) and choosing an appropriate transfer catheter (Al-Shawaf et al., 1993). Despite these measures, there exists a small but significant group of patients in whom embryo transfer remains extremely difficult. Under these circumstances, a laparoscopic tubal embryo transfer can be undertaken in patients with patent tubes. However, this method is invasive in nature, necessitates the use of general anaesthesia and adds to the cost of an IVF cycle. For patients with history of tubal disease or pelvic adhesions, the transmyometrial-route 'Towako method' has been suggested (Kato et al., 1993). Whilst some authors have reported a very good outcome with this technique (Kato et al., 1993; Sharif et al., 1996), others have not (Groutz et al., 1997).

Cervical dilatation has been suggested as a mean to overcome difficult embryo transfer (Glatstein et al., 1997; Groutz et al., 1997; Abusheikha et al., 1999). Groutz et al. (1997) showed that whilst cervical dilatation on the day of the egg collection leads to an easier embryo transfer, the pregnancy rate after this procedure was very low (2.5%). They suggested that the 48-h interval between egg collection and embryo transfer was too short for a complete recovery of the cervix and the endometrium from the trauma inflicted by the dilatation.

### Table I. Embryo transfer grading before and after Dilapan-S insertion

<table>
<thead>
<tr>
<th>Grade</th>
<th>Number</th>
<th>Grade</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2a</td>
<td>37</td>
<td>28</td>
<td>75.6</td>
</tr>
<tr>
<td>2b</td>
<td>10</td>
<td>9</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>7</td>
<td>6</td>
<td>85.7</td>
</tr>
<tr>
<td>Total</td>
<td>54</td>
<td>43</td>
<td>79.6</td>
</tr>
</tbody>
</table>

Hygroscopic rod use facilitates embryo transfer
Abusheikha et al. (1999) performed cervical dilatation prior to starting gonadotrophin stimulation. This led to an easier embryo transfer and improved the pregnancy rate. However, this approach necessitates general anaesthetic and added cost. The use of osmotic cervical dilators (laminaria tents) has been reported in two patients with cervical stenosis (Glatstein et al., 1997). In the first patient, a laminaria tent was inserted after cervical dilatation on the day of the egg collection and was removed after 24 h. In the second patient the laminaria tent was inserted and kept in situ for 24 h before a frozen–thawed embryo transfer. Both patients conceived.

In our study, we used Dilapan-S hygroscopic rods for cervical dilatation. Dilapan-S is a hygroscopic cervical dilator that is manufactured from AQUACRYL, a proprietary hydrogel. The dilators are firm hygroscopic rods, similar in shape to natural laminaria tents. They absorb moisture through hygroscopic action and gradually swells in diameter with sufficient radial force to gently dilate the cervical canal. The dilators are capable of increasing in diameter on average from 3–4 to 8–12.5 mm within 4–6 h. They have been used for cervical ripening prior to induction of labour and for cervical preparation prior to suction termination of pregnancy.

In contrast to the two cases reported by Glatstein et al. (1997), in our study the Dilapan-S was inserted, and left for 4 h, prior to starting the gonadotrophin stimulation. Using conventional cervical dilatation under general anaesthesia, Abusheikha et al. (1999) showed that in 29.8% (17/57) of patients with cervical stenosis, embryo transfer remained difficult. In our study, embryo transfer remained difficult after the use of Dilapan-S in 20.4% (11/54) of patients. This suggests that conventional cervical dilatation under a general anaesthetic does not seem to be more effective than the use of Dilapan-S.

We conclude that the use of Dilapan-S rods for cervical dilatation in an outpatient setting prior to starting ovarian stimulation in patients who have previously had a difficult embryo transfer or mock embryo transfer is simple, cost effective and allows a technically easier embryo transfer, and thus helps to achieve a higher pregnancy rate.

References

Submitted on June 13, 2003; accepted on August 15, 2003