Experience of in vitro fertilization surrogacy in Finland

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Background. In vitro fertilization (IVF) surrogacy makes it possible for women who do not have a functional uterus to have their own genetic offspring. We describe here our experience of IVF surrogacy in Finland over a 10-year period.

Methods. This retrospective study included 17 women who underwent ovarian stimulation in connection with surrogacy in 1991–2001 at four clinics. The surrogate mothers were unpaid volunteers: six sisters, three mothers, one husband’s sister, one cousin, four friends and three other volunteers. Thorough counseling was given to the commissioning couples and to the surrogate mothers and their partners. The commissioning couples were prepared to adopt their biological children.

Results. Twenty-eight surrogate IVF cycles were started in 17 women. One couple received donated oocytes. Trans-vaginal oocyte retrieval was feasible in every case, including those five women with congenital absence of the vagina and uterus. An average of 1.8 embryos was transferred at a time, and 11 pregnancies were achieved [50% per fresh embryo transfer (ET) and 16% per frozen-thawed ET]. Nine healthy singletons and one set of twins were born. One pregnancy ended in miscarriage. The mean birth weight of singleton infants was 3498 g (2270–4650 g). The birth weights of the twins were 2900 and 2400 g. In all cases the genetic parents took care of the infant immediately after birth. Two surrogate mothers had postpartum depression.

Conclusions. Altruistic IVF surrogacy works well, but careful counseling of all parties involved is essential.

Key words: adoption; commissioning couple; congenital absence of the uterus; hysterectomy; in vitro fertilization surrogacy

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In vitro fertilization surrogacy (IVF surrogacy) makes it possible for women to have their own genetic offspring among those who have functioning ovaries but who suffer from uterine infertility or have a severe medical condition incompatible with pregnancy. In IVF surrogacy treatment, the genetic mother undergoes ovarian stimulation and oocyte retrieval. The collected oocytes are fertilized in vitro using her partner’s sperm. The surrogate mother carries the pregnancy to term and surrenders the child to the genetic parents (commissioning couple) at birth or shortly thereafter. In vitro fertilization surrogacy should clearly be separated from ‘partial or traditional’ surrogacy, which means that the surrogate mother provides the egg as well.

The first successful IVF surrogacy pregnancy, in
a woman who gestated a genetically unrelated embryo, was reported by Utiyan et al. in 1985 (1). Nowadays, this treatment option is used in North America (2, 3) but it is prohibited by law in many European countries, among them Sweden, Norway, Denmark and Iceland. In Europe, IVF surrogacy is practiced according to legislation only in the United Kingdom and Israel (4, 5). It has also been carried out in Belgium, Finland, Greece and the Netherlands (2). According to international agreement the woman who delivers a child is the mother of the child. In IVF surrogacy arrangements, the biological parents adopt the infants of IVF surrogate mothers after the birth.

Thus far, there are only a few reports describing pregnancy results associated with IVF surrogacy and most treatments have been carried out in the United States (3, 6–10). Meniru and Craft (1997) reported six IVF surrogate pregnancies among 16 genetic mothers in whom hysterectomy had been carried out (7). Corson et al. (1998) treated 75 couples and 37 pregnancies were established in the gestational carriers (8). Goldfarb et al. (2000) reported experience of IVF surrogacy treatment of 112 couples (3). The clinical pregnancy rate (PR) was 19% and the live birth rate 16%. From the United Kingdom, there are some reports of IVF surrogacy outcome (11–13). In Bourn Hall Clinic, 1990–98, 49 patients and 53 surrogate mothers started treatment. The live birth rate per surrogate host was 34% and the live birth rate per genetic couple was 37% (13).

The obstetric and perinatal outcome after IVF surrogacy has been shown to be favorable. According to Parkinson et al. (1999), birth weights associated with singleton pregnancies following IVF surrogacy and standard IVF were similar, whereas multiples born after IVF surrogacy were considerably heavier than those born after standard IVF treatment (9). The incidence of low birth weight was significantly lower in children born after IVF surrogacy than after conventional IVF. The malformation rate in the infants was similar to that of the general population (9). In another study, no speech or motor delays were noted at 2 years of age in IVF surrogacy children (14). No serious case of postpartum depression was documented among 95 surrogates, but five of them showed signs of mild postpartum ‘maternal blues’ (9).

Since the early 1990s sporadic treatments involving IVF surrogacy have been carried out in four different infertility clinics in Finland. The aim of the study was to collect information about these treatment arrangements and to report outcomes achieved over a 10-year period. Several medical, legal and ethical aspects involved in the IVF surrogacy process will be discussed.

Material and methods
This study covers the period between January 1991 and May 2001, during which time 17 couples attempted one or more IVF surrogacy cycles. In addition, one couple is still seeking a surrogate mother after they have succeeded in freezing 13 embryos. Twelve treatments were carried out at the Family Federation of Finland, Helsinki, two at the Felicitas Clinic, Helsinki, two at the Eira infertility clinic, Helsinki and one at Kuopio University Hospital, Department of Obstetrics and Gynecology, Kuopio. Four of the couples came from abroad (two from Sweden, one from Norway and one from Denmark). Data were collected through detailed review of medical records of all subjects who participated in IVF surrogacy treatment.

The mean age of the commissioning mothers was 33 years (range 20–40 years). Five women had Mayer–Rokitansky–Küster–Hauser (MRKH) syndrome. One of them suffered from partial ovarian agenesis in addition to congenital lack of a uterus and vagina and she had developed ovarian failure at the age of 20 years. A functional vagina had surgically been created in this woman. In all other MRKH patients the vagina had been created using mechanical dilators. Five women had had their uterus removed because of severe obstetric complications such as postpartum bleeding and rupture of the uterus (Table I). Three women had had hysterectomy because of a gynecologic disease and two patients had uterine abnormalities (Table I). One couple had gone through six unexplained spontaneous miscarriages. One genetic mother with severe systemic lupus erythematosus had gone through terminations of pregnancy at 6 weeks and at 22 weeks of gestation because of hypertension and kidney complications. Twelve of the males had normospermia, four had mild teratozoospermia or asthenozoospermia and one man had oligoasthenoteratozoospermia.

At all four clinics, a prerequisite of surrogacy treatment was that the commissioning couple arranged their surrogate mother by themselves. One couple had two different gestational carriers. The surrogate mother was mostly a close relative or a near friend of the commissioning couple (Table I). The mean age of the surrogate mothers was 36 years (range 29–52 years). They had successfully delivered at least one child of their own (mean 2.6 per woman) and seven had had sterilization carried out. Most of the surrogate mothers were healthy. One 52-year-old woman had uterine fibroids and mild disturbance of glucose metabolism. One 48-year-old mother had suffered from transient cerebral ischaemia and from migraine. Furthermore, she had gone through neurosurgery because of sci-
Table I. Outcome of IVF surrogacy arrangements in Finland 1991–2001

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Age (years)</th>
<th>No. of IVF stimulations</th>
<th>No. of eggs obtained</th>
<th>Cytocles fertilized</th>
<th>Surrogate</th>
<th>No. of fresh embryo transfers</th>
<th>No. of frozen/thawed embryo transfers</th>
<th>Pregnancy outcome</th>
<th>Embryos in freezer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aplasia vaginae et uteri</td>
<td>31</td>
<td>5</td>
<td>4–27</td>
<td>2–17</td>
<td>volunteer</td>
<td>2</td>
<td>1</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>friend</td>
<td>1</td>
<td>6</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>3</td>
<td>12–18</td>
<td>2–9</td>
<td>sister</td>
<td>1</td>
<td>6</td>
<td>1) miscarriage</td>
<td>2) CS*, 3800 g</td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>1</td>
<td>23</td>
<td>14</td>
<td>cousin</td>
<td>3</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>donated oocytes</td>
<td>8</td>
<td>2</td>
<td>sister</td>
<td>1</td>
<td>PSC†, 3530 g</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Aplasia vaginae et uteri</td>
<td>20</td>
<td>2</td>
<td>1–2</td>
<td>0–2</td>
<td>mother</td>
<td>PSC, 3610 g</td>
<td>CS, 3670 g</td>
<td>6</td>
<td>–</td>
</tr>
<tr>
<td>Aplasia vaginae et uteri</td>
<td>34</td>
<td>1</td>
<td>18</td>
<td>9</td>
<td>friend</td>
<td>1</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Ruptured uterus h 34, infant died, hysterectomy</td>
<td>28</td>
<td>2</td>
<td>12–18</td>
<td>7–13</td>
<td>mother</td>
<td>2</td>
<td>CS, 2270 g</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Ruptured uterus intrauterum, hysterectomy</td>
<td>37</td>
<td>1</td>
<td>26</td>
<td>5</td>
<td>husbands sister</td>
<td>1</td>
<td>PSC, twins 2900 g/2400 g</td>
<td>CS, 2900 g</td>
<td>4</td>
</tr>
<tr>
<td>Postpartum bleeding, hysterectomy</td>
<td>37</td>
<td>1</td>
<td>15</td>
<td>5</td>
<td>sister</td>
<td>1</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Sarcoma uteri, hysterectomy</td>
<td>33</td>
<td>1</td>
<td>12</td>
<td>7</td>
<td>mother</td>
<td>CS, 3020 g</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Adenomyosis, hysterectomy</td>
<td>36</td>
<td>3</td>
<td>0–1</td>
<td>1</td>
<td>volunteer</td>
<td>1</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Cervical cancer, hysterectomy</td>
<td>33</td>
<td>1</td>
<td>17</td>
<td>9</td>
<td>volunteer</td>
<td>1</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Uterus duplex</td>
<td>28</td>
<td>1</td>
<td>9</td>
<td>6</td>
<td>friend</td>
<td>2</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Status</td>
<td>40</td>
<td>2</td>
<td>2–6</td>
<td>2–4</td>
<td>sister</td>
<td>1</td>
<td>CS, 3800 g</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>post resectionem myomae, IVFx6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Abortus</td>
<td>39</td>
<td>1</td>
<td>30</td>
<td>19</td>
<td>sister</td>
<td>1</td>
<td>CS, 4650 g</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>SLE† hypertension, pregnancy contraindication</td>
<td>35</td>
<td>1</td>
<td>9</td>
<td>3</td>
<td>sister</td>
<td>1</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

* Cesarean section.
† Partus sine complications.
‡ Systemic lupus erythematosus.

ata, and treatment of gastric ulcer. She used a mini dose of aspirin during the pregnancy. One surrogate woman had undergone surgery because of toxic goitre and another had been treated for hypothyroidism.

Both the genetic mother and the gestational carrier were medically examined to exclude any contraindication for ovarian stimulation and, respectively, for pregnancy. All parties, including the male partners of the surrogates, underwent thorough counseling carried out by an independent psychologist, and/or a psychiatrist. The surrogate and her partner were given thorough advice on how to prepare the children for the fact that their mother was going to have a child which would be given away to his/her biological parents. Subjects from abroad had psychological counseling in their home country.

The adoption guidance is an important part of the treatment process. The genetic parents and the surrogate mother contacted the adoption agency before the treatment was started. In Finland, the children involved have legally been transferred to the commissioning couple in two different ways. In
most cases the biological father of the child received the infant immediately after delivery and the biological mother later adopted her child. Based on recommendations from the Finnish adoption authorities, this practice changed in 1998 and since then both the biological mother and father have adopted the child. The adoption procedure can be completed at the earliest 2 months after the birth of the child. In practice all commissioning parents have taken care of the child immediately after his/her birth.

If there was nothing to prevent the adoption plans, treatment was commenced at the infertility clinic. If pregnancy started, both the genetic couple and the surrogate were offered the possibility to continue psychological counseling during the pregnancy and after the birth of the child. The treatments were carried out on an altruistic basis and without commercial involvement. All expenses incurred by the surrogate mother were fully reimbursed by the prospective parents.

Stimulation protocol

The genetic mothers underwent ovarian stimulation after pituitary down-regulation with a gonadotropin-releasing hormone agonist (GnRHa) started in the mid-luteal phase of the previous menstrual cycle. The date of ovulation was determined either by ultrasonography or by urine ovulation tests. If necessary, the mid-luteal phase was determined by repeated progesterone measurements. When suppression was achieved, ovarian stimulation was performed using either urinary or recombinant gonadotropins. Three women underwent a total of nine cycles with human menopausal gonadotropin (HMG), 150–225IU daily. Three women had highly purified follicle-stimulating hormone (FSH), 225–3001U per day, in four treatment cycles. In all other cycles, recombinant FSH, 150–450IU daily, was used. All cycles were monitored using transvaginal ultrasonography and by assay of serum estradiol. Human chorionic gonadotropin (HCG) was administered when the diameter of at least two leading follicles had reached 18 mm. Ultrasound-guided transvaginal collection of oocytes was carried out 36h after HCG administration. Standard techniques for IVF were used in fertilization of the oocytes.

In the early 1990s the first four replacements of fresh embryos were carried out in a natural cycle. Thereafter, synchronization between the biological mother and the surrogate was achieved using pituitary desensitization with GnRHa and hormone replacement therapy (HRT) in the surrogate (15). The surrogate mothers used 4–6mg estradiol valerate/day, and vaginally administered natural progesterone, 600mg/day, starting 2–4 days (in one case 6 days) before embryo transfer (ET). Ultrasonography to determine endometrial thickness was carried out on the 10th estrogen day and, if needed, the dose was modified. If pregnancy started, HRT was continued up to the end of the 12th week of gestation.

Surplus embryos were frozen, using propanediol-sucrose as a cryoprotectant. Frozen/thawed embryos were transferred in either natural or HRT cycles.

Results

A total of 28 IVF surrogate cycles were started in 17 couples. Two cycles were cancelled due to unresponsiveness of the ovaries in one case. One couple received eight donated oocytes. An average of 13.2 oocytes (329/25) (range 1–30 oocytes) were collected. The fertilization rate was 53.2% (175/329). On average, 1.8 fresh and 2.1 frozen/thawed embryos were transferred at a time and 11 pregnancies were achieved (Table I). The ongoing PR/fresh ET was 50.0% (8/16) and the clinical PR/frozen-thawed ET was 15.8% (3/19). The implantation rate of fresh embryos was 33.3% (9/27). The live birth rate/surrogate mother was 55.6% (10/18) and the live birth rate/genetic couple was 58.8% (10/17). Eleven infants (nine singletons, one pair of twins) were born and one pregnancy ended in miscarriage. Obstetric complications noted were hypertension (1), placental insufficiency (1), and disturbance of glucose metabolism (2). Elective cesarean section was carried out in seven of 10 labors (70%). The mean birth weight of singleton infants was 3498g (2270–4650g). The birth weights of the twins were 2900 and 2400g.

In all cases the genetic parents took care of the infant immediately after birth. Two surrogate mothers, to our knowledge, suffered from postpartum depression, one of whom needed antidepressants and psychotherapy.

Discussion

This study comprised all cases of IVF surrogacy performed in Finland over a 10-year period. Furthermore, there have been at least three cases of IVF surrogacy arrangement, which have been rejected by the infertility clinic. The reasons for not treating these couples were contraindications as regards ovarian stimulation in the genetic mother, or disease in the proposed surrogate. In addition to the reported cases there have been a few inquiries about surrogacy treatment, some of which have come from other Nordic countries.

Infertility due to congenital absence of the
utero is uncommon but it does exist. There will always be some girls born without a functioning uterus but with completely normal ovarian function. The prevalence of M R K H syndrome has been reported to be one in 4000–5000 female births (16). In Western countries life-threatening obstetric complications seldom occur, but when the uterus ruptures during pregnancy or delivery, it is usually a very great family tragedy as it often leads to death of the infant, as in three of our families. Such healthy women who have lost their uterus can be helped by IVF surrogacy.

In this study, individuals with congenital absence of the uterus, and hysterectomized women, mostly responded well to ovarian stimulation. In both groups there were only a few poor responders. Meniru and Craft (1997) demonstrated varying patterns of ovarian response in women who had undergone hysterectomy (7). Goldfarb et al. (2000) found that among women with congenital absence of the uterus, significantly more oocytes were retrieved than among those who had undergone hysterectomy (3). Because of the small number of treatment cycles in the present material, further comparisons cannot be made. It is worth mentioning that there were no difficulties in transvaginal oocyte retrieval in the women with M R K H syndrome.

We achieved a pregnancy rate of 50%/fresh ET and all pregnancies after fresh embryo transfer ended with the birth of healthy infants. In the United States, where mostly at least three embryos are transferred at a time, ongoing pregnancy rates of 19–38% per ET have been reported (3,6–9). Brinsden et al. (2000) reported 18 ongoing/delivered pregnancies out of 87 ETs (21%). In the United Kingdom the success rates tend to be more limited than in standard IVF (13).

The high PR appears to reflect a well-functioning hormone replacement protocol, adapted from our oocyte donation program (15). In the early 1990s the first fresh embryos were transferred in natural cycles and all these attempts were unsuccessful because of inadequate endometrial synchronization. With pituitary desensitization and HRT the pregnancy results have been excellent (66.7%; 8/12 fresh ETs).

In all treatments the commissioning couples arranged their surrogate mother themselves. In most cases the surrogate was a close relative. Three of them were genetic mothers (of 42, 49, and 52 years) of the female subjects. The health risks of the surrogate mother increase considerably with increasing age of the woman. It is of great importance that the surrogate mother is healthy and does not suffer from any disease which might have adverse effects on the course of the pregnancy. However, after careful consideration, a 49-year-old woman with previous cerebral ischaemic disturbances was accepted as a gestational carrier. She managed well during pregnancy and she underwent a cesarean section at 35 weeks of gestation because of signs of placental insufficiency.

In vitro surrogacy is regarded as controversial in many societies, and several countries have drawn up laws to prohibit the practice. The objections are based on concern that it involves a risk of exploitation of women and that the surrogate mother will be exposed to real, albeit usually slight risks of medical, physical and mental complications (17). There has also been fear of unexpected complications as regards the parenthood of the child involved. In the United States such complications have occurred when the carrier has also provided the egg. Such an arrangement is, of course, a completely different situation from IVF surrogacy. It has also been suspected that a couple may not want to have the child if he/she is not healthy. It is difficult to imagine that couples with a long-lasting desire for a child would not accept their offspring. Legally, it must be remembered that the biological father is also the official father (18).

The circumstances involved in IVF surrogacy bring up many unique ethical issues. The process involves many parties, not only the intended parents but also the surrogate mother, her partner and children. All parties of the surrogacy arrangement should be assessed with extreme care and offered adequate counseling. It is important to ensure that the decisions made by the surrogate are based on deep considerations. The medical team should be alert to any change in behavior in the surrogate and recognize signs, which may indicate a wish to withdraw. During pregnancy there may be conflicting interests between the carrier and the genetic mother, for example as regards mode of delivery, or a pregnancy complication. In two of the present cases the genetic parents strongly affirmed that cesarean section should be carried out on the surrogate. Both couples had previously lost a child in connection with delivery. Their tragic obstetric history makes it easy to understand such wishes. However, in pretreatment counseling obstetric history makes it easy to understand such wishes. However, in pretreatment counseling all parties but also the surrogate mother, her partner and children. All parties of the surrogacy arrangement should be assessed with extreme care and offered adequate counseling. It is important to ensure that the decisions made by the surrogate are based on deep considerations. The medical team should be alert to any change in behavior in the surrogate and recognize signs, which may indicate a wish to withdraw. During pregnancy there may be conflicting interests between the carrier and the genetic mother, for example as regards mode of delivery, or a pregnancy complication. In two of the present cases the genetic parents strongly affirmed that cesarean section should be carried out on the surrogate. Both couples had previously lost a child in connection with delivery. Their tragic obstetric history makes it easy to understand such wishes. However, in pretreatment counseling obstetric history makes it easy to understand such wishes. However, in pretreatment counseling all parties should be made aware of the fact that the mode of delivery in the surrogate will be handled according to obstetric indications.

In Finland all surrogate mothers are altruistic volunteers. The motivation for participation is based on a true wish to help a less fortunate relative or a close friend. In the literature this form of arrangement has been called ‘compassionate family surrogacy’ (17). According to legislation in the United Kingdom also, it is possible for a member of the family or a close friend to be a surrogate.
mother. On the other hand, in Israel, the surrogate mother should be single or divorced, anonymous and not a relative of either of the parents. It is thought that this avoids any potential pressure on relatives to become surrogates, and subsequent complications within the family (4).

At our units we have not encountered any real adverse outcome, medically or socially, with the exception of unhappiness and disagreement between two sisters immediately before and after delivery. By means of careful psychological support the situation was resolved, but the surrogate mother suffered from severe depression in the postpartum period and needed antidepressive medication and psychotherapy. Another surrogate mother (biological mother to the commissioning woman) was also depressed after delivery, but she needed no additional treatment for this. In an earlier report, Parkinson et al. (1998) documented the fact that five of 95 surrogate mothers were mildly depressed in the postpartum period (9). The risk of depression after delivery is obvious and our experience indicates the importance of careful counseling, not only during treatment and pregnancy but also in the postpartum period.

Preparation of all persons involved in IVF surrogacy treatment takes time and treatment should not be started until thorough counseling and proper assessment of the surrogacy arrangements have been carried out. Adoption guidance is also a vital part of the process. The collaboration with adoption counselors is a new approach, which increases the openness of this treatment and could be recommended also to other countries. Not all risks can be totally excluded. However, in our experience IVF surrogacy has shown a high success rate and a gratifying outcome for all parties involved.

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References


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