SHORT COMMUNICATION

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Successful Pregnancy and Delivery Following Combined Treatment of In Vitro Maturation (IVM) and Testicular Sperm Extraction (TESE): A Case Report

Submitted July 12, 2004; accepted July 19, 2004

Purpose: To report the efficacy of the combined treatment of in vitro maturation (IVM) and testicular sperm extraction (TESE).

Methods: A couple in which the wife had polycystic ovarian syndrome and the husband had severe oligozoospermia. Oocytes were cultured in vitro for maturation followed by oocytes pickup with natural cycle, and TESE was undergone for husband. Matured oocytes were fertilized by intracytoplasmic sperm injection, and two embryos were transferred to wife's uterine.

Results: This case was achieved during pregnancy and delivery of a healthy female infant.

Conclusions: The combined treatment of IVM and TESE was effective for this couple's specific infertility factors.

KEY WORDS: In vitro maturation (IVM); polycystic ovarian syndrome (PCOS); severe oligozoospermia; testicular sperm extraction (TESE).

INTRODUCTION

A patient with the polycystic ovarian syndrome (PCOS) has a high possibility of developing the ovarian hyperstimulation syndrome (OHSS) following ovarian stimulation. Furthermore, since the androgen level is high in these patients, it may have a negative influence on oocyte maturity within the ovary (1). Thus, in vitro maturation (IVM) of immature oocytes from PCOS patients is advantageous for the elimination of this problem. Since IVM does not involve ovarian stimulation, it avoids OHSS; furthermore, it may improve the environment for oocyte maturity. In addition, the procedure has been estab-

lished for testicular sperm extraction (TESE) followed by intracytoplasmic sperm injection (ICSI); this procedure (TESE-ICSI) is efficacious for the treatment of an infertile couple with azoospermia. TESE was found to be equally effective in azoospermia secondary to either a maturation arrest or a Sertoli cell only syndrome (2,3). In our clinic, TESE-ICSI may be performed not only for azoospermia but also for severe oligozoospermia. This report revealed that the combined treatment of IVM and TESE-ICSI was efficacious for a couple with PCOS and severe oligozoospermia; a successful pregnancy outcome ensued.

CASE REPORT

A 25-year-old man and a 20-year-old woman were married in April 1997; subsequently, the husband was diagnosed with severe oligozoospermia and Chinese medicine was prescribed. Following this treatment, the sperm count increased to $1 \times 10^6/\text{mL}$; a natural pregnancy ensued, and in November 1998, she delivered a live infant. She failed to conceive again, despite two IUI cycles in 2000. A testicular biopsy was performed in August 2000 and he was diagnosed as a maturation arrest. Subsequently, in 2001–02, three cycles of intracytoplasmic sperm injection (ICSI)-embryo transfer (ET) were done; however, one cycle was an oocyte pickup (OPU) cancellation and another cycle was an ET cancellation.

The couple presented at our clinic in 2002; the wife was diagnosed as having PCOS on the basis of an ultrasound examination and hormonal levels 5 days after the onset of menses (LH, 11.7 mIU/mL; FSH, 10.2 mIU/mL; PRL, 37.3 ng/mL; T, 1.4 ng/mL). The semen analysis revealed no sperm on the Makular chamber, but sperm were found on the slide glass; the motility was 34.2%, and the abnormal morphology was 46.5%. In addition, the husband's FSH values were high (21.2 mIU/mL), and the testes measured 10 mL on the right and 8 mL on the left by orchid meter. His chromosome analysis was normal (46, XY). From these results, he was diagnosed as severe oligozoospermia.

The first OPU was conducted at our clinic in June 2002. The ovaries were stimulated using the GnRH antagonist method; three oocytes were retrieved, and one was a metaphase II (MII) oocyte. Although ICSI was performed on this oocyte fertilization occurred, cleavage did not occur; thus, the cycle was deemed an ET cancellation.

The second OPU was conducted at our clinic in March 2003; ovarian stimulation was not performed, but the retrieved oocytes from this natural cycle were subjected to IVM. We prepared the IVM media, using a modified method described by Cekleniak *et al.* (4). Eight oocytes were retrieved, and four MII oocytes were present 24 h after IVM. They were subjected to ICSI and although three were fertilized, cleavage was minimal, and the cycle was deemed an ET cancellation.

The third OPU was conducted at our clinic in June 2003; as in the previous cycle, ovarian stimulation was not performed; however, OPU with a natural cycle and IVM were conducted. Moreover, TESE was conducted (sperm was found in the testicular interior) and ICSI was performed using the testicular sperm. The Jhonsen's Score of the testicular biopsy was 4.8. A total of 13 oocytes were retrieved, and 7 were MII 24 h after IVM. Fertilization occurred in six of the seven oocytes. All of the six cleaved on the day following fertilization confirmation. Embryo transfer was conducted using the two best quality embryos (both four cells). The serum hCG value on 14 days after OPU was 266.9 mIU/mL. At 5 weeks and 4 days, a gestational sac was visualized; and at 7 weeks and 4 days, a fetal heartbeat was detected. In February 2004, at 37 gestational weeks, the patient delivered a healthy, 3170 g, female infant, by cesarean section.

DISCUSSION

Since PCOS patients have numerous ovarian follicles, OHSS often occurs after ovarian stimulation. Moreover since the androgen level is elevated in these patients, oocytes growth is affected. IVM is performed on this type of patient, and the literature contains many reports of subsequent successful pregnancy outcomes (5–10). Moreover, in azoospermic patients, performing TESE and ICSI using testicular sperm has become routine in most clinics. However, this case revealed that TESE is effective for patients with both azoospermia and severe oligozoospermia. In this case, the wife had PCOS and the husband had severe oligozoospermia. To the best of our knowledge, this is the first report of the combined treatment of IVM and TESE-ICSI.

In vitro matured oocytes contain more immature cytoplasm than those matured in vivo, and it has been suggested that this affects embryo growth. The rate of embryo growth in IVM is lower when compared with

cases of retrieved MII oocytes subjected to IVF (11). This may be a reason why IVM has not come into widespread usage. Despite research on determining the most appropriate culture medium for the maturation of oocytes both in vivo and IVM (12–14), a definitive culture medium has not been found. Since nuclear and cytoplasmic maturity is delayed, various animal studies are ongoing (15–17). These studies provide hope for the future. In IVM, ovarian stimulation is not performed; thus, this procedure mitigates a physical, mental, and economic burden for these patients. With the establishment of IVM technology, in vitro fertilization methodology can be expected to markedly change.

The material extracted in TESE contains immature forms, such as the round spermatid (18). However, when an ejaculated specimen contains minimal sperm and/or good-quality embryos are not obtained with ICSI using ejaculated sperm, as in this case, it will be efficacious to obtain sperm from the testicular interior. Moreover, since this case used immature oocytes in addition to TESE, it has significant biological impact.

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