

# Successful live birth after rescue ICSI following failed fertilization

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## ABSTRACT

In a conventional IVF cycle unexpected complete fertilization failure may occur in 10-25% of infertile women. To overcome this barrier of fertilization failure, some investigators have suggested intracytoplasmic sperm injection (ICSI) on day 1 of an unfertilized mature oocyte, the so called "rescue ICSI". We report a case of fertilization failure followed by rescue ICSI resulting in a live birth. Although the success of rescue ICSI is still questionable, this procedure is worth an attempt in order to give the best chance to the couple in that cycle.

**KEY WORDS:** Fertilization failure, pregnancy, rescue ICSI

## INTRODUCTION

Total failure of fertilization after conventional *in vitro* fertilisation (IVF) is documented in around 10-25% of cycles.<sup>[1]</sup> To overcome this barrier of fertilization failure, some investigators have suggested ICSI on day 1 of an unfertilized mature oocyte, the so-called "rescue ICSI".<sup>[2-5]</sup> Factors leading to failed fertilization are defective oocyte, abnormal sperms, improper stimulation protocol, environmental factors, or combination of any of these. Traditional techniques which have been used for managing failed fertilization are partial zona dissection, subzonal insemination, and re-insemination but all of these have shown depressed results. Rescue ICSI is being performed in an attempt to salvage such an event. The pregnancy rate after rescue ICSI are lower than fresh ICSI due to *in vitro* aging of the oocytes, poor quality of embryos, and higher incidences of cytogenetic abnormalities in the resulting embryo have been reported when the time interval between oocytes retrieval and fertilization is increased.<sup>[6-11]</sup> An asynchrony between embryo development and endometrial secretory pattern can be a contributing factor as well. Between May 2007 and May 2012, 37 rescue ICSI procedures have been performed; of these four patients have conceived with one live birth. We report a case of fertilization failure in IVF cycle, rescued with ICSI resulting in a live birth.

## CASE REPORT

A 32-year-old patient presented to us with unexplained infertility for 6 years, she had previous six failed ovulation induction (OVI) with intrauterine insemination (IUI). After performing all baseline investigations including detailed semen analysis, she was recruited for IVF under agonist protocol. Downregulation was started in mid-luteal phase using luperide 1 mg daily for 14 days followed by stimulation with recombinant FSH 300IU (Gonal F-Merc serono) daily for 9 days after which eight follicles of 17-19 mm were seen with E2 level of 2317 pg/ml. Ovulation trigger was given with HCG 10000 IU and 36 hours later total 6 oocytes were retrieved under general anesthesia by transvaginal ultrasound-guided aspiration. The cumulus-oocytes complex was inseminated 4 hours after ovum pick up with 70000 motile spermatozoa in a 50- $\mu$ l embryo culture medium microdroplets under mineral oil and examined for 18 hours postinsemination. None of the oocytes showed any signs of fertilization i.e., presence of two pronuclei (2 PN) and two polar bodies therefore after an informed consent decision was taken to perform rescue ICSI on day 1 with sperm from day 0 insemination. Four oocytes were injected and three of them showed 2 PN. Three good quality embryos (two 6-celled and one 4-celled) were transferred on day 3 after rescue ICSI. Progesterone supplementation

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was started from the day of oocyte retrieval in the form of intramuscular micronized progesterone 100 mg daily. Serum  $\beta$ -HCG level on 16<sup>th</sup> day after embryo transfer was 502 IU/L. A clinical pregnancy was confirmed at 6 weeks by a positive fetal heart beat on transvaginal sonography. Her antenatal course was uneventful. She underwent lower segment Cesarean section at 38 weeks in view of patients' choice and delivered a healthy normal baby weighing 2.7 kg. The baby is now 3 years of age with normal developmental milestones.

## DISCUSSION

Fertilization is a complex procedure involving an interaction between sperm and oocytes. For a couple it may be disappointing if there is no embryo transfer due to total fertilization failure during an IVF cycle. In such a case rescue ICSI may be attempted to salvage an IVF cycle by increased fertilization with an ensuing embryo formation. Rescue ICSI can result in good fertilization rates but it may not translate into pregnancy. This poor outcome can be attributed to oocyte aging as oocyte have an optimum period for fertilization that results in viable embryos.

Fertilization failure is a known complication of conventional IVF cycles which not only causes psychological trauma to the infertile couple but also increases the economical burden. Rescue ICSI was introduced in 1993<sup>[12]</sup> to overcome this catastrophe of failed fertilization but it remains controversial till date. Some studies have not proved it to be beneficial;<sup>[13]</sup> however, the success rate following rescue ICSI in terms of achieving fertilization is 28-60% with a pregnancy rate as high as 38%.<sup>[14]</sup> The outcome of rescue ICSI is uncertain due to aged oocyte, poor embryo quality, and chances of cytogenetic abnormality but still it can be performed as the last ray of hope in case of failed fertilization.

At our center, fertilization failure is seen in approximately 12-15% cases of conventional IVF cycles. We routinely perform ICSI in all the cases of male factor infertility and cases with previous failed IVF but not infertile couple with unexplained infertility. This is not only time consuming but also overcome the selection barrier and affects quality of embryo. However, as seen in this case of unexplained infertility rescue ICSI proved to be a boon for this couple. Now we have started performing routine ICSI with IVF in all cases of unexplained infertility.

## CONCLUSIONS

Based on our experience, we conclude that though the

success of rescue ICSI is still questionable, this procedure is worth an attempt in order to give the best chance to the couple in that cycle.

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