

# Conventional oocyte insemination may result in a better pregnancy outcome than intracytoplasmic sperm injection (ICSI) for unexplained infertility

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## Summary

**Purpose:** To determine in cases of unexplained infertility whether conventional oocyte insemination vs intracytoplasmic sperm injection results in differences in fertilization rates, frequency of failed fertilization, clinical and live delivered pregnancy rates, and implantation rates. **Methods:** Retrospective evaluation of these parameters in couples undergoing in vitro fertilization embryo transfer (IVF-ET) (minimum 2 embryos) in women with unexplained infertility over a 7-year period. **Results:** There was a significantly higher fertilization rate ( $p < .001$ ) with ICSI vs conventional insemination (73.7% vs 63.7%). However of greater clinical importance, the clinical and live delivered pregnancy rates were significantly higher with conventional insemination (52.7% and 46.2%) than with ICSI 33.6% and 29.0%. The implantation rates were also significantly higher with conventional oocyte insemination (24.9% vs 17.8%). Failed fertilization was low in both groups. **Conclusions:** The process of ICSI, whether it involves possible subtle oocyte damage by the procedure or the andrologist not choosing the ideal sperm, may lead to embryos that are less hearty despite their normal appearance.

**Key words:** Unexplained infertility; Intracytoplasmic sperm injection; In vitro fertilization; Conventional insemination.

## Introduction

One of the reasons for performing in vitro fertilization-embryo transfer (IVF-ET) is unexplained infertility. One theoretical benefit of IVF for unexplained infertility is to bypass possible defective fallopian tubes despite their apparent normal appearance. Another possibility is that somehow despite apparently normal sperm concentration and motility and morphology, sperm do not reach the oocyte for fertilization or for some reason need more sperm than the normal amount to bind to the zona pellucida to allow fertilization.

However, another possible cause of unexplained infertility may be the failure of the sperm to bind to the zona pellucida. For this reason many IVF centers will fertilize the oocytes by intracytoplasmic sperm injection (ICSI) rather than risk failed fertilization. There is a theoretical downside, however, of empirically using ICSI in that it may be that the zona pellucida has the capacity to select a more ideal sperm than the andrologist/embryologist.

The purpose of the present study was to compare pregnancy outcome for cases of unexplained infertility when IVF-ET was performed using conventional insemination of oocytes vs ICSI.

## Materials and Methods

A retrospective review over a 7-year period was performed. Couples aged  $\leq 43$  with unexplained infertility were given the option of performing ICSI or not.

To be considered unexplained infertility, the couple had to have a minimum of one year of infertility, with a semen analysis demonstrating a concentration of  $20 \times 10^6/\text{ml}$ , 40% motility with at least 10% with linear progressive motion, strict morphology  $> 4\%$ , absence of antisperm antibodies, and a hypo-osmotic swelling test score  $\geq 50\%$ . The female partner (with or without corrective measures) had to demonstrate a mature follicle, oocyte release by ultrasound, patent tubes by at least hysterosalpingogram, normal post-coital test and in-phase endometrial biopsy in the late luteal phase.

The main reason for not performing ICSI was to save money on the extra expense from ICSI. Parameters evaluated included fertilization rate and the rate of fertilization failure, clinical and delivered pregnancy rates, and implantation rates according to whether ICSI was performed or not. Only transfers with two or more embryos were evaluated.

## Results

There were 107 transfers with ICSI vs 91 without ICSI. Thus 54% chose ICSI. Failed fertilization occurred in three couples in both groups ( $p = \text{NS}$ ). The fertilization rate was 73.7% in the ICSI group vs 63.7% in the non-ICSI group ( $p < .001$ ).

The average number of embryos transferred was 3.2 in each group. The clinical and delivered pregnancy rates for those having ICSI was 33.6% and 29.0% vs 52.7% and 46.2% for those having conventional inseminations ( $p < .007$ , and  $p < .02$ , respectively). The respective implantation rates were 17.8% and 24.9% ( $p < .02$ ).

The data divided into four age groups are shown in Table 1.

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Table 1. — Fertilization, pregnancy and implantation rates according to age based on method of oocyte fertilization.

	Unexplained with ICSI					Unexplained without ICSI				
	Total	≤ 35	36-39	40-42	≥ 43	Total	≤ 35	36-39	40-42	≥ 43
# transfers ≥ 2 ETs	107	52	43	8	4	91	45	40	6	0
# eggs retrieved	1937	1122	641	124	50	1725	945	625	154	1
# fertilized	1123	670	361	69	23	1078	606	373	99	0
% fertilized	73.7	76.2	70.4	74.2	59.0	63.7	64.8	61.2	66.9	0.0
Average # of embryos transferred	3.2	2.8	3.3	4.1	5.3	3.2	2.8	3.6	4.0	0
# implanted	61	35	22	2	2	73	38	27	8	0
% implanted	17.8	23.6	15.6	6.1	9.5	24.9	29.9	19.0	33.3	0
# of clinical pregnancies	36	18	14	2	2	48	26	17	5	0
Clinical pregnancy rate/transfer (%)	33.6	34.6	32.6	25.0	50.0	52.7	57.8	42.5	83.3	0
# live deliveries	31	18	10	2	1	42	23	14	5	0
Live delivery rate/transfer (%)	29.0	34.6	23.3	25.0	25.0	46.2	51.1	35.0	83.3	0

## Discussion

Fertilization of eggs by ICSI for unexplained infertility may result in more embryos for transfer as determined by a significantly higher fertilization rate. Nevertheless, the percentage of couples failing to fertilize any embryos was similar and uncommon (2.8% with ICSI vs 3.2% without ICSI).

However this may be at the expense of a decreased implantation potential of these embryos. A similar finding was found when conventional insemination vs ICSI was compared following fertilization with sperm with low quality morphology as determined by strict criteria [1].

These data suggest that the process of ICSI may result in a less hearty embryo than when fertilized with conventional insemination. Though one should be cautious about the conclusions from a retrospective study involving only 198 cases, this information can be provided to a patient and allow them to participate in the decision to perform ICSI or not.

At least the fear that conventional insemination could lead to a greater risk of failed fertilization can be allayed by this study. The process of ICSI increases the expense for the patient and intensifies the work load for the embryologist. If future prospective studies fail to support

the conclusion for higher pregnancy and implantation rates with conventional oocyte insemination vs ICSI for unexplained infertility, there is little likelihood that prospective studies will yield opposite results, and therefore will probably show that conventional oocyte insemination is at least as good as ICSI for unexplained infertility. Thus at a minimum the couple could save money.

Should these conclusions about superiority of conventional insemination be confirmed the possibility exists that the zona pellucida can select a sperm that is more likely to produce a better embryo than the andrologist or embryologist.

## References

- [1] Check J.H., Bollendorf A., Wilson C., Summers-Chase D., Horwath D., Yuan W.: "A retrospective comparison of pregnancy outcome following conventional oocyte insemination vs. intracytoplasmic sperm injection for isolated abnormalities in sperm morphology using strict criteria". *J. Androl.*, 2007, 28, 607.

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