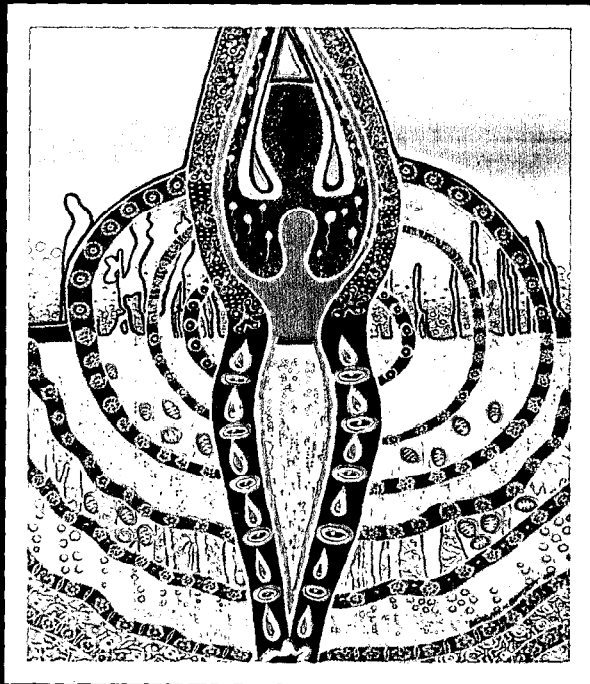


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A Comparison of Survival, Pregnancy, and Implantation Rates of Cryopreserved/Thawed Embryos that Were Formed by Conventional Insemination Versus Intracytoplasmic Sperm Injection (ICSI)

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Summary

A comparative study was conducted to determine if embryos fertilized by intracytoplasmic sperm injection (ICSI) were less likely to survive the rigors of the cryopreservation process than embryos cryopreserved following conventional in vitro fertilization (IVF) insemination. The survival, pregnancy rates (PRs) and implantation rates of 73 frozen embryo transfer (ET) cycles in which all the embryos were inseminated by ICSI were compared to those of 125 frozen ET cycles in which all embryos were inseminated by conventional insemination. There was no difference found between the rates by insemination method. The survival rates were 94.6% for ICSI and 91.7% for standard IVF. For ICSI cycles, the clinical PR and implantation rate were 42.5%, 20.0%, respectively; for standard IVF, the rates were 50.4% and 19.7%. These data demonstrate no detrimental effect of cryopreservation on embryos fertilized by ICSI when compared to embryos fertilized by standard IVF.

Introduction

There have been conflicting reports in the literature as to the ability of

embryos fertilized through ICSI to survive the rigors of cryopreservation and thawing. The first study performed (1) reported low survival and implantation rates for ICSI embryos. There have been reports with good survival but poor implantation (2), lower survival and PRs than conventional IVF (3), and comparable survival and implantation rates for both methods of insemination (4-6).

The objective of this study was to compare the outcome of a recent series of frozen ET cycles by insemination method used to help resolve the conflicting reports in the literature. This series has been done since changes in the transfer technique at our center have resulted in a significant improvement in PRs and implantation rates, and we wanted to determine in a larger series if these changes would alter our previous conclusions that the PR following transfer of embryos obtained by ICSI is comparable to PRs following frozen ET of embryos obtained by conventional insemination (4).

Materials and Methods

A retrospective comparative study was performed in which all frozen ET cycles performed between January 1, 1997 and August, 1998 were reviewed. Cycles were included in the study if the patient received only hormone replacement in preparation for ET and all embryos transferred were cryopreserved following fertilization with ICSI (n=73 cycles) or standard IVF insemination methods (n=125). The process of conventional insemination and ICSI were performed as previously described (4).

Embryos were cryopreserved and thawed using a simplified method (4). The protocol for frozen ET included graduated increments of oral estradiol (E2) until a follicular phase of at least 2 weeks was achieved in conjunction with an endometrial lining of at least 8mm with a trilaminar echo pattern. Intramuscular progesterone (P) was then started and ET occurred on the fourth day of P therapy. Embryos were transferred using a Wallace catheter with ultrasound guidance.

The main outcome measures were survival rates, clinical PRs and implantation rates. Survival was defined as the embryo being intact 24 hours following thaw. Clinical pregnancy was defined as sonographic confirmation of a gestational sac in the uterus. Statistical analysis included chi-square test to compare the rates by insemination method and t-test to compare the age and number of embryos transferred by insemination method. A p value of .05 was used.

Results

The groups did not differ by mean age (33.0 ± 5.0 for ICSI, 33.9 ± 4.5 for IVF), number of embryos thawed (4.9 ± 1.7 for ICSI, 5.1 ± 1.7 for IVF), nor by the number of embryos transferred (3.4 ± 1.0 for ICSI, 3.7 ± 1.1 for IVF). The survival rates were similar in the two groups both for embryos cryopreserved

Table 1 - Comparison of outcome measures by insemination method

	ICSI (n=73)	Conventional IVF (n=125)
Age (years)	33.0±5.0	33.9±4.5
Number of embryos		
Thawed	4.9±1.7	5.1±1.7
Transferred	3.4±1.0	3.7±1.1
Survival rates		
All embryos	94.6% (336/355)	91.7% (585/638)
Pronuclear	96.6% (284/294)	95.6% (434/454)
Multi-cell	85.2% (52/61)	82.1% (151/184)
Clinical PRs	42.5% (31/73)	50.4% (63/125)
Implantation rate	20.0% (50/25)	19.7% (91/462)
SAB rate/clinical pregnancy	12.9% (4/31)	15.9% (10/63)

at the pronuclear stage and those cryopreserved at the multi-cell stage (Table 1).

There was no significant difference in the clinical PR nor implantation rate by insemination method ($P=NS$, chi-square). The clinical PR for the ICSI group was 42.5% and the implantation rate was 20.0%. For the conventional group, the clinical PR was 50.4% and the implantation rate was 19.7%. The spontaneous abortion rate was also comparable in the two groups (12.9% for ICSI and 15.9% for IVF, $P=NS$, chi-square).

Conclusions

These data corroborate the conclusion reached by Al-Hasani et al (5) and Kowalik et al (6) that fertilization by ICSI does not compromise success following frozen ET even though a different method of cryopreservation (4) was used in the study presented here. The data supports our previous conclusions despite using a different transfer technique (4); PRs have thus increased following frozen ET using the new method regardless of method of fertilization.

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