

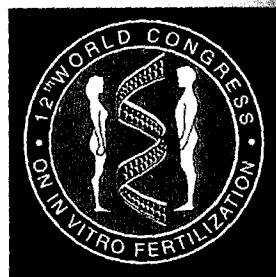
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Anibal A. Acosta



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Overnight Sperm Survival Test Does not Correlate with Embryo Implantation Failure

K. Swenson, J.H. Check, D. Summers-Chase, M.L. Check,
D. Kiefer and J.K. Choe

*The University of Medicine and Dentistry of New Jersey
Robert Wood Johnson Medical School at Camden
Cooper Hospital/University Medical Center
Department of OB/GYN, Division of
Reproductive Endocrinology & Infertility, Camden, NJ, U.S.A.*

Summary

A subnormal sperm stress test has also been associated with implantation failure despite apparently normal fertilization. However this test is cumbersome and time consuming. The overnight sperm survival test has been considered to possibly demonstrate lipid peroxidation abnormalities similar to the sperm stress test. The present study evaluated whether lower overnight survival scores were associated with lower pregnancy and implantation rates following in vitro fertilization-embryo transfer. The results showed no adverse effect of poor overnight survival test scores. Possibly, the overnight survival test though similar in some respects to the sperm stress test is not similar for properties of predicting embryo implantation defects. Corroboration that subnormal stress tests predicts implantation disorders is needed.

Introduction

Some sperm abnormalities, e.g., a subnormal hypo-osmotic swell-

ing test (HOST) allow normal fertilization rates and embryo formation but inhibit embryo implantation (1-3). Another test that has claimed to be a predictor of embryo implantation disorders without adversely affecting fertilization is the stress test (4).

Some have considered the sperm survival test as a simpler test than the stress test but with possibly the same potential to predict implantation disorders (5). The rate of motility loss in vitro of human sperm is correlated with the rate of endogenous lipid peroxidation at temperatures between 24 and 40°C (6). Lipid peroxidation causes extensive damage to the plasma and acrosomal membranes leading to loss of permeability and leakage of pyridine nucleotides, which impairs sperm motility (7-9). The study presented here evaluated if embryo implantation rates correlated in a negative way with sperm that had <70% of the baseline motility after evaluation close to 24 hours later compared to the sperm used to inseminate the oocytes.

Materials and Methods

An aliquot of sperm that had been used to inseminate oocytes for in vitro fertilization-embryo transfer (IVF-ET) was allowed to incubate in human tubal fluid at room temperature overnight. The percentage of sperm motility with linear progression was compared to the motility on the previous day. Pregnancy rates (PRs) and implantation rates were compared to whether there was a $\geq 30\%$ decrease in motility (group 1) or <30% change (group 2). Cycles where intracytoplasmic sperm injection (ICSI) was performed were excluded from the study.

Results

Clinical pregnancies (ultrasound evidence of intrauterine pregnancies) were found in 51.5% of the 399 group 1 patients vs 41.0% of the 551 group 2 patients ($p > .05$). The miscarriage rate was 7.9% for group 1 patients vs 14.6% of group 2 patients. Multiple gestations were found in 45.1% of group 1 patients vs 46.0% group 2 patients.

Conclusions

There has been some debate as to whether all IVF cycles should use ICSI rather than conventional insemination of the oocytes in case failed or poor fertilization occurs. However, the majority opin-

ion is that unpredicted failed fertilization is uncommon and thus not with the extra expense and extra technical expertise needed. The worst scenario that happens is that when failed fertilization occurs one will only waste one cycle; the next time ICSI will be performed and will usually solve the problem.

However, it is frightening to consider that if some toxic factor is present on sperm that gets transferred to the zona pellucida after binding, a woman could go through many IVF cycles and fail to conceive despite the transfer of apparently normal embryos, and yet could have been successful if ICSI had been performed.

A subnormal HOST score has clearly been demonstrated to inhibit implantation without adversely affecting fertilization rates or embryo quality (1,2). In one study of shared oocytes for a donor oocyte program (where half of the oocytes of a woman undergoing IVF is given to a recipient) the PR for couples where the males had normal semen parameters and normal HOST scores was 50% per transfer but none of the couples whose male partner had normal semen parameters but subnormal HOST scores achieved a pregnancy (2). Because ICSI resulted in a 49% PR despite low HOST scores, it has been hypothesized that some toxic factor in the sperm is transferred to the zona pellucida by the supernumerary sperm and this subsequently has an affect on embryo implantation (10). There are some data suggesting this factor is a protein because the HOST score will improve frequently following the protein digestive enzyme chymotrypsin (11) and the toxic factor may be cryolabile (12).

The sperm stress test evaluates motility after incubation at 40°C in a shaking water bath for 4 hours (4). In 119 IVF or GIFT cycles there were 24 pregnancies (20%). Twenty-three of the 24 pregnancies occurred in sperm sampled with stress scores ≥ 0.75 . The sensitivity of the stress test was 96% and the specificity 57%. The negative predictive value defined as the absence of pregnancy with stress scores < 0.75 was 98% (4). Approximately a quarter of the males had subnormal stress scores. Thus this abnormality is more prevalent than low HOST scores (13).

The data with subnormal stress tests has neither been corroborated or refuted. The stress test itself is a bit cumbersome. It is easier to perform the overnight stress tests and some think the tests may evaluate the same thing. These data did not show that sperm that show subnormal overnight sperm survival correlate with embryo implantation defects. If these tests are comparable, then this study

opens to question whether subnormal stress scores really do detect sperm that can cause implantation problems. However it could also be that the stress test abnormality depicts some defect not detected by subnormal survival tests. The sperm in our study were incubated at room temperature and not at 40°C. However, it would seem that sperm showing low survival without heat stress would be predicted to be subnormal with heat stress.

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Via Ferrarese, 119/2 - 40128 Bologna, Italy

Tel ++ 39-051 4151123 - Fax ++ 39-051 4151125