ANDROLOGY

Morphology in Intracytoplasmic Sperm Injection: Preliminary Results

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Purpose: Direct intracytoplasmic sperm injection (ICSI) is a successful treatment of severe male subfertility. Conventional in vitro fertilization shows poor pregnancy rates especially in cases of severe teratozoospermia. The objective was to determine if severe morphological defects of spermatozoa in oligoasthenoteratozoospermia (OAT) have any impact on the fertilization process in ICSI and if there are any specific morphological characteristics in nonfertilized oocytes after the ICSI procedure.

Methods: Ejaculates and nonfertilized oocytes were investigated by electron microscopy.

Conclusions: The lack of intracytoplasmic sperm-oocyte interaction, not severe sperm defects, displays the most critical role in the fertilization process. Clinical data with fertilization rates of 66% and pregnancy rates of 23.3% confirm the fertilization capacity of severely defective spermatozoa in ICSI.

KEY WORDS: ICSI; OAT syndrome; ultrastructure of spermatozoa and oocytes.

INTRODUCTION AND AIM OF THE STUDY

Since 1992 the intracytoplasmic sperm injection (ICSI) has turned out the treatment of choice in cases of severe male subfertility. All centers of reproductive medicine performing ICSI are reporting high fertilization rates and achieve pregnancy rates around 30% per embryo transfer. That means an important progress in treating male factor sterility compared to conventional IVF.

Clinical data confirm the better fertilization and pregnancy rates of ICSI in comparison to conventional IVF. But it is still an open question which mechanisms lead to fertilization failure in ICSI.

Our objective was to determine if severe morphological defects of spermatozoa in patients with severe OAT syndrome have any impact on the fertilization process in ICSI.

Another objective of our study was to determine possible characteristics of the ultrastructure in unfertilized oocytes 48 h after the ICSI procedure.

The investigation of ultrastructural elements in spermatozoa and unfertilized oocytes was based on 271 ICSI treatment cycles in cases of severe OAT syndrome. All women were treated with HMG/HCG after pituitary desensitization with GnRH-analogues. Oocyte retrieval was performed by ultrasound guided puncture. Only metaphase II oocytes have been taken for the intracytoplasmic sperm injection.

MATERIAL AND METHODS

Fifty-five semen samples of OAT patients with a 0% normal sperm morphology were analyzed by transmission electronmicroscopy. The analysis was performed in the Department of Andrology of the
transmission electronmicroscopy. The analysis was performed in the Department of Andrology of the University Hospital Eppendorf in Hamburg, Germany (Dir.: Prof. Dr. W. Schulze).

On the other hand, 15 oocytes displaying no signs of fertilization 48 h after the ICSI procedure were assessed as well by transmission electronmicroscopy. The analysis was performed by the Institute of Anatomy of the Medical University Lübeck, Germany (Dir.: Prof. Dr. W. Kühnel).

The ejaculate and the unfertilized oocytes were fixed in 2.5% glutaraldehyde and washed in 0.3 M cacodylate buffer. Fixation of the oocytes was performed through 4 h at a temperature of 4°C. Before semen samples and oocytes were processed by electronmicroscopy they were postfixed in 1% osmium tetroxide. Embedding of the material was performed in EPON 812.

Oocytes were serially semi- and ultrathin sectioned before analysis.