SHORT COMMUNICATION

TYGERBERG, SOUTH AFRICA

An Intracytoplasmic Sperm Injection Pregnancy with a Globozoospermic Male

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INTRODUCTION

The incidence of the globozoospermic sperm morphology pattern in our male infertility population is extremely low—estimated to be less than 0.05%. These spermatozoa are associated with structural, biochemical, and chromatin arrangement anomalies.

Due to the absence of the acrosomal structures and contents, round-headed spermatozoa have been reported to have a severely reduced capacity to bind to the zona pellucida and penetrate an oocyte normally. These spermatozoa have also been shown to be deficient in oocyte activation factor and may have chromosomal defects (1,2). The initiation of fertilization using round-headed spermatozoa may therefore require the oocyte to be artificially activated (2,3). Intracytoplasmic sperm injection (ICSI) has the capacity to overcome the deficiencies of round-headed sperm and initiate fertilization, albeit at a lower rate than normal, and ultimately initiate a viable pregnancy (4,5). With the general availability of ICSI, the diagnosis of sterility that globozoospermia patients were once condemned to has now been converted in most cases to one of severe infertility.

In this case report we discuss the infertility follow-up and treatment of a couple in whom the male has been diagnosed with globozoospermia.

CASE REPORT

History

The couple was referred to our clinic suffering from approximately 5 years of primary infertility. The husband, 38 years of age, presented at our laboratory with a semen sample in which 99% of the sperm were round-headed acrosomeless spermatozoa. The other major semen parameters were within our normal ranges: concentration, 38×10^6 cells/ml; motility, 40%; and forward progression, 2.5 (scale of 1–4). The exception was the percentage of normal cells (strict criteria), which was 0% (Fig. 1). The wife, 34 years of age, presented with a diagnosis of anovulation.

Treatment with Intracytoplasmic Sperm Injection

Assisted reproduction, with ICSI to initiate fertilization, was advocated. Superovulation was induced and controlled with a combination of Fertomid (CC; Cipla-Medpro South Africa Pty. Ltd.), Perganol (FSH/LH; Serono South Africa Pty. Ltd.), and Metrodin (FSH; Serono South Africa Pty. Ltd.) starting on day 2 of her cycle. Follicular growth was followed-up by means of vaginal sonography and luteinizing hormone determinations from day 8. On day 9, 10,000 IU of Profasi (hCG, Serono South Africa Pty. Ltd.) was administered, and 34 hr later a transvaginal aspiration under ultrasound guidance was performed. Seven oocytes were obtained. A semen sample was obtained from the husband after the follicular aspiration and prepared using a wash and swim-up procedure. The resultant sperm sample had a concentration of 10×10^6 motile cells/ml.

The ICSI procedure used was based on the method described by Van Streitgheim *et al.* (6). Seven mature (metaphase II) oocytes were injected, using sperm selected based only on their motility. Postinjection the ova were not subjected to any artificial activation process. Eighteen hours postinjection three ova showed the presence of two pronuclei, with all three developing into embryos. On day 3

Fig. 1. Light micrographs demonstrating the differences in the appearances of acrosome-containing (A) and globozoospermic (B) sperm.

postaspiration three six-cell embryos had developed and were transabdominally transferred into a single fallopian tube.

A pregnancy was signaled by two serum β hCG readings. The readings were 101 IU/L (day 10) and 1181 IU/L (day 14). A clinical pregnancy was confirmed by ultrasound at 7 weeks of gestation. The ultrasound examination revealed two gestational sacs, each containing a fetal heartbeat.

DISCUSSION

ICSI has revolutionized the treatment of male infertility to such an extent that Nagy *et al.* (7) stated that their results showed that there was no important influence from either the type or the extent of sperm impairment on the outcome of ICSI. Ultimately the only criterion for successful ICSI is the presence of at least one living spermatozoon per oocyte. To every rule there is an exception, and maybe patients diagnosed with globozoospermia represent one of these. Although presenting with normal motility patterns, the injection of round-headed sperm has resulted in varying levels of success (fertilization and cleavage), ranging from 0 to 90%. With the general consensus suggesting a lower success rate than that of standard (nonglobospermic) ICSI cases (2,4,5,8). The first reported case of a pregnancy after ICSI using spermatozoa from a globozoospermic man was by Trokoudes *et al.* (9). The pregnancy was obtained after complete failure of in vitro fertilization and subzonal insemination. The underlying pathology of round-headed sperm and the ICSI technique itself may be the major

contributors to this variation. The examination of the semen sample must confirm whether the sperm from the sample are type I (complete lack of acrosomal structures and contents) or type II (limited acrosomal structures) (5). In our case the sperm were classified as type I by a transmission electron microscopic evaluation. Other varying aspects which future investigations may indicate is what proportion of the sperm is deficient in or lacks oocyte activating factor and contains chromatin abnormalities (1,2). The chromatin abnormalities, as well as the lack of or inability to release the oocyte activating factor, may lead to premature chromatin condensation and development arrest. Another obstacle in the path may be the degree of access of the oocyte-associated sperm decondensing factor and its ability to decondense this uniquely packaged chromatin. When performing ICSI with round-headed sperm, attention to oocyte activation must therefore be paid, be it mechanically (cytoplasmic aspiration technique) or chemically (calcium ionophore).

This and a number of other studies have shown that if the hurdles to normal fertilization can be surmounted, the embryos that develop from these round-headed sperm are normal in all other respects. In our case three of seven embryos (43%) developed, with their quality ranging from poor (1) to good (2). The transfer of these three embryos resulted in an ongoing twin gestation. With better understanding of the underlying pathologies of round-headed sperm and improvement in ICSI technology, greater success may be achieved in the treatment of this unique male diagnostic group.

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