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Intrauterine Insemination in Treatment of Infertility

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Introduction

Infertility treatment progressed greatly using advances related to improvement in sperm biology and delivery of sperm to the uterine cavity. The sperm then has to swim to the tubal lumen to reach the oocyte. Following fertilization, the early embryo moves to the uterine cavity to implant and continue its development until the delivery of the baby.

For Intrauterine Insemination the sperm must be prepared by a special process known as a sperm wash. This sperm wash removes the seminal plasma and dead sperm, leaving the good sperm with improved motility to be ready for insemination.

The insemination is done by connecting the syringe containing the washed sperm to a special thin catheter. The catheter is introduced through the cervical canal to the uterine cavity and then the sperm is injected to reach the tubal lumen. The catheter is then removed and the patient rests on the table for about a half-hour before she moves out. A serum pregnancy test is performed in ten to fifteen days to check for pregnancy.

Materials and Methods

Total number of patients in the study: 102 infertility patients. All participants completed HSG and were showing normal fallopian tubes and uterine cavity. Semen samples were collected by masturbation and washed on a discontinuous density gradient column (Isolate, Irvine Scientific, Santa Ana, CA) and modified human tubal fluid (mHTF: Irvine Scientific, Santa Ana, CA). The washed pellet was resuspended in 2 ml of fresh mHTF and was then used for intrauterine insemination. Patient remained resting for half-hour before leaving for home. A serum BHCG is performed two weeks after the insemination procedure.

Results

One hundred and two patient cases were reviewed for this study. Twenty-one cases resulted in pregnancies and seventy-eight did not result in a pregnancy, resulting in a 22% pregnancy rate in this selection of cases.

Pregnancy Rate
Pregnancy Rate: 22% (23 Pregnancies, 79 Negatives, 102 Total Cases)

The average baseline sperm count was 283.12 million and after the sperm wash the average count was 139.64 million. The average baseline motility was 58.62%, and after washing the average sperm motility was 86.9%. In cases where pregnancy was achieved, the average count was 252.29 million and the average motility was 86.9%. In cases where pregnancy was not achieved, the average count was 291.4 million and the average motility was 86.8%. There was no statistical difference in sperm count and motility between those who achieved pregnancy and those who did not.

Positive vs. Negative Pregnancies Parameters		
Positive Parameters	**Negative Parameters**	**p-Value (α-0.05)**
Average Baseline Motility: 58.3%	Average Baseline Motility: 58.7%	0.891291-Not significant
Average Baseline Count: 252.29 (M)	Average Baseline Count: 291.4 (M)	0.420415-Not significant
Average Post-Wash Motility: 86.9%	Average Post-Wash Motility: 86.8%	0.754669-Not significant
Average Post-Wash Count: 129.42(M)	Average Post-Wash Count: 142.4 (M)	0.599156-Not significant

Patients achieving pregnancy: 23 patients.

- Singleton: 20 patients
- Triplets: 3 patients

Discussion

Intrauterine insemination (IUI) is the first treatment of choice for cervical subfertility, male factor infertility and in cases of unexplained infertility. The IUI is a simple, economical and less invasive procedure compared to in vitro fertilization (IVF) and intracytoplasmic sperm injection (ICSI). The objective of IUI is to bypass the cervical mucus barrier and increase gamete density at the site of fertilization [1]. The IUI is performed either with the natural menstrual cycle or with controlled ovarian hyperstimulation (COH). The semen samples are routinely collected by masturbation, or a special condom can be used for semen collection through intercourse if a patient cannot collect by masturbation. The collected semen samples can be prepared by a variety of techniques for IUI. These techniques include simple sperm wash, swim up, swim down, glass wool filtration, and density gradient centrifugation. All sperm preparation techniques have merits and drawbacks and have been discussed in detail by Hankel and Schill [2]. Simple sperm wash, and discontinuous

density gradient centrifugation are commonly used methods to prepare sperm for an IUI. The main objective of a sperm preparation is to isolate the maximum number of motile sperm without causing any damage, eliminate dead sperm, amorphous cells, leukocytes, debris etc. and separate seminal plasma from the ejaculate.

The simple sperm wash separates seminal plasma but cannot eliminate dead or amorphous cells from the ejaculate; therefore, it should be used for patients with low sperm count having minimal amorphous cells and leukocytes. The swim up is a simple and less expensive technique but results in low yields and a significant decrease in sperm with normal condensed chromatin. In addition, the cell-to-cell contact with debris or leukocytes may produce high levels of reactive oxygen species (ROS) which are detrimental for sperm function and for subsequent fertilization [3]. Therefore, the swim up method should not be used for ejaculates with low sperm count or with increased leukocytes. The sperm preparation by centrifugation of sperm on a discontinuous gradient column with two to three layers of increasing concentrations of gradient material (silane coated silica particles in a buffered culture medium) is a better choice. This technique is useful for patients with normal and subnormal semen parameters but not a good choice for oligoasthenozoospermic patients. Density gradient centrifugation was found superior to swim up procedure in selecting sperm with good acrosome reaction, hyposmotic swelling and nuclear maturity in men with abnormal semen analysis [4]. The centrifugal force propels the sperm and debris into contact with the fluid interface between semen and gradient layers. The motile sperm easily pass through the fluid interfaces and the non-motile sperm, amorphous cells and debris are trapped at the interfaces. The pellet is recovered and washed again by centrifugation following the addition of sperm wash medium. The final pellet is then resuspended in the medium and used for an IUI. The density gradient centrifugation results in highly motile and morphologically normal sperm fractions. This technique eliminates amorphous cells, leukocytes and thus significantly reduces the chances of ROS production. Density gradient centrifugation is the method of choice today based on its merits over the other sperm washing procedures. Density gradient centrifugation not only yields more motile sperm but also provides sperm with better DNA quality. De Jonge described that sperm preparation by density gradient centrifugation is similar to the passage of sperm through cervical mucus. Cervical mucus filters out sperm with poor morphology and motility.

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