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Improved motility and subsequent pregnancies following intracervical insemination of sperm suspended in donor seminal plasma

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SUMMARY

Poor quality sperm motility might, in some instances, be related to a defect in the seminal fluid rather than in an intrinsic sperm defect. Three men with sperm lacking progressive forward motion (PFM) 40 minutes after suspension of their small antegrade fraction of a retrograde ejaculation in Ham's F-10 medium did demonstrate sperm with PFM after suspension of the sperm in donor seminal plasma (DSP). All three achieved pregnancies following the intracervical insemination of their wives within a total of nine ovulatory cycles. Further investigation is needed to determine if the use of DSP can be applied to improve sperm motility in infertile males with asthenospermia but without the complications of retrograde ejaculation.

INTRODUCTION

Males with retrograde ejaculation have been shown to be capable of impregnation following intrauterine insemination (IUI) of sperm washed and resuspended in HAM'S F-10 media.[1] Three men with retrograde ejaculation but a small antegrade fraction failed to show motile sperm when the above technique was used to process the retrograde fraction. Similarly, despite suspension in Ham's F-10 or sperm washing or swim up of the antegrade fraction 40 minutes after collection, no progressively motile sperm was demonstrated although initially (5-15 minutes), some motility was noted. It was then hypothesized that a vital, but as yet unknown component of seminal plasma essential for sperm motility might be missing from the HAM's F-10 media. Thus, donor seminal plasma (DSP) was added to the semen of these men, evaluated for sperm motility, and then used for intracervical insemination of their wives.

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MATERIAL AND METHODS

Three men with infertility of 2 - 10 years duration and retrograde ejaculation were treated with Ornade® spansules twice daily for 10 days prior to ejaculation, at which time they were then capable of producing a small antegrade fraction with a volume ranging from 0.05 to 0.4 ml. The semen was diluted with sperm-free DSP to a volume of 0.5 to 1.0 ml. The DSP was prepared from normal fertile males following centrifugation of the donor semen in a microcentrifuge at 16,000 rpm. The minimum motility of the donor semen needed was 70%, with grade 3 or 4 quality based on a scale from 0-4. The supernatant DSP thus obtained was checked microscopically for the absence of sperm.

The intracervical insemination of the husband's sperm suspended in DSP was timed according to pelvic sonography in the wife (minimum diameter of follicle 18 mm) and by serum estradiol (minimum estradiol of 200 pg/ml per mature sized follicle) and was performed on 2 successive days.

RESULTS

Evaluation of the direct antegrade semen specimen 40 minutes after collection failed on 2 separate occasions to show sperm with progressive forward motion (PFM). Suspending the centrifuged sperm but in Ham's F-10 media also failed to demonstrate motile sperm, as did swim up.

Sperm counts in the antegrade specimen ranged from occasional to 137×10^6/ml. The volumes ranged from less than 0.05 to 0.4 ml. Initial motility following liquifaction 5-15 minutes after ejaculation ranged from 5-50% with grade ranging from 2-2.5. The sperm concentration on the retrograde fraction ranged from occasional to 63×10^6/ml and the motility, from 0% to 25%.

Suspending the sperm in DSP resulted for the first time in sperm with progressive forward motion (PFM) 40 minutes after collection in each of 9 ovulatory cycles evaluated. Conception occurred in all 3 couples at 1, 3 and 5 months respectively. The semen analysis during each of the three conception cycles is seen in Table 1.

Evaluation of the cervical mucus 2 hours following insemination showed sperm with PFM in all 3 cases ranging from 5-10-poor (p), 15-20 fair (f), and > 20-good (g).

TABLE 1

Semen Analysis 40 Minutes After Adding Donor Seminal To The Antegrade Fraction Of 3 Men With Retrograde Ejaculation During Their Wives Conception Cycle

	Patient #1	Patient #2	Patient #3
Initial volume/ml	0.4	0.05	0.2
DSP added/ml	0.9	0.95	0.8
Final volume/ml	1.3	1.0	1.0
Count (mill/ml)	25	40	18
% Motility	35	35	43
Quality (scale 0-4)	2.5	2.5	3.0

DISCUSSION

Contributions from the seminal vesicles, prostate, bulbo-urethral and urethral glands, and epididymis all contribute to the normal function of the sperm. Suspending media eg. HAM'S F-10 media[1] and Biggers, Whitten, and Whittingham (BWW)[2] have proven adequate to

sustain sperm motility. However, the possibility does exist that under certain circumstances, a critical substance may be deficient in the initial ejaculate so that the spermatozoa are not capable of exhibiting motility despite being supplemented with an energy source. Epidydimal pathology, for example, might cause changes in sperm function. A substance known as the epidydimal motility protein which coats sperm appears to induce motility in bovine sperm;[3] other substances that may effect motility include seminal plasma prostaglandins.[4]

The demonstration of sperm with progressive forward motion (PFM) following suspension in DSP but not HAM's F-10 supports the hypothesis that some, but not all males may demonstrate asthenospermia related not to an intrinsic sperm defect but to a seminal plasma abnormality. Determination of whether suspension in DSP will prove to be a useful ancillary technique to improve fertility only in the small antegrade fraction of men with retrograde ejaculation or will prove useful for poor quality sperm motility in other circumstances, will require further testing and evaluation of the data.

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