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The Value of the Postcoital Test in Predicting the Fertilization of Human Oocytes

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The relevance of the postcoital test (PCT) in relation to the fertilization rate of oocytes was determined in an analysis of 66 couples in an in vitro fertilization (IVF) program. The test is routinely performed in the workup of all IVF patients and is accurately timed to the immediate preovulatory period by daily hormonal, cervical mucus, and ultrasound monitoring. Cases demonstrating antispermatozoal antibodies in the serum of either partner, in cervical mucus, or in semen were excluded. There was no significant difference in the fertilization rate of oocytes whether the PCT result was negative, equivocal, or positive, and the finding was the same in both normospermic and oligospermic groups. It is concluded that the PCT is of no value in predicting the outcome of IVF and, conversely, IVF should be considered as a therapeutic option for couples with a negative PCT.

KEY WORDS: human in vitro fertilization; postcoital test.

INTRODUCTION

The postcoital test (PCT) was first described by Sims (1) and subsequently reintroduced by Huhner (2), and it has since continued to be used diagnostically in the investigation of the infertile couple (3). More specifically, however, attention has recently been drawn to the value of the PCT in predicting the outcome of in vitro fertilization (IVF). One group (4) reported a significantly reduced fertilization rate in couples with a negative/poor PCT compared to couples with only a tubal problem. However, this relationship between the results of the PCT and IVF is not universally accepted. Another group (5) has shown that the outcome of IVF in their laboratory is unrelated to the result of the PCT.

The aim of the present study was to compare retrospectively the result of the PCT with the fertilization rate of oocytes at the PIVET Laboratory and determine if the PCT was of any value in the prediction of successful fertilization.

MATERIALS AND METHODS

Patients

A total of 592 couples has received treatment in the PIVET IVF program. Of these, 70 had a PCT performed in the preliminary workup (6), with 4 couples subsequently showing evidence of antispermatozoal antibodies in the serum of one or both patients. The specific tests applied were the gelatin agglutination test, the complement-dependent immobilization test, and the tube-slide agglutination test (7). The remaining 66 couples were included in the present study. Couples were categorized according to the quality of the husband's semen produced on the day of oocyte collection in the IVF treatment cycle as being (i) normospermic if the semen contained $\geq 12 \times 10^6$ motile spermatozoa/ml or (ii) oligospermic if the semen contain $<12 \times 10^6$ motile spermatozoa/ml. These definitions were derived from the recommendations of the World Health Organization (WHO) task force on the diagnosis and treatment of infertility (8), based on a consistent correlation with in-

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fertility when the total spermatozoal concentration falls below 20 × 10^6/ml, with 60% motility.

Postcoital Test

The cervix and mucus of the female partners were examined daily from Day 8 of an unstimulated observation cycle, and a subjective scoring system was applied (9). Follicle development was also detected by daily ultrasound tracking, in combination with serum hormonal parameters [estradiol-17β and luteinizing hormone (LH)], to define accurately the day of ovulation. Cervical mucus was obtained for scoring using a blue inoculation loop (Nunc; Intermed, Roskilde, Denmark), taking care not to contaminate the sample with vaginal fluid. Four characteristics were assessed, namely, the quantity and clarity of the mucus, the length of the spinnbarkeit, the complexity of the ferning pattern after the mucus was allowed to dry on a slide, and the degree of dilatation of the cervical canal. Each characteristic was scored out of 3, giving a possible total of 12. Intercourse occurred when the patient was preovulatory and the cervical score was ≥6/12, and mucus from the endocervical canal was examined 8 to 12 hr later using long forceps with slim blades to traverse 1.5 to 3.0 cm into the cervical canal. The result was classified as negative (no progressively motile spermatozoa per high-power field), equivocal (1 to 9 progressively motile spermatozoa per high-power field), or positive (≥10 motile spermatozoa per high-power field).

In Vitro Fertilization

Couples subsequently underwent an IVF treatment cycle. Details of the ovarian stimulation regimen, monitoring of the female partner, and oocyte collection have been previously reported in detail (6). Briefly, follicle growth was stimulated by the administration of clomiphene citrate (Clomid; Merrel Dow Pharmaceuticals, Inc., Cincinnati) and human menopausal gonadotropin (hMG) (Pergonal, Serono, Rome) or hMG alone, depending upon the results of previous treatment cycles. The response to the treatment was monitored by the daily assessment of cervical mucus, and measurement of serum estradiol-17β, progesterone, and LH using radioimmunoassay. Ovulation was triggered by the occurrence of an endogenous LH surge or the administration of 10,000 IU human chorionic gonadotropin (hCG) (Primogonyl, Schering, Berlin) at an appropriate time and oocytes were collected 32 to 36 hr later.

Similarly, the collection of semen, preparation of spermatozoa, and culture conditions have been previously described in detail (10). Semen was produced by masturbation and processed 30 min after collection. Motile spermatozoa were isolated using an overlay technique, and a final concentration of 1 × 10^6 washed motile spermatozoa was prepared. Oocytes were inseminated 4 to 6 hr after collection, pronuclei were identified 16 to 20 hr later, and embryo transfer was undertaken 44 to 48 hr after insemination. Pregnancies were diagnosed 16 to 19 days after laparoscopy by a rising concentration of β-hCG in the serum and confirmed about 5 weeks after embryo transfer by the ultrasonic detection of an intrauterine gestational sac.

Statistical Analysis

All data were examined in 2 × 2 contingency tables using the Fisher exact probability test (11) and differences considered significant for $P < 0.05$.

RESULTS

The number of patients with negative, equivocal, and positive PCT results and the subsequent fertilization rates of oocytes from oligospermic and normospermic couples are given in Tables I and II, re-

Table I. Comparison Between the Fertilization Rates of Oocytes from 17 Women Whose Husbands Are Oligospermic and the Results of the Postcoital Test (PCT)

Group	PCT result	Patients (*N*)	Oocytes (total *N*)	Fertilization*	
				Yes	No
A	Negative	15	80	51 (64%)	29
B	Equivocal	1	4	3 (75%)	1
C	Positive	1	4	2 (50%)	2

* A vs B, $P > 0.39$, not significant. A vs C, $P > 0.33$, not significant. B vs C, $P > 0.43$, not significant.

Table II. Comparison Between the Fertilization Rates of Oocytes from 49 Women Whose Husbands Are Normospermic and the Results of the Postcoital Test (PCT)

Group	PCT result	Patients (*N*)	Oocytes (total *N*)	Fertilization*	
				Yes	No
A	Negative	22	80	58 (72%)	22
B	Equivocal	5	25	20 (80%)	5
C	Positive	22	110	88 (80%)	22

* A vs B, $P > 0.16$, not significant. A vs C, $P > 0.07$, not significant. B vs C, $P > 0.22$, not significant.

spectively. The 15 negative PCT results in the oligospermic group were due to the absence of spermatozoa in the mucus (1 couple) or the presence of nonmotile spermatozoa (14 couples). Similarly, the 22 negative PCT results of the normospermic group were reported because of the absence of spermatozoa (2 couples) or the presence of nonmotile spermatozoa (20 couples).

Table I shows that no significant difference in the fertilization rate of oocytes from oligospermic couples was seen when the PCT result was negative (51/80; 64%), equivocal (3/4; 75%), or positive (2/4; 50%). Similarly, Table II shows no difference in the fertilization rate of oocytes from normospermic couples when the patients were categorized as negative (58/80; 72%), equivocal (20/25; 80%), or positive (88/110; 80%) on the basis of the PCT result.

DISCUSSION

The interpretation and clinical value of the PCT in predicting fertility, however, remain controversial and unresolved. A survey of recent literature reveals that there is remarkable inconsistency in the expression of a positive PCT result between groups. Generally, 10–20 progressively motile spermatozoa per high-power field are required if a cervical factor is to be excluded as a cause of infertility (3). However, it has been proposed that the presence of one or more progressively motile spermatozoa should be considered as indicating a normal result and there is no importance in the number of spermatozoa per high-power field (3, 12). Accordingly, the present study has regarded the absence of progressively motile spermatozoa as a negative result, the presence of 1–9 motile spermatozoa per high-power field as equivocal, and >10 spermatozoa per high-power field as positive. It is appreciated that the equivocal results may well be regarded as positive by other workers.

It is clearly seen in the present study that the fertilization rate in cases with a negative PCT result is not different from the rate in those couples with an equivocal or positive PCT result and that the PCT is of no value in predicting the outcome of IVF. This is the experience of another IVF center (5), but is in contrast to findings elsewhere (4) in which 16% of the oocytes were fertilized in couples with a negative PCT, compared with a fertilization rate of 55% in couples with a positive PCT result. However, an interesting point was raised by Hull *et al.* (4), who said that, "in most couples with a poor PCT, despite good mucus production, improved efficiency of the IVF methods may lead to a greater therapeutic success." If one accepts that couples with a negative PCT have a severely reduced chance of conception without treatment, then our data would indicate that IVF has a place in the treatment of couples with impaired spermatozoa–mucus interaction.

In conclusion, the postcoital test has been shown to be of no value in predicting the outcome IVF. Conversely, the value of IVF as a therapeutic procedure in the treatment of couples with negative PCT results requires further consideration.

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