

Association of the change in serum estradiol (E2) levels from the day of to the day after human chorionic gonadotropin (hCG) injection and pregnancy outcome following in vitro fertilization-embryo transfer (IVF-ET) in less than average responders

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Summary

Purpose: To determine if the change in serum estradiol (E2) from the day of human chorionic gonadotropin (hCG) injection to the day after predicts pregnancy and implantation rates following in vitro fertilization-embryo transfer (IVF-ET) in less than average responders. **Methods:** A retrospective cohort analysis was performed in women with less than average follicular response as defined by a peak serum E2 on the day of hCG of < 1500 pg/ml despite a maximum stimulation gonadotropin protocol. Pregnancy and implantation rates were compared in five groups based on standard deviation (SD) below or above the mean. **Results:** No differences were found in outcome in any groups including those that were 1-2 SD below the mean or within 1 SD below the mean or up to 2 SD above the mean. The group that was 2 SD above the mean seemingly had higher pregnancy and implantation rates but there were insufficient numbers to allow statistical comparisons. There did not appear to be any confounding variables among these groups. **Conclusions:** A drop in serum E2 in a group of women that were less than average responders was not associated with a lower chance of conception following IVF-ET.

Key words: In vitro fertilization; Serum estradiol change; Human chorionic gonadotropin injection; Pregnancy outcome.

Introduction

In the early days of in vitro fertilization there was a report that women with tubal disease who exhibited a drop in their serum estradiol (E2) values after exogenous human chorionic gonadotropin (hCG) during in vitro fertilization (IVF) cycles infrequently become pregnant [1]. The authors even suggested cancellation of the retrieval if the serum E2 dropped [1].

However, another study published 13 years later did not find any difference in clinical pregnancies in women whose serum E2 dropped > 10% the day after hCG injection, plateaued or increased > 10% [2].

The women studied in the aforementioned study were generally normal responders [2]. Thus the conclusions reached may not apply to less than average responders. The present study evaluated the effect of the difference in serum E2 on the day of vs the day after the hCG injection in women who were less than average responders.

Materials and Methods

A retrospective study was performed over an 8-year time period to evaluate subpar responders who did not attain a serum E2 of 1500 pg/ml on the day of hCG injection. Only transfers with a minimum of two embryos were evaluated in women age \leq 39.

The data were not stratified by type of gonadotropin or gonadotropin releasing hormone (GnRH) antagonist or agonist (ganirelix or cetorelix). The data were stratified according to five groups – two groups where the serum E2 was 1 or 2 standard deviations (SD) below the mean to three groups where the SD was above the mean.

There were no minimal stimulation protocols used for this study [3]. All women were started at 300 U exogenous FSH. Both GnRH agonist protocols with leuprolide acetate started in mid luteal phase and GnRH antagonist protocols using ganirelix or cetorelix were included.

Results

The mean percent rise in serum E2 on the day after hCG injection was 25% with a SD of 14%. The clinical and live/delivered pregnancy rates and implantation rates according to four groups based on the percentage increase rise of serum E2 the day after hCG injection is shown in Table 1. There were no significant differences in these outcome parameters according to E2 response.

The average age and the serum levels of E2 on the day of and the day after hCG injection is presented in Table 2 as are the average number of mature eggs retrieved.

There were only seven cases with E2 3 SDs above the mean so the data could not be compared. The average age for this group was 32.4. The serum E2 levels the day of and day after hCG were 1001.1 and 4892.3. The average

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Table 1. — Clinical and live/delivered pregnancy rates and implantation rates according to four groups based on the percentage increase or decrease in rise of serum E2 the day after hCG injection.

Group	1-2 SD below the mean	Within 1 SD below the mean	Within 1 SD above the mean	1-2 SD above the mean	p value
Clinical pregnancy rate	32.1% (18/56)	42.6% (58/136)	35.5% (49/138)	44.8% (13/29)	.398
Live/delivered pregnancy rate	30.4% (17/56)	39.7% (54/136)	31.2% (43/138)	27.6% (8/29)	.343
Implantation rates	17.5% (30/171)	21.2% (90/425)	20.2% (80/138)	21.2% (18/85)	.790

Table 2. — Average age and serum levels of E2 on the day of and the day after hCG injection.

	≤ 11% 2 SD below	12-25% 1 SD below	26-40% 1 SD above	41-55% 2 SD above
# transfers ≥ 2 embryos	56	136	138	29
Average age	35.8	35.6	34.6	33.5
Avg. E2 levels day of hCG (pg/ml)	1049.7	1050.6	976.4	976.1
Avg. E2 levels post-hCG (pg/ml)	1118.9	1297.2	1435.9	1813.9
Avg. no. mature eggs retrieved	5.2	5.6	6.2	8.2

number of mature eggs was four. Clinical and delivered pregnancy rates were 85.7% and 85.7%, respectively, and the implantation rate was 47.4%. However for the other four groups there did not appear to be any advantage from having a higher serum E2 the day after hCG injection.

Discussion

These data in women with somewhat diminished egg reserve as manifested by generating a maximum serum E2 < 1500 pg/ml on the day of hCG reached the same conclusions as women with normal egg reserve that a drop in the serum E2 level the day after the hCG injection does not predict a lower pregnancy rate [2].

The data was not analyzed as previously, i.e., < 10% within 10% or > 10% which we believed more arbitrary. Instead we thought that from a scientific standpoint an evaluation according to standard deviation was more appropriate.

References

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