Relationship of serum progesterone levels on the day of hCG administration and clinical outcomes in in vitro fertilization cycles

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Background

The influence of elevated serum progesterone levels on the day of hCG administration and the pregnancy outcome in IVF/ICSI cycles is still under debate. If subtle rise of progesterone level had negative effect on pregnancy outcome, defining the cut-off value of progesterone is important for clinical practice. Reviewing previous literature, most studies suggested serum P4 level more than 1.5 ng/ml associated with reduced ongoing pregnancy rates, but the arbitrary threshold values is still not determining. Our aim is to find the optimal serum P4 level which is suitable for embryo transfer.

Patients and method

In a retrospective, single-center, cohort study, total 365 cycles undergoing IVF/ICSI cycles with age < 40 year-old were included from Jan. 2011 to Nov. 2012. Patients underwent COS using either a GnRH agonist or GnRH antagonist protocol. Ovarian hyperstimulation protocol was individualized according to patients' ovarian function reserve and clinical characteristics such as endometriosis and patient's preference. Serum E2 and P4 were checked on the day of hCG administered. Patients were divided into two groups according to the serum P4 level on the day of hCG administered. Serum P4 level 1.2 ng/ml on the day hCG administration was used as cut off value on Group I and 1.5 ng/ml on Group II. Both Groups were subdivided into two Groups. Group Ia included 314 cycles with P4 level on the day of hCG administration <1.2 ng/ml. Group Ib included 51 cycles with P4 level on the day of hCG administration ≧1.2 ng/ml. Group IIa included 337 cycles with P4 level on the day of hCG administration <1.5 ng/ml. Group IIb included 28 cycles with P4 level on the day of hCG administration ≧1.5 ng/ml. Clinical outcomes were compared between all groups. Student's t-test and χ^2 test were used for statistical analysis. P< 0.05 was considered statically significant.

Results

There was no difference in patient's age between two groups in Group I (34.4±3.2 vs. 34.3±3.3) (Table 1). The number of retrieved oocytes (6.8±3.9 vs. 7.2±3.4), basal FSH level (5.0±2.9 vs. 5.0±1.9), dose of gonadotropins (3174±1239 vs. 3122±1131), fertilization rate (69.6% vs. 66.3%) and number of embryos transferred (2.8±1.0 vs. 2.7±1.0) per cycle were also comparable between two groups. The implantation rate was significantly higher in group Ia compared to group Ib (25.8% vs. 16.8%, P=0.023). The clinical pregnancy rate is also significantly higher in group Ia compared to group Ib (49.7% vs. 31.4%, P=0.015). The patient's characteristics and clinical outcomes were all compatible in Group II except the fertilization rate was higher in Group IIa compared to Group IIb (69.9% vs. 59.6%)

Table I. Patient's characteristics and clinical outcomes when P4 level 1.2 ng/ml was used as cutoff value

	Group Ia	Group Ib	P value
No. of cycles	314	51	
Age (years)	34.4±3.2	34.3±3.3	NS
BMI (kg/m^2)	21.8±2.9	21.2±2.9	NS
Basal FSH(mIU/mL)	5.0±2.9	5.0±1.9	NS
Dose of gonadotrophins(unit)	3174±1239	3122±1131	NS
Peak E2 level(pg/mL)	1710±1011	2076±1359	0.024
No. of oocytes retrieved	6.8±3.9	7.2±3.4	NS
Fertilization rate	69.6%(1483/2132)	66.3%(242/365)	NS
No. of embryos transferred	2.8±1.0	2.7±1.0	NS
Clinical pregnancy rate	49.7%(156/314)	31.4%(16/51)	0.015
Multiple pregnancy rate	32.7%(51/156)	9.8%(5/51)	0.001
Implantation rate	25.8%(224/868)	16.8%(23/137)	0.023

Table II. Patient's characteristics and clinical outcomes when P4 level 1.5 ng/ml was used as cutoff value

	Group Ia	Group Ib	P value
No. of cycles	337	28	
Age (years)	34.4±3.2	34.3±3.3	NS
BMI (kg/m2)	21.7±3.0	21.7±3.0	NS
Basal FSH(mIU/mL)	6.2±3.2	5.4±1.2	NS
Dose of gonadotrophins(unit)	3161±1232	3295±1110	NS
Peak E2 level(pg/mL)	1758±1052	1728±1266	NS
No. of oocytes retrieved	6.8±3.9	6.8±3.1	NS
Fertilization rate	69.9%(1611/2305)	59.6%(121/203)	0.0024
No. of embryos transferred	2.8±1.0	2.5±1.0	NS
Clinical pregnancy rate	48.4%(163/337)	35.7%(10/28)	NS
Multiple pregnancy rate	31.9%(52/163)	30.0%(3/10)	NS
Implantation rate	25.0%(234/935)	18.4%(14/76)	NS

Conclusion

Serum P4 level 1.2 ng/ml on the day of hCG administration seems to be a better indicator than 1.5 ng/ml for deciding to transfer the embryo or not. Elevated serum progesterone level had deteriorative effect on pregnancy outcome in IVF/ICSI cycles. Since the maternal age, oocyte retrieved number, fertilization rate and embryo transfer numbers were comparable between two groups. The inferior clinical outcome in Group Ib may be due to suboptimal endometrial receptivity originated from the elevated P4 serum level. Accordingly, we suggest frozen embryo transfer as an alternative option to improve pregnancy outcome when serum progesterone level on the day of hCG administration is greater than 1.2 mg/ml.

Compassion   Accountability   Effectiveness

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