Effect of Coculture System with Autologous Cumulus Cells on Embryo Quality and Pregnancy Rates

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=Abstract=

Despite the rapid development of assisted reproductive technologies(ART) in recent years, implantation rates after replacement of embryos into the uterine cavity remains low. Several techniques such as culture conditions based on formulations of human tubal fluid and various ART techniques as GIFT, ZIFT, TET have been adopted in recent years to improve embryo viability in vitro and implantation rates. Also, coculture of human IVF-derived embryos have been used in an effort to increase the number of viable embryos following IVF and to improve synchrony between the developing embryo and the uterine environment.

The aim of this study was to evaluate whether the use of coculture with autologous cumulus cells has a significant beneficial effect on the development of embryos in vitro and its relation to the pregnancy rates in 120 patients with previous failed IVF-ET from September, 1995 to January 1998.

We obtained the results from which significant improvement in the quality of viable embryos were observed using a coculture system with autologous cumulus cells, but pregnancy rates in this group of patients did not differ from the rate in the standard IVF group during the same period.

Our study shows that a simplified short-term coculture system with autologous cumulus cells may help rescue moderate quality embryos to cleave regularly.

90%

15% .   3

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(Thibodeaux & Godke,

1995).

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1.

1995 9   1998 1

,   120

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,   60

.   32.1±4.8   32.5±4.7   ,

27   29 ,   9   11 ,   3   1 ,   4   1 ,   17

18   (Table 1).

2.

1)

GnRH-a   .   20 22   Nafarelin

acetate(Synarel®, Syndex, Swiss) 200mcg   4   2

hCG   3   .   2   3   FSH(Metrodin®, Serono, Swiss)

hMG(Merionol®, Serpentam, Swiss)   150IU   4   hCG   hMG

225IU   .   16mm   2   hCG(Profasi®, Serono,

Swiss) 10,000IU   34 36   .

2)

Ham's F-10   TCM 199   ,   .

                                                                                        , 18   20
                                                                                    .

                                                                    60

                                                    ,   60

                                    .   2   3

                                ,

                            .

    3)

                4   8   ,

        (Erenus et al., 1991)   1, 2   .

                                        1   ,

        2   ,   3   .

                                                        0.4% trypan blue

                        80%   .   12   β-hCG

        , 4   5

    .

    4)

                                                                                                SPSS

                t-test χ^2-test   ,   .

    1.

                1   3   2   3   LH, FSH, E₂   3.5±
3.1mIU/mL, 6.7±1.5mIU/mL, 28.8±19.2pg/mL   3.3±3.0mIU/mL, 6.2±1.8mIU/mL, 24.1±
20.4pg/mL   .   hCG   LH, E₂, P₄
    1.3±0.9mIU/mL, 1847±1706pg/mL, 0.9±0.8ng/mL   1.5±0.9mIU/mL, 1901±1754pg/mL,
0.9±0.8ng/mL   (Table 2).

    2.

                ,   ,   ,   ,   9.1±6.1 , 7.0±5.2
, 76±25%, 6.0±3.9 , 63±26%   8.8±4.7 , 6.6±4.7 , 76±24%, 6.3±3.2 , 69±
25%   .

                            , 1, 2   73±32%   76±20%
        1   36±39%   54±33%   (P<0.01).

                        16.7%(10   )   20.0%(12   )   (Table 3).

(Gandolfi & Moor, 1987; Pexroad & Powell, 1988)

. 1989   Bongso

.   Plachot   (1993),

Mansour   (1994), Yeung   (1996), Guerin   (1997)   ,   ,   ,   Vero

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(Thibodeaux & Godke, 1995; Dirnfeld et al.,

1997).

.   17   25%

.   ,

.   . Bongso

(1992)   44%

Yeung   (1996)   6.5%

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Vero   .

Vero   , Guerin   (1997)   (1997)

.   ,

Vero   .

(Mansour et al., 1994; Saito et al., 1994; Quinn P & Margalit R, 1996)

(Plachot et al., 1993; Dirnfeld et al., 1997)

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,   .

,   1   .

, 1   2   76±20%   73±32%   1

54±33%　　　　36±39%　　　　　　　　(P<0.01).　　,

2

1　　　　　　　　(Thibodeaux & Godke, 1995)

.　　　　　　20.0%　　　　16.7%　　　　　　　　　　　,

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Bongso　(1992)

(　　,　　,　　,　　,　　,　　,

,　　,　　, 1998)　　　　　　　　　　　　　　　,

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1995　9　　1998　1

120　　　　　　　　　　　　　60　　　　　,　　60

2　　　1　　　　　　　,　　　　　　　　　　　.

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blastocyst　　　　　　　　　　.　II.　　　　　　　　　　Blastocyst　　　　　.

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.　　　　　　　　1997, 24, 211-216.

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Table 1. Age and causes of infertility

	Conventional Culture Group	Cumulus cells Coculture Group
Patients(No.)	60	60
Age(years)[*]	32.1± 4.8	32.5± 4.7
Ex. of Infertility(No.)[**]		
BTO	27(45%)	29(48%)
Chronic anovulation	9(15%)	11(18%)
Hydrosalpinx	3(5%)	1(2%)
Endometriosis	4(7%)	1(2%)
Unexplained	17(28%)	18(30%)

[*]Values are Mean± S.D., t-test, not significant
[**]x^2-test, not significant

Table 2. Clinical characteristics[*]

	Conventional Culture Group	Cumulus cells Coculture Group
Ampules of gonadotropin(75IU)	29.7± 4.3	30.1± 4.5
Days of hCG administered	10.1± 1.5	10.2± 1.8
Basal hormonal levels		
LH(mIU/mL)	3.5± 3.1	3.3± 3.0
FSH(mIU/mL)	6.7± 1.5	6.2± 1.8
E2(ng/mL)	28.8± 19.2	24.1± 20.4
Hormonal levels on hCG day		
LH(mIU/mL)	1.3± 0.9	1.5± 0.9
E2(pg/mL)	1847± 1706	1901± 1754
P4(ng/mL)	0.9± 0.8	0.9± 0.8

[*]Values are Mean± S.D., t-test, not significant

Table 3. The effect of coculture on embryo quality in patients with previous failed IVF[*]

	Conventional Culture Group	Cumulus cells Coculture Group	P value
Eggs retrieved(No.)	9.1± 6.1	8.8± 4.7	NS
Total fertilized eggs(No.)	7.0± 5.2	6.6± 4.7	NS
Total fertilization rate(%)	76± 25	76± 24	NS
Normal fertilized eggs(No.)	6.0± 3.9	6.3± 3.2	NS
Normal fertilization rate(%)	63± 26	69± 25	NS
Embryo quality(%)			
Grade 1	36± 39	54± 33	P<0.01
Grade 2	37± 33	22± 27	P<0.01
Grade 1+2	73± 32	76± 20	NS
Grade 3	27± 28	24± 17	NS
Embryos transfered(No.)	3.6± 2.1	4.1± 2.0	NS
Clinical pregnancy rate(%)[**]	16.7	20.0	NS

[*]Values are Mean± S.D., t-test
[**]x^2-test
NS: not significant