



## Pregnancy Outcomes of Three Different Sources of Embryos During Early Rescue-ICSI

Kun Liu <sup>a</sup>, César Martin Plagaro <sup>b</sup>, Bairong Shen <sup>c</sup>

<sup>a</sup> Reproductive Medicine Center of Lanzhou University First Hospital, Lanzhou, 730030, China

<sup>b</sup> Biochemistry and Molecular Biology Department, University of the Basque Country UPV/EHU, 48940, Leioa, Biscay, Spain.

<sup>c</sup> Institutes for Systems Genetics, West China Hospital, Sichuan University, Chengdu, 610000, China

### Graphical Abstract

None

### Abstract

**BACKGROUND:** This retrospective study aimed to investigate pregnancy outcomes when transferred three different sources embryos during early rescue ICSI.

**MATERIAL AND METHOD:** A total of 805 infertility cases were included. On the third day after insemination, 615 cases transferred with one to three embryos. The pregnant rate, abortion rate and live birth rate were compared in three groups.

**RESULTS:** ①Pregnant group with younger female age, less starting gonadotropin dose, fertilization and embryonic score were better. ②Pregnant rate, early abortion rate and ectopic pregnancy rate were the lowest in only ICSI sources embryo. Multiple pregnancy rate and the birth rate of low weight babies at term was lower in the transferred both IVF and ICSI sources embryo group. ③The sex ratio of the newborn in the three groups were different significantly, IVF with more girl, ICSI with more boy, and IVF/ICSI group was the most balanced. ④Both cleavage rate and good quality embryo rate were the predictors of clinical pregnancy and live birth.

**CONCLUSIONS:** Using the early rescue ICSI based on short-term insemination was helpful to increase the utilization rate of the embryo, and improve the clinical pregnancy outcome. While more researches are needed on the safety of offspring.

**Key Words:** Fertilization failure, Early rescue ICSI, Pregnancy outcomes

### References

1. Chen C, Kattera S: Rescue ICSI of oocytes that failed to extrude the second polar body 6 h post-insemination in conventional IVF. *Human reproduction*. 2003, 18(10):2118-2121.

2. Barlow P, Englert Y, Puissant F, Lejeune B, Delvigne A, Van Rysselberge M, Leroy F: Fertilization failure in IVF: why and what next? *Human reproduction*. 1990, 5(4):451-456.
3. Chen L, Xu Z, Zhang N, Wang B, Chen H, Wang S, Sun H: Neonatal outcome of early rescue ICSI and ICSI with ejaculated sperm. *Journal of assisted reproduction and genetics*. 2014, 31(7):823-828.
4. He Y, Liu H, Zheng H, Li L, Fu X, Liu J: Effect of early cumulus cells removal and early rescue ICSI on pregnancy outcomes in high-risk patients of fertilization failure. *Gynecological endocrinology : the official journal of the International Society of Gynecological Endocrinology*. 2018, 34(8):689-693.
5. Huang B, Qian K, Li Z, Yue J, Yang W, Zhu G, Zhang H: Neonatal outcomes after early rescue intracytoplasmic sperm injection: an analysis of a 5-year period. *Fertility and sterility* 2015, 103(6):1432-1437 e1431.
6. Veeck LL: Fertilization and early embryonic development. *Current opinion in obstetrics & gynecology*. 1992, 4(5):702-711.
7. Gardner DK, Lane M, Stevens J, Schlenker T, Schoolcraft WB: Blastocyst score affects implantation and pregnancy outcome: towards a single blastocyst transfer. *Fertility and sterility*. 2000, 73(6):1155-1158.
8. Floehr J, Dietzel E, Neulen J, Rosing B, Weissenborn U, Jahnen-Dechent W: Association of high fetuin-B concentrations in serum with fertilization rate in IVF: a cross-sectional pilot study. *Human reproduction*. 2016, 31(3):630-637.
9. Zhang L, Jiang XH: [Ultrastructure of unfertilized human oocytes and undivided human zygotes]. *Sichuan da xue xue bao Yi xue ban = Journal of Sichuan University Medical science edition*. 2010, 41(5):810-813.
10. Nakamura T, Iwase A, Bayasula B, Nagatomo Y, Kondo M, Nakahara T, Takikawa S, Goto M, Kotani T, Kiyono T *et al*: CYP51A1 induced by growth differentiation factor 9 and follicle-stimulating hormone in granulosa cells is a possible predictor for unfertilization. *Reproductive sciences*. 2015, 22(3):377-384.
11. Ming L, Liu P, Qiao J, Lian Y, Zheng X, Ren X, Huang J, Wu Y: Synchronization between embryo development and endometrium is a contributing factor for rescue ICSI outcome. *Reproductive biomedicine online*. 2012, 24(5):527-531.
12. Raziell A, Friedler S, Strassburger D, Komarovskiy D, Kasterstein E, Ron-el R: Reproductive performance of patients undergoing intracytoplasmic sperm injection with 100% implantation rate. *Journal of assisted reproduction and genetics*. 2000, 17(7):379-384.
13. Hwang SY, Jeon EH, Kim SC, Joo JK: Clinical factors that affect the pregnancy rate in frozen-thawed embryo transfer in the freeze-all policy. *Yeungnam University journal of medicine* 2020, 37(1):47-53.
14. Ubaldi F, Rienzi L: Morphological selection of gametes. *Placenta*. 2008, 29 Suppl B:115-120.
15. Kahraman S, Yakin K, Donmez E, Samli H, Bahce M, Cengiz G, Sertyel S, Samli M, Imirzalioglu N: Relationship between granular cytoplasm of oocytes and pregnancy outcome following intracytoplasmic sperm injection. *Human reproduction*. 2000, 15(11):2390-2393.
16. Jin H, Shu Y, Dai S, Peng Z, Shi S, Sun Y: The value of second polar body detection 4 hours after insemination and early rescue ICSI in preventing complete fertilisation failure in patients with borderline semen. *Reproduction, fertility, and development*. 2014, 26(2):346-350.
17. Simopoulou M, Giannelou P, Bakas P, Gkoles L, Kalampokas T, Pantos K, Koutsilieris M: Making ICSI Safer and More Effective: A Review of the Human Oocyte and ICSI Practice. *In vivo* 2016, 30(4):387-400.
18. Rubino P, Vigano P, Luddi A, Piomboni P: The ICSI procedure from past to future: a systematic review of the more controversial aspects. *Human reproduction update*. 2016, 22(2):194-227.
19. Liu W, Liu J, Zhang X, Han W, Xiong S, Huang G: Short co-incubation of gametes combined with early rescue ICSI: an optimal strategy for complete fertilization failure after IVF. *Human fertility*. 2014, 17(1):50-55.