

Comparison on the Perinatal Complications for Newborns between by IVF-ET and Natural Delivery

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Abstract: This study was conducted to compare the perinatal complications for newborns by In vitro fertilization with embryo transfer (IVF-ET) and natural delivery. Respectively 50 cases of the IVF-ET and 50 cases of the natural delivery were selected from Hospital of Chengde Medical University as research subjects. All the recruited cases were selected with the newborns from April, 2021 to April, 2022. Defining the IVF-ET as the test group, while the natural delivery as the control group to compare and analyze the perinatal situations and the incidences of complications in both the groups. This study showed that the incidences of pregnancy-induced hypertension, diabetes, multiple pregnancy, premature delivery, and cesarean section in the test group were significantly ($p < 0.05$) higher, than the control group. In addition, the incidences of neonatal respiratory distress syndrome (NRDS) and hyperbilirubinemia of newborns in the test group were statistical ($p < 0.05$) higher, compared to the control group. In contrast, there are no statistically significant differences in terms of hypoglycemia, pneumonia, and neonatal asphyxia incidences between the two groups ($p > 0.05$). Interestingly, there is a significant difference ($p < 0.05$) in the incidences of neonatal cardiac anomalies in both groups, however, no significant differences ($p > 0.05$) were observed in terms of birth defects including hypospadias, the cleft lip and palate, polydactyly, anal atresia, and esophageal atresia in both the groups. In summary, the test tube babies of IVF-ET are more susceptible to complications in their perinatal stage compared with natural delivery newborns, therefore, during the clinical development physicians should strengthen clinical attention and take proactive healthcare management, in order to maintain the health and life of the newborns.

Keywords: IVF-ET; Test tube baby; Newborn of natural delivery, Perinatal stage, Complication

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1. Introduction

In vitro fertilization with embryo transfer (IVF-ET), referring to a process of removing sperm and eggs from the body of men and women, respectively, by using some methods, subsequently fertilize them in a cultured medium, followed by embryos transferring into the women's uterus to grow and develop. With continuous development, this method has been gradually mature, and at present, there are approximately 5,000,000 test tube babies worldwide^[1-3]. Since the incidence of test tube babies has increased in recent years with the development of IVF-ET, clinical physicians have been focusing on the safety of the infant patients, thereby deeply involving themselves in relevant research^[4,5]. Based on this background, taking the test tube babies and natural delivery newborns as research subjects, this study was conducted to analyze the complication during the newborn perinatal stage.

2. Materials and methods

2.1. Study subjects

This study was conducted in Chengde Medical University Hospital from the period of April, 2021 to April, 2022. In this study, 50 test tube babies of IVF-ET were enrolled as the study subjects, and was defined as the test group. Of the 50 cases, 26 were male infants and 24 were female infants, respectively with 33.45 ± 3.18 weeks of average gestational age. Additionally, 50 newborns of natural delivery in the same hospital at the same period were selected as the control group, of which 27 were male infants and 23 were female infants, respectively with 33.55 ± 3.19 weeks of average gestational age. By comparing and analyzing the general materials of both groups through statistical method, both groups were not statistically significant, meaning that data obtained from both the groups can be statistically compared [6-9].

2.2. Research method

After the study subjects in both groups were determined, the hospital records and follow-up registration for those newborns were established. During this process, the perinatal situation in both groups, especially the mother's conditions in pregnant stage, as well as the incidences of complications in both groups, including pregnancy-induced hypertension syndrome, diabetes, premature delivery, and mother's age were examined. Also, the complication incidences of newborns in both groups were assessed, mainly including neonatal asphyxia, neonatal respiratory distress syndrome (NRDS), hypoglycemia, and hyperbilirubinemia. Additionally, the incidences of birth defects, including congenital heart disease (CHD), the cleft lip and palate, and hypospadias were also evaluated.

2.3. Statistical methods

The statistical analysis was performed using SPSS20.0 software, and the calculating results of the measurement data were mainly present as $\bar{x}\pm s$, and the t value was mainly used for verification. While on the statistics on measurement data, the comparison results were counted with n, %, and verified with χ^2 . The data indicated as significant, if the p value is less than 0.05 ($p<0.05$).

3. Results

3.1. Comparison on mother's condition during pregnancy stage

The incidences of pregnancy-induced hypertension syndrome, diabetes, multiple pregnancy, premature delivery, and cesarean section in the test group were significantly ($p<0.05$) higher, than the control group as shown in **Table 1**.

Table 1. Comparison on the adverse conditions of mothers during pregnancy stage in both groups [n (%)]

Group	Pregnancy-induced hypertension syndrome	Diabetes	Multiple pregnancy	Premature delivery	Cesarean section	Placental abnormality	Premature abruption of fetal membrane
Test group (n=50)	15(30.00)	9(18.00)	25(50.00)	20(40.00)	41(82.00)	2(4.00)	7(14.00)
Control group (n=50)	6(12.00)	2(4.00)	3(6.00)	10(20.00)	25(50.00)	2(4.00)	4(8.00)
χ^2	4.882	5.005	24.008	4.762	11.408	0.000	0.919
p	0.027	0.025	0.000	0.029	0.001	1.000	0.338

3.2. Complication incidences of newborns

The incidences of NRDS and hyperbilirubinemia in the test group were significantly ($p < 0.05$) higher, compared with the control group 2, however, no significant difference ($p > 0.05$) in the terms of hypoglycemia, pneumonia, and neonatal asphyxia were found in both groups (**Table 2**).

Table 2. Comparison of complication incidence of newborns in both groups [n (%)]

Groups	NRDS	Hypoglycemia	Pneumonia	Neonatal asphyxia	Hyperbilirubinemia	Apnea
Test group (n=50)	8(16.00)	7(14.00)	8(16.00)	5(10.00)	14(28.00)	6(12.00)
Control group (n=50)	2(4.00)	5(10.00)	9(18.00)	4(8.00)	6(12.00)	5(10.00)
χ^2	4.000	0.379	0.071	0.122	4.000	0.102
p	0.046	0.538	0.790	0.727	0.046	0.749

3.3. Birth defects of newborns

There were significant statistical ($p < 0.05$) differences in the incidences of heart anomalies in both groups, in contrast the incidences birth defects such as hypospadias, the cleft lip and palate, polydactyly, anal atresia, and esophageal atresia in both groups were no statistically significant ($p > 0.05$) as shown in **Table 3**.

Table 3. Comparison of birth defect rate of newborns in both groups [n (%)]

Groups	Heart anomalies	Hypospadias	Cleft lip and palate	Polydactyly	Esophageal atresia	Anal atresia
Test group (n=50)	7 (14.00)	1 (2.00)	1 (2.00)	1 (2.00)	1 (2.00)	1 (2.00)
Control group (n=50)	1 (2.00)	1 (2.00)	1 (2.00)	1 (2.00)	0 (0.00)	1 (2.00)
χ^2	4.891	0.000	0.000	0.000	1.010	0.000
p	0.027	1.000	1.000	1.000	0.315	1.000

4. Discussion

In a recent development, insufficient awareness of health issues, and changes in the life habits of women, leading to the increased in the incidences of female infertility in the country, resulting in an increased incidence of IVF-ET to a certain extent, as well as the increased population of test tube babies [10-12]. The IVF-ET usually requires to transfer 2-3 embryos at the transfer center to improve the success rate of the pregnancy in a single transferring. Thus, in general, the rate of multiple pregnancy in IVF-ET is significantly higher, than in natural pregnancy [13-16]. At the present clinical situation, there is a common complication usually occurred in test tube babies with multiple pregnancy, which would be a health-threatening issues to mother and baby.

In this study, by researching on 50 cases of test tube babies and 50 cases of natural newborns, it showed that the multiple pregnancy rate in the test group was significantly ($p < 0.05$) higher than the control group. Also, the results demonstrated that multiple pregnancy is the major cause of premature delivery. Moreover, a significant higher incidence of premature delivery was found in the test group compared with the control group, which verified the above conclusion. Under the background of continuous development and advancement of IVF-ET technology, the twin or multiple pregnancy rate has been constantly increasing,

leading to an increased in the population of premature newborns, resulting in the rising incidence of complications related to premature delivery ^[17,18]. Based on the results from this study, the age of the mothers with IVF-ET was older than the natural pregnancy, which implies that most mothers performed IVF-ET after diagnosed with infertility, or long-term unsuccessful pregnancy ^[19]. In addition, the results also demonstrated that the rate of cesarean section of puerperae in the test group was significantly higher than the control group, which suggests that IVF-ET could increase the rate of clinical cesarean section, and this can be explained by these three reasons; (1) Emphasis on test tube babies from their families and health care workers, the indication of cesarean section was extended; (2) The multiple pregnancy rate of IVF-ET is usually high, therefore in the circumstance of multiple pregnancy, it would increase the incidence of perinatal complication for puerperae. Furthermore, puerperae may suffer various complications with serious symptoms, therefore they have to perform a cesarean section; (3) Due to the nervous emotion and moods of puerperae with IVF-ET during last stage of pregnancy, the intensive desire of having a baby, as well as high family stress, most puerperae choose to have a cesarean section ^[20].

In general, the assisted reproductive technology (ART) is performed to human chorionic gonadotropin (HCG) during the process of controlled ovarian hyperstimulation, in return the HCG may stimulate the renin-angiotensin-aldosterone system (RAAS) of the patients, resulting in a higher incidence of pregnancy-induced hypertension syndrome ^[21]. In addition, multiple pregnancy may increase the uterine cavity pressure of puerperae, which is most likely to result in placental ischemia. During this process, the active lipid peroxidation and the leukocytes at intervillous space strengthen the oxidative stress reaction of puerperae, leading to immune injury, subsequently obstructing the function of vascular endothelial cells and injuring their structure, further may increase the incidence of pregnancy-induced hypertension syndrome ^[22-25]. The results of this study showed that the incidences of complications of puerperae in the test group were significantly higher, than the control group. Besides, it is demonstrated that multiple pregnancy tends to cause premature delivery and injured the organ function of the test tube babies, leading to neonatal hypoplasia, and other kinds of complications. In addition, a significantly higher incidence ($P<0.05$) of neonatal RNDS was found in the test group compared with the control group. RNDS is a common complication in premature test tube babies with poor clinical treatment effect and high mortality to the patients. Therefore, physicians should provide individualized treatment for patients based on their actual conditions, to maintain a healthy life for the newborns. In addition, the higher incidence of neonatal hyperbilirubinemia in the test group compared with the control group, suggesting that clinically it might be relevant to elder age mothers of IVF-ET demanding for the cesarean section. Besides, the incidence of neonatal congenital heart defect in the test group was higher than the control group ($P<0.05$), which implies that IVF-ET might cause birth defects, suggesting physicians to provide genetic testing for the newborns during their embryo transferring to reduce the rate of birth defects.

In conclusion, during clinical development, the test tube babies with IVF-ET are more susceptible to complications, compared to the natural delivery newborns, suggesting that physicians should strengthen clinical attention, and take proactive healthcare management to maintain the healthy life for the newborns.

Disclosure statement

The authors declare no conflict of interest.

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