

Analysis of relevant risk factors for intrauterine death of fetuses in the third trimester of pregnancy

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Abstract: Our study aimed to explore the relevant risk factors for intrauterine death of fetuses in the third trimester of pregnancy via a retrospective analysis. Then, 98 pregnant women with intrauterine death of fetuses in the third trimester of pregnancy were enrolled, who had undergone the induced labor of dead fetuses in our hospital from January, 2013 to January, 2015. By taking their disease conditions into considerations, methods of induced labor as softening of cervix with dinoprostone suppositories and amniotic infusion of ethacridine or oxytocin were performed, and the timely cesarean section for termination of pregnancy was performed. After the treatment, a detailed medical history was recorded, including their family history, past history and conditions of this pregnancy. Besides, autopsy of dead fetuses and pathological examinations were performed as well as chromosome examinations of the placenta, the umbilical cord and the fetal membrane in an attempt to identify the relevant factors for causes of death, so as to do a good job in the post-natal consultation. The induced labor procedures were successfully performed on all pregnant women, and the investigation of causes of intrauterine death showed that placental factors were responsible for the largest proportion of all causes of intrauterine death in single (28 patients), which was 31.82%, including 13 patients with placenta praevia and 13 with placental abruption. The secondary factors were umbilical cord factors, accounting for 30.68%. Among the factors of pregnant women, gestational hypertension occurred in 7 patients, accounting for 58.33% of factors of pregnant women. While among the causes of intrauterine death in twins, umbilical cord factors were found to be the main causes of death, accounting for 30.00%, followed by placental factors and factors of pregnant women, which accounted for 20.00%, respectively. Placenta factors, umbilical cord factors and factors of pregnant women were the main causes of intrauterine death of fetuses in the third trimester of pregnancy. Therefore, pregnancy tests on time for routine screening is recommended for pregnant women so as to identify the potential risk factors in time and actively carry out symptomatic treatment, thereby reducing the chances of intrauterine death of fetuses and improving the qualities of pregnancy. It is worth clinical attention.

Keywords: Fetuses in the third trimester of pregnancy, intrauterine death, risk factors, analysis.

INTRODUCTION

With the continuous development of modern society, people are increasingly paying attention to health care, particularly in the treatment of pregnant women, while the perinatal mortality is an important basis for the evaluation of the medical qualities of a country or region (Liu *et al.*, 2014). Fetuses in the third trimester of pregnancy refer to the intrauterine fetuses after over 28 weeks of pregnancy, when the fetuses have almost complete development of various organs and systems. However, fetuses at this time are often prone to influences of such aspects as pregnant women or placentas, umbilical cords and themselves, etc, which can lead to fetal distress and even intrauterine death of fetuses. This study provides a more in-depth study in the diagnosis, treatment and prevention of maternal and fetal diseases, etc. 98 pregnant women with intrauterine death of fetuses in the third trimester of pregnancy who had undergone the induced labor of dead fetuses in our hospital from January, 2013 to January, 2015 were selected and the relevant risk factors and

causes of death were retrospectively analyzed. Now the study is reported as follows.

Data and methods

Clinical data

98 pregnant women with intrauterine death of fetuses in the third trimester of pregnancy who had undergone the induced labor of dead fetuses in our hospital from January, 2013 to January, 2015 were selected. This study was conducted after the pregnant women signed the informed consent and had been reviewed and approved by the Clinical Research Ethics Committee of Medicine of our hospital. Patients enrolled in this study must meet the following criteria: (1) whose intrauterine pregnancy had been confirmed by the ultrasound examinations, etc; (2) who had been pregnant for over 28 weeks; (3) who had previous pregnancy tests in which the normal fetal movement and fetal heart tones had been recorded; (4) whose fetal heart could not be heard through examinations conducted in our hospital or other hospitals and who had been diagnosed with harboring dead fetuses via the B-ultrasound examinations; (5) who were not complicated by other malignancies and (6) who or whose

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families had been informed and agreed on the study (Zhou, 2014; Deneff *et al.*, 2015). Of all pregnant women admitted to our hospital, 88 presented with single fetal death, accounting for 89.80% and 10 presented with death of one twin, accounting for 10.20%. The general data of these two types of pregnant women are shown in table 1 and it was found that ages, gestational ages and the ratios of primiparas to pluriparas between the two groups were not significantly different ($P>0.05$) and thus were comparable between the patients.

Treatment methods and observation of disease causes

Of all the 98 patients presenting with dead fetuses admitted to our hospital, 55 underwent the induced labor through the softening of cervix with dinoprostone suppositories, the amniotic infusion of ethacridine or oxytocin, etc and another 43 underwent the cesarean section for termination of pregnancy. After the surgical procedures, they were routinely supplemented with nutrition and closely monitored for vital signs. During the whole process of treatment, the medical staff combined their detailed medical history, including their family history, past history and conditions of this pregnancy, and also recommended the autopsy of the dead fetuses and pathological examinations as well as chromosome examinations of placentas, umbilical cords and fetal membranes in an attempt to find the related factors for the causes of death, so as to do a good job in the post-natal consultation (Zhou YY, 2012; Ruan ZH, 2012). According to reports of relevant literature, related risk factors leading to the intrauterine death of fetuses in the third trimester of pregnancy are generally divided into the following five categories: (1) placental factors: placenta praevia, placental abruption, vasa previa, acute chorioamnionitis and hemorrhage of placenta, etc; (2) umbilical cord factors: Cord velamentous insertion, knot of umbilical cord, circulator of umbilical cord and umbilical cord abnormalities, etc; (3) fetal factors: Fetal malformations, fetal growth restriction, fetal infection, twin to twin transfusion syndrome and maternal-fetal blood group incompatibility, etc; (4) factors of pregnant women: Gestational hypertension, diabetes, antiphospholipid-antibody syndrome and shocks due to various causes and (5) unknown reasons: Abnormalities found in pregnant women and fetuses, umbilical cords and the amniotic fluid (Ma and Quan L, 2015; Shen, 2014).

STATISTICAL ANALYSIS

SPSS18.0 was selected for data statistics. The data were expressed as mean \pm standard deviation ($\bar{x} \pm s$), the comparison between measurement data were made using the t test, the count data were compared using the χ^2 test and the ranked data were compared using the rank-sum test. Differences were considered statistically significant when $P<0.05$.

RESULTS

Analysis of causes of intrauterine death in single

The analysis of the causes of intrauterine death in single showed that placental factors were responsible for the largest proportion of all causes (28 patients), which stood at 31.82%, including 13 patients with placenta praevia and 13 with placental abruption. The secondary factors were umbilical cord factors, accounting for 30.68%. While among the factors of pregnant women, gestational hypertension occurred in 7 patients, accounting for 58.33% of factors of pregnant women. Details are shown table 2.

Analysis of causes of intrauterine death in twins

Among the causes of intrauterine death in twins, umbilical cord factors were found to be the main causes of death, accounting for 30.00%, followed by placenta factors and factors of pregnant women, which accounted for 20.00%, respectively. Details are shown in table 3.

Comparisons and analysis of the causes of intrauterine death of fetuses in two types of pregnant women

Comparisons of the causes of intrauterine death between two types of pregnant women showed that differences in placental factors, umbilical cord factors, fetal factors, factors of pregnant women and unknown reasons were not significantly different ($P>0.05$). Details are shown in table 4.

DISCUSSION

The blood for fetuses' use in the uterine is derived from pregnant women and the supplies of nutrients and the expulsion of metabolites are transfused through the placenta. Relevant studies show that currently tissue hypoxia caused by a variety of factors is considered to be the common cause of intrauterine death of fetuses in the third trimester of pregnancy and that even if pregnant women suffer from mild hypoxia, the effect on them may be extremely minor, while the risks for fetuses who have not developed perfectly in every aspect may be fatal (Huang *et al.*, 2014; Wang *et al.*, 2012). Pregnant women tend to visit doctors when they feel the disappearance of fetal movement consciously or abdominal discomfort, and the B-ultrasound examination confirms the fetal death. Therefore, high attention is paid to the perinatal mortality in a country or region. In advanced countries or regions, the perinatal mortality is generally less than 0.10%, while it is as high as 2.66% in China. And because of the unbalanced development between urban and rural areas and the uneven regional medical levels, a proportion of fetuses in the third trimester of pregnancy fall victim to fetal distress, which often not only leads to intrauterine fetal death, but also threatens the lives of pregnant women (Stergiotou *et al.*, 2015; Lv *et al.*, 2013; Huang, 2012). In this case, both the lives of fetuses and pregnant women

Table 1: Comparison of general data between the 2 types of pregnant women

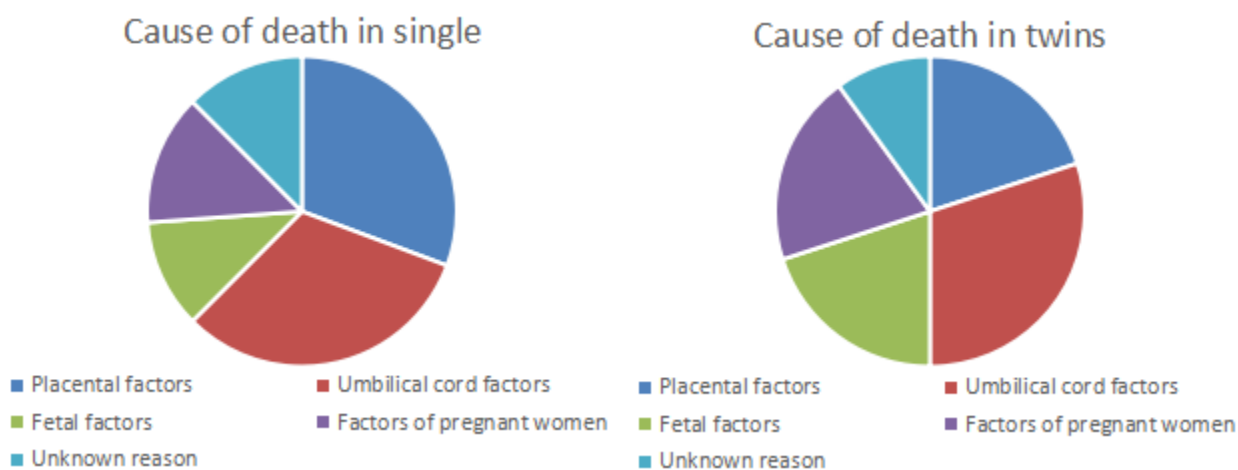
	Number of cases	Primiparas/ Pluriparas	Age ($\bar{x} \pm s$, Years)	Gestational age ($\bar{x} \pm s$, Weeks)
Pregnant women with intrauterine death in single	88	69/19	30.5±4.6	33.4±3.8
Pregnant women with intrauterine death in twins	10	7/3	33.5±5.4	32.8±2.0
Statistical value		0.3647	1.9206	0.4900
P value		0.5459	0.0578	0.6252

Table 2: Analysis of causes of intrauterine death in single (n(%))

	Placental factors			Umbilical cord factors	Fetal factors	Factors of pregnant women		Unknown factors
	Placenta praevia	Placental abruption	Others			Gestational hypertension	Others	
Intrauterine death in single	13 (14.77)	13(14.77)	2 (2.28)	27(30.68)	10 (11.36)	7(7.96)	5(5.68)	11(12.50)

Table 3: Analysis of causes of intrauterine death in twins (n(%))

Intrauterine death in twins	Placental factors	Umbilical cord factors	Fetal factors	Factors of pregnant women	Unknown reasons
	2 (20.00)	3 (30.00)	2(20.00)	2(20.00)	1(10.00)



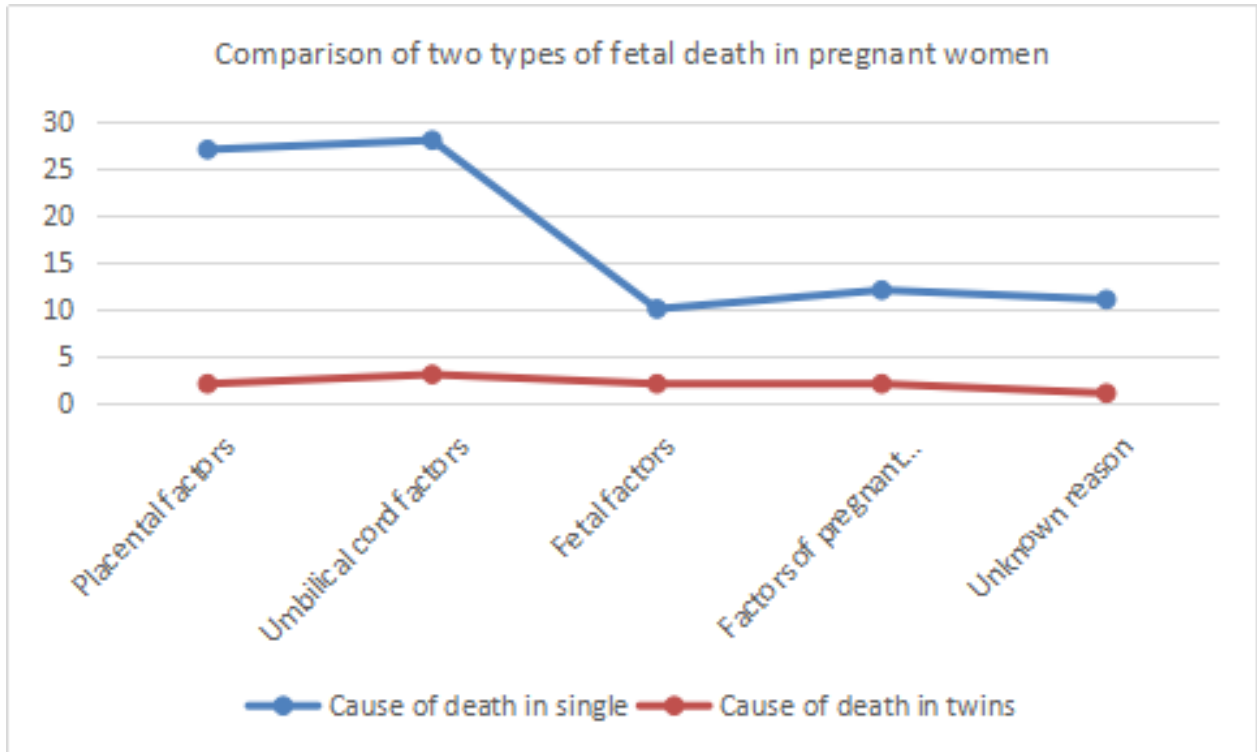
are hard to save and tragedies will occur, so the whole country and society are increasingly paying attention to the diagnosis, treatment and prevention of such diseases.

This study investigates and analyzes the relevant risk factors for the intrauterine death of fetuses in the third trimester of pregnancy, and the main causes of death are still centering on five risk factors: Placental factors, umbilical cord factors, factors of pregnant women, fetal factors and unknown factors. Taking the patients admitted to our hospital into consideration, the results show that both the intrauterine death in single and in twins occupy a certain proportion on these five risk factors and there are no significant differences. The incidence of intrauterine death in single accounted for 89.80% of the overall mortality rate, in which placental factors, as the main risk

factors for death, accounted for 31.82%. Placenta praevia, which was the result of decreased oxygen content in pregnant women due to repeated and painless vaginal bleeding in the third trimester of pregnancy, and placenta abruption, which occurred as a result of pregnant women' failure to pay enough attention and seek medical advice in time due to their poor medical consciousness, accounted for 92.86% of placental factors. All of these strongly indicate that there may be an enough close relationship between the intrauterine death of fetuses in the third trimester of pregnancy and fetuses' death due to lack of blood and hypoxia induced by the placental dysfunction (Zhao, 2013). The secondary causes are umbilical cord factors, which account for 30.68%. While the umbilical cord abnormalities may be associated with such factors as super high-intensity exercises, frequent fetal movement

Table 4: Comparisons of the causes of intrauterine death of fetuses between two types of pregnant women (n(%))

	Placental factors	Umbilical cord factors	Fetal factors	Factors of pregnant women	Unknown reasons
Intrauterine death in single	28 (31.82)	27 (30.68)	10 (11.36)	12(13.64)	11(12.50)
Intrauterine death in twins	2(20.00)	3(30.00)	2(20.00)	2(20.00)	1(10.00)
χ^2 value	0.5904	0.0020	0.6233	0.2970	0.0522
P value	0.4422	0.9646	0.4298	0.5858	0.8192



and polyhydramnios, etc. of pregnant women in the third trimester of pregnancy, all these factors eventually leading to the same outcomes. However, factors of pregnant women, which accounted for 13.64%, cannot be ignored, including gestational hypertension, a disorder that can cause spasm of systemic small arteries, endothelial injury and local bleeding. The perfusion of all the viscera in all the systems reduces, including the reduction in the placental blood flow in the uterine, which results in decreased placental function and thus causes fetal death (Mastrolia *et al.*, 2015). This accounts for 58.33% and other complications include anemia, etc. When pregnant women present with severe anemia or the oxygen supply and nutrients of placentas cannot meet the needs of fetuses, fetal distress and even death will occur easily. For the above-mentioned risk factors, timely and regular pregnancy tests, early diagnosis and treatment and timely termination of pregnancy can avoid such tragedies.

To prevent such diseases, it is recommended that pregnant women in the third trimester of pregnancy should adjust their habits of living and diets, exercise properly and increase the frequency of pregnancy tests. With the

continuous advances in medical technologies, the routine fetal heart monitoring, the biophysical profile score and the color doppler ultrasonography, etc should be performed in time on high-risk pregnant women so as to learn the conditions of the fetus and placenta, etc and enhance monitoring (Saccone *et al.*, 2015; Zhao and Zheng, 2014). Relevant medical knowledge should be taught to high-risk pregnant women so that they can master the fetal movement counting. And if any abnormal changes are found, they should immediately seek medical advice. The reproductive tract infections should be prevented, and blood pressure and blood glucose levels should be measured on a regular basis. And if serious complications occur, all factors should be taken into consideration and pregnancy should be terminated in time, so as to prevent intrauterine fetal death and the endangering of the lives of pregnant women and to alleviate the suffering caused by the disease, thereby solving the big medical issues in the society.

To sum up, analysis of the related risk factors for the intrauterine death of fetuses in the third trimester of pregnancy show that placental factors, umbilical cord

factors and factors of pregnant women represent the major causes and particular attention should be paid to such risk factors clinically. Regular monitoring, symptomatic treatment and timely termination of pregnancy should be carried out to reduce the incidence of intrauterine fetal death and enhance the therapeutic effects. Therefore, it is worthy of being widely used in clinical practices.

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