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Seasonality in Early Loss of One Fetus Among Twin Pregnancies

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Abstract. Ultrasonographic examinations were performed on 519 pregnant women in the first trimester at three hospitals in Tokyo from August 1985 to March 1987. Among 519 women, two fetal heart movements (FHMs) were confirmed in six cases. In two of these six cases, one of two FHMs disappeared two weeks later, and these were considered the “vanishing twin”. In eight cases among those with ultrasonographic image of echo-free-space (EFS) in the uterus, the observed EFS was considered to be a probable empty gestational sac (GS-like-EFS-image). Seven of eight GS-like-EFS-images were observed in October-December ($p < 0.01$) and two “vanishing twin” cases were also observed in the same season. Spontaneous abortion occurred in 11 cases and these were also more frequently observed in October-November ($p < 0.05$). Some abortive factor is supposed to have prevailed in October-December. All six women having twin fetuses (including the “vanishing twin” cases) were born in January-May ($p < 0.05$) and those having GS-like-EFS-images or terminating their pregnancy in spontaneous abortion were also born more frequently in the same season. Twin-prone and abortion-prone characteristics of the women born in this season are considered.

Key words: Vanishing twin, Seasonality

INTRODUCTION

A seasonal variation in twin births has been reported by several authors [2-4,6-9,11,12,18,20-22,24] and some causative factors such as sunlight [3,24], rainfall [12] and temperature [11] have also been proposed. No persuasive explanations which can generally explain this seasonality, however, have been presented.

Several causes for the seasonality of twin births can be considered such as a seasonal variation of the rate of multiple ovulation, that of the early separation of fertilized ovum

and that of the spontaneous abortion. Among these causes, it seems to be more practical to examine the seasonal variation of spontaneous abortions in general or in twin pregnancies. There have been several studies on the seasonality of spontaneous abortions [1,5,13,17], which however, could not show any correlation between the frequency of spontaneous abortions and the seasonality of births or twin births. This failure is probably due to a great number of unrecognized abortions at a very early stage of pregnancy.

Since the development of ultrasonography, the fetus after the fourth or fifth week can be visualized and the rates of twin fetuses and of their abortions at a fairly early stage became detectable. By this method, a much higher rate of multiple pregnancies than actual multiple deliveries has been detected [10,14-16,23,25]. It has been reported that up to 78% of cases diagnosed ultrasonographically as multiple pregnancy have terminated in singleton deliveries [14]. This early loss of one of two fetuses is called the "vanishing twin".

While several authors have reported the frequency of the "vanishing twin" cases [10,14-16,23,25], the seasonal occurrence of these cases has not yet been examined. Since we are assuming some "seasonal infertility factors" as a cause of seasonal variation of births [19] and twin births [18,22], the "vanishing twin" may be caused also by the same factors and may show a seasonality correlated with that of the general births or twin births. To examine this assumption the seasonality of possible "vanishing twin" cases and spontaneous abortions were examined.

We have also reported that there is a certain change in the twinning rate and in the general birth rate according to the month of mother's birth [18,19,21,22] and supposed that females born in a particular season become twin-prone and also abortion-prone [18,22]. In the present study, the birth season of the pregnant women was also examined.

MATERIAL AND METHODS

Ultrasonographic examinations were performed on 519 pregnant women in the first trimester for confirmation of pregnancy at three hospitals in Tokyo during the period between August 1985 and March 1987. The gestational week at the first observation was

Table - Outcome of ultrasonographically diagnosed twin pregnancies

| Patient | 1st observation | | 2nd observation | | Outcome |
|---------|-----------------|--------------|-----------------|--------------|-----------------------|
| | Stage | Finding | Stage | Finding | |
| 1 | 9w4d | 1sac , 2FHMs | | | Artificial abortion |
| 2 | 9w6d | 2sacs, 2FHMs | | | 36w3d twin births |
| 3 | 11w0d | 2sacs, 2FHMs | 13w4d | 1sac , 1FHM | 40w0d singleton birth |
| 4 | 7w0d | 2sacs, 2FHMs | 9w0d | 2sacs, 2FHMs | 31w6d twin births |
| 5 | 9w0d | 1sac , 2FHMs | 11w0d | 1sac , 1FHM | 40w0d singleton birth |
| 6 | 7w5d | 2sacs, 2FHMs | 8w5d | 2sacs, 2FHMs | Artificial abortion |

within the range of 5-13 in more than 95% of all cases which ranged from 5 to 18 gestational weeks. Ultrasonographic images of gestational sac and fetal heart movement were examined by careful scanning. The scanning was repeated at intervals of a week until the outcome of each gestational sac was confirmed. The pregnant women were inquired about complications of bleeding and infectious diseases during their present pregnancy.

RESULTS

Two fetal heart movements (FHM) were confirmed in each of six cases and one FHM disappeared two weeks later in two of six cases (Table). These two cases were considered to be the "vanishing twin". Two of six cases terminated in twin births. In eight cases among those with ultrasonographic image of echo-free-space (EFS) in uterus, the EFS was considered to be a probably empty gestational sac (GS-like-EFS-image).

The GS-like-EFS-images were more frequently observed during the period of October-December (7/182 vs 1/337 in the other months, $\chi^2_1 = 7.6$, $p < 0.01$) and two cases of "vanishing twin" were also observed in this season (Figure, A).

The last menstruation of the cases with GS-like-EFS-image occurred in the months between September and December (8/222 vs 0/295 in the other months, $\chi^2_1 = 8.6$, $p < 0.01$) and that of two "vanishing twin" cases was in September (Figure, B).

Eleven cases diagnosed as spontaneous abortion were more frequently observed during the period of October-November (6/119 vs 5/400 in the other months, $\chi^2_1 = 4.7$, $p < 0.05$). The last menstruation in these cases happened more frequently, but not significantly, in July-December (8/328 vs 3/189 for the other months).

The birth months of the women having twin fetuses (including the "vanishing twin" cases) were found exclusively during the period between January and May (6/245 vs 0/275 in the other months, $\chi^2_1 = 4.8$, $p < 0.05$) and those of the women with GS-like-EFS-images were mainly within a similar period (7/324 in November-May and 1/195 in the other months) (Figure, C). Eight of eleven women whose pregnancy spontaneously terminated in abortion were also born in the same season (8/294 in December-May and 3/235 in other months).

DISCUSSION

The incidence of twin pregnancy by the ultrasonographic examination during the first trimester is generally twice or more than that at delivery. Among European countries, where the rate of twins at birth is about 1%, the incidence of ultrasonographically-diagnosed multiple pregnancy was found to be 1.7% in France [16] and 2.0% in England [25].

The frequency of twin pregnancy in the present study was estimated to be about 1% (six cases including two "vanishing twin" cases among 519 cases) vs 0.6% in the general population of Japan.

The rate of the "vanishing twin" cases in the present study is 33% (2/6). But these values may be underestimated since there is a possibility that the GS-like-EFS-images

were once an actual GS with an embryo. If we include all the cases with GS-like-EFS-images into the “vanishing twin” cases, the frequency of twin pregnancy can be estimated at 2.7% (14/519) and that of the “vanishing twin” at 70% (10/14). Estimation of the incidence of twin disappearance at an early stage is considerably difficult. The reported rates vary from 0% to 78% depending on the timing and number of ultrasonographic scanning performed [14].

Though the number of cases examined in our survey is too low to estimate the incidence of vanishing twins, it is noteworthy that most cases diagnosed or suspected as van-

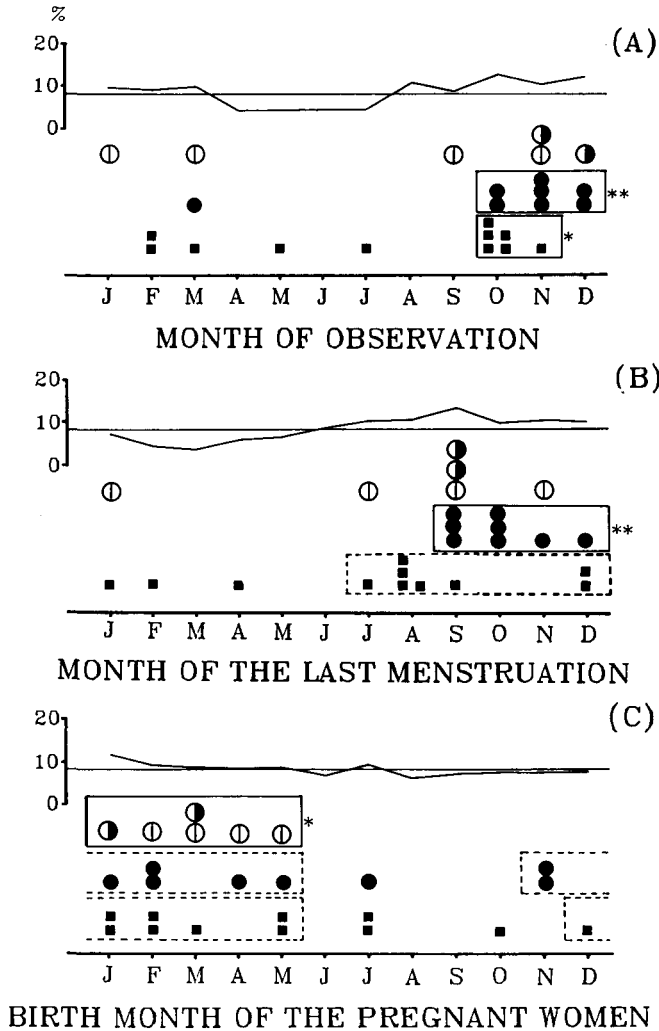


Figure. Monthly distribution of observed cases (—), cases with twin fetuses (⊙), with a “vanishing twin” (●), with GS-like-EFS image (●), and cases which terminated in spontaneous abortion (■). (A): month of observation; (B): month of the last menstruation; (C): month of pregnant women’s birth. *: $p < 0.05$ by χ^2 -test; **: $p < 0.01$ by χ^2 -test.

ishing twins (cases with GS-like-EFS-image) were observed in one period between October and December. The cases diagnosed as spontaneous abortion were also more frequently observed during the period of October-November. These coincidences suggest that a certain local abortive factor is suspected to have prevailed during this particular period to affect fetuses at an early stage.

Because not only all six women having twin fetuses (including two "vanishing twin" cases) but also five of eight women having suspected "vanishing twin" were born from January to May, the real rate of twin conception of the women born in this period must be very high. The twinning rate has been reported to differ according to the season of mothers' birth [18,21,22]. The present result is consistent with these previous findings on Japanese twins' mothers

The birth months of women whose pregnancy terminated in spontaneous abortion were also in the same season. It can therefore be assumed that the women born in this period, from winter to early summer, might be not only twin-prone but also abortion-prone. In our previous reports, we suggested that these women might be twin-prone and also abortion-prone on account of seasonal factors which prevailed around their birth [18,22].

What kind of seasonal abortive factor prevailed in October-November? Some infectious factor such as rubella virus, which can induce fetal death, may be one of the most likely. Though many pregnant women in this season had complications such as common cold, no specific infectious disease could be indicated in this period. Even if some infectious factor actually prevailed, its effect on pregnant women could be without symptoms, its effect on fetuses being not so severe as to harm both fetuses. Under an epidemic of such a mild factor, whether a fetus is missed or not may depend on the vulnerability of the pregnant women with regard to this factor. Should a group of women, born in a particular period (January-May) to be abortion-prone and also twin-prone, be exposed to the seasonal abortive factor (which prevails in October-December), early abortion, including twin fetuses, would be more frequent than in the other pregnant women. And some of the twin cases, by loss of only one fetus, would become "vanishing twin" cases.

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