



## The Assessment of the Umbilical Blood Flow of the Surviving Twin after the Intrauterine Death of the Other Twin

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**Abstract.** This paper summarizes our experience with Doppler velocimetry in survivors of intrauterine co-twin demise. In the first trimester, ten dichorionic deaths occurred; none of the survivors developed flow disorders. During the second trimester, there were three intrauterine demises, two of them were monochorionic and the survivors developed flow disorders: one presented transitory venous flow aberration, the other one an impaired development of diastolic flow. In the third trimester, two intrauterine deaths occurred. One case of twin to twin transfusion syndrome (TTTS) was complicated by the donor's death and the recipient showed a loss of diastolic flow. The second one happened during a dichorionic twin pregnancy. The survivor presented high systolic/diastolic daily ratio ( $S/D = 7.8$ ).

**Key words:** Twin pregnancy, Single fetal demise, Doppler ultrasound, Twin doppler

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### INTRODUCTION

Twin pregnancies belong to the high risk group. Multiple pregnancies are more likely to present either frequent obstetrical complications, which occur in unifetal pregnancies, and pathologies which are characteristic for multiple pregnancies only. One of such complications is the intrauterine death of one of the fetuses.

The aim of our study was a long-term assessment of the blood flow in the umbilical vessels of a surviving twin after the intrauterine death of the other one.

### MATERIAL AND METHODS

Between 1990 and 1994, 86 primarily twin pregnancies were observed at the Obstetrics-Gynecological Department of the Regional Hospital in Kutno; 15 of them were complicated

by the intrauterine death of one of the fetuses. In 10 cases the fetus died in the first trimester, in 3 cases in the second trimester, in 2 cases in the third trimester of gestation (Table 1).

The blood flow was measured in the umbilical arteries and veins of the surviving fetus, first using a Hitachi EUB-40, and in the last two years using a B and K Medical 3535. In all the cases a 3.5MHz convex probe in 2D projection + pulse Doppler were used. The level of the wall filter was constant and was 100 Hz, and the size of the gate was 3mm. The arterial flow was analysed on the basis of the systole/diastole /S/D/ ratio, and the venous flow analysis was based on the visual evaluation of the recording.

**Table 1 - Characteristics of twin pregnancies complicated by the intrauterine death of one of the fetuses**

Time when the fetus died	number of cases	time of delivery	type of twin pregnancy
1st trimester	10	at term	DC DA
2nd trimester			
13Hbd	1	39Hbd	DC DA
14 Hbd	1	34 Hbd	MC DA
16 Hbd	1	40 Hbd	MC DA
3rd trimester			
31 Hbd	1	34 Hbd	DC DA
33Hbd	1	34 Hbd	MC DA

DC DA: dichorionic diamniotic pregnancy

## RESULTS

In ten cases of the primarily twin pregnancies, one twin died intrauterinely in the first trimester of gestation. Consecutive sonographic examinations revealed no pathological levels of Doppler parameters in the surviving twins. The only clear obstetrical complication observed at the time was bleeding from genital tracts of different intensity and duration. This induced to hospitalize the patients and examine them ultrasonographically.

In three twin pregnancies the intrauterine death of one fetus occurred in the 2nd trimester of gestation. In one case the diastolic flow delayed considerably /28Hbd/. It was a surviving fetus with the Dandy-Walker syndrome and congenital gastroschisis, whose co-twin had died intrauterinely in the 14th week of monochorionic diamniotic twin gestation. Another case is represented by a monochorionic diamniotic pregnancy. One fetus died in the 16th week of gestation, whereas the surviving fetus revealed a pathological flow in the umbilical vein in the form of non-respiratory venous pulsation and too high recoil wave in the inferior caval vein. This pathological image persisted for about four weeks and then disappeared. The infant was born in the 40th week of gestation and is now alive. The third case was a dichorionic pregnancy. The surviving fetus, after the co-twin's death in the 13th week of gestation, revealed no pathological flows in Doppler measuring.

In two twin pregnancies, one fetus died intrauterinely in the 3rd trimester of gesta-

tion. In the first case, after one fetus died in the 31st week of twin dichorionic gestation, the surviving one had very high Stuart index /S/D/. Previous examinations showed an index for both fetuses between 3.6 and 3.9. After the intrauterine death of one twin, we observed an increased of the S/D index in the surviving twin up to 7.8 on the day of delivery /34Hbd/. The infant is alive. The second case was a monochorionic diamniotic pregnancy complicated by persistent interfetal blood leakage. The donor died intrauterinely in the 33rd week of gestation, whereas the recipient survived with fetal hydrops and for several days had increased S/D values – from 4.0 to 5.0 – and just before being born (34Hbd) no diastolic flow. The infant is alive and growing up well.

## DISCUSSION

Ultrasonography, being routinely used in the 1st trimester of pregnancy made it possible to verify opinions about the frequency of primarily multifetal gestations. It was proved that the true rate of twin pregnancies is much higher than that observed at the term of delivery [2, 6, 7, 8, 14]. About 70% of pregnancies recognized as multifetal in the 1st trimester are believed to terminate with only one fetus born [6]. Part of twins also die in the later period of pregnancy. Thus a question arises: what about the pregnant woman and the surviving fetus in all these cases?

Both our observations and the literature [1, 2, 3, 8] prove that, in twin gestations, the intrauterine death of one of the fetuses creates no serious danger to the health and life of a pregnant woman. In the literature available we have found only three cases when this condition resulted in the intravascular clotting syndrome in the mother's circulatory system [9, 11, 13]. In all these cases it was successfully treated with heparin, and the pregnancies were carried to term.

The second part of the question cannot be answered so clearly. Thus it is extremely important to evaluate the wellbeing of a fetus intrauterinely and to monitor its further development. This is possible by measuring the blood flow in the umbilical and intrafetal vessels with a Doppler probe.

The findings of our examinations have proved that in the group of pregnancies where one fetus died in the 1st trimester, the surviving one revealed no pathological Doppler measurements. A more important fact is that all these pregnancies were dichorionic. It cannot be excluded that such pathologies may be observed in monochorionic pregnancies.

The presence of flow in the diastolic phase in an umbilical artery is associated with the developmental phase of capillaries in tertiary villi [10, 12]. It is commonly believed that in unifetal pregnancies this flow should be seen in the 20th week of gestation at the latest [5, 10]. Its delayed appearance may result from a pathological course of pregnancy – chromosomal aberrations, fetal developmental anomalies, pathologies within tertiary villi [5, 10]. In one of our cases we observed considerably delayed flow in the diastolic phase [28Hbd]. It was observed in a fetus presenting the Dandy- Walker syndrome and congenital gastroschiasis. Thus the delayed flow in the diastolic phase might be of help for an early prognosis. In another case of a twin dying in the 16th week of gestation, the surviving twin revealed transient disturbances of venous flow. However, they were of no prognostic value, because the fetus was born at term and is developing well. In the third

case of a dichorionic pregnancy we observed no pathological vascular Doppler measurements in the surviving fetus.

In two cases one of the fetuses died intrauterinely in the 3rd trimester of a twin pregnancy. One case was a dichorionic pregnancy with the surviving fetus's S/D values growing as high as 7.8 on the day of delivery. The baby was born with low Apgar scale – 3 after the first minute, 4 after fifth – and needed a prolonged care at a newborn ward. The other case was a twin monochorionic pregnancy complicated by persistent intrafetal bleeding. The surviving “recipient” fetus first had high stuart index values – from 4.0 to 5.0 – then the flow in the diastolic phase disappeared. This particularly pathological Doppler measurement resulted probably from very bad hemodynamic conditions in the fetus's circulatory system – polycythemia, polyglobulia, hypertension. In the postpartum period the newborn needed an enhanced intensive medical care. In both these cases Doppler measurements had a significant prognostic value.

However, current litterature cannot provide exhaustive reports either on the vascular flow in a surviving twin after the co-twin's intrauterine death in the 1st and 2nd trimester of gestation, and on the events on the 3rd trimester. We could examine only few fases, and we could not reach definite and reliable conclusions. However it seems that prognosis for surviving twins may essentially depend on:

1. period during which the co-twin's death has occurred;
2. type of pregnancy (monochorionic or dichorionic);
3. cause of the co-twin's intrauterine death;
4. quality of obstetrical care.

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