Death of One Twin Followed by Extremely Variable Flow Velocity Waveforms in the Surviving Fetus

M. Monique Lander
H. Henk Oosterhof
J.G. Jan G. Aarnoudse

Department of Obstetrics and Gynaecology, State University Hospital, Groningen, The Netherlands

Key Words
- Doppler
- Twin
- Pregnancy
- Fetal death

Abstract
Intrauterine death of one fetus after the second trimester in a twin pregnancy, with continuation of the pregnancy is a rare complication. The risks of morbidity and mortality for the surviving fetus are high. A 32-year-old woman was admitted to the antenatal ward at 27 weeks gestation because of intrauterine death of one twin. During the first 24 h after the death of one twin, Doppler ultrasound assessment showed a remarkable variability in flow velocity waveforms in the umbilical artery of the surviving fetus. Changes from reversed to normal end-diastolic flow velocities were recorded within 6 min. These findings are explained by twin-to-twin transfusion due to intravascular blood pressure changes, or by release of vasoactive substances by the dead fetus.

Jan G. Aarnoudse, MD, PhD, Department of Obstetrics and Gynaecology, State University Hospital, Oostersingel 59, 9713 EZ Groningen (The Netherlands)

Introduction
The incidence of twin delivery in western Europe is 1:80 (1.2%) [1]. Death of one twin may have considerable consequences for the surviving one. A remarkable change in flow velocity waveforms (FVWs) is described in the surviving twin after intrauterine death of the other.

Case Report
A 32-year-old woman, in her third pregnancy, was admitted to the antenatal ward of the University Hospital Groningen, at 27 weeks gestation because of intrauterine death of one twin. She had a history of one undisturbed pregnancy and delivery and had one pregnancy complicated by intrauterine death of a fetus at gestational age 29 weeks with a birth weight of 850 g. As for the current pregnancy, she obtained prenatal care at an antenatal clinic elsewhere, where twin pregnancy was diagnosed at the end of the first trimester. At gestational age 27 weeks, routine ultrasound assessment showed 2 fetuses with separate amnion and chorion. The estimated fetal weights were 700 and 800 g, respectively, which were both too small for gestational age ( < 10th centile). Therefore, she was admitted and both fetuses were monitored daily by cardiotocography. Initially, the cardiotocograms of the twins were suboptimal. The baseline variability of one fetus was slightly reduced, but recovered later on. The second twin had a flat trace with decelerations of fetal heart rate. This pattern persisted until 2 days later an ultrasound scan was repeated, showing that the
fetus with the flat cardiotocographic recordings had died. Doppler ultrasound recordings revealed negative end-diastolic flow of the umbilical artery in the surviving fetus. At 27 weeks and 4 days, the patient was transferred to the University Hospital because it was expected that the surviving fetus had to be delivered soon, needing neonatal intensive care. Ultrasound assessment showed a remarkable variability in FVWs in the umbilical artery of the surviving fetus (fig. 1). First we recorded FVWs with normal end-diastolic flow. A few hours later, reversed end-diastolic flow was recorded, which changed over a period of 6 min into FVWs with normal end-diastolic flow. Observation showed normal fetal body movements and breathing activity. The amount of amniotic fluid was in the normal range. Fetal cardiotocography revealed good baseline variability. At 29 weeks and 5 days, the fetal cardiotocogram showed reduced variability and deep decelerations. A caesarean section was performed and two boys were delivered, one of which was stillborn. The surviving one had Apgar scores of 7 and 9 and weighed 700 g ( < 5th centile). The umbilical pH values were 7.26 and 7.36 for the arterial and venous blood, respectively. Placental examination showed two placentas, totally fused, with vessel connections, dichorionic and diamniotic. The one of the dead fetus was very small and had a number of blood clots on the maternal side and very dark membranes. •The infant was transported to the neonatal intensive care unit. He started breathing spontaneously but a few hours after birth, he became dependent on oxygen and artificial ventilation. Ultrasound scanning of the cerebrum showed a periventricular echodensity, sus-

Fig. 1. Flow velocity waveforms of the umbilical artery of the surviving fetus during the first days after the death of one twin.

body movements and breathing activity. The amount of amniotic fluid was in the normal range. Fetal cardiotocography revealed good baseline variability. 

At 29 weeks and 5 days, the fetal cardiotocogram showed reduced variability and deep decelerations. A caesarean section was performed and two boys were delivered, one of which was stillborn. The surviving one had Apgar scores of 7 and 9 and weighed 700 g ( < 5th centile). The umbilical pH values were 7.26 and 7.36 for the arterial and venous blood, respectively. Placental examination showed two placentas, totally fused, with vessel connections, dichorionic and diamniotic. The one of the dead fetus was very small and had a number of blood clots on the maternal side and very dark membranes. •The infant was transported to the neonatal intensive care unit. He started breathing spontaneously but a few hours after birth, he became dependent on oxygen and artificial ventilation. Ultrasound scanning of the cerebrum showed a periventricular echodensity, sus-

Day 2 3:37 p.m
5:51 p.m.
5:55 p.m. 5:57 p.m.
iiii
iiii
* * l * * Da

pect for leukomalacia. A few days later this finding was validated by repeated ultrasound examinations. The infant died 14 weeks after birth. Post mortem examination was not performed.

Comment

Intrauterine death of 1 fetus with uncomplicated continuation of the pregnancy in the first trimester is very common, about 60% [1]. In the second and third trimester it is less common (0.5-6.8%), but more serious for the surviving one [2-6]. The reported combined morbidity and mortality risks vary from 17 [2] to 46.2% [3]. A high incidence of preterm delivery, fetal distress and pre-eclampsia is reported. Renal, cerebral and cutaneous lesions in the surviving fetus have been described in cases with connection of the circulation between the dead and alive fetus. The lesions are explained by transient isch-aemia due to acute transfusion into the dead fetus [2, 3-6]. The remarkable changes in FVW patterns of the umbilical artery within the first 24 h after the death of one fetus can be caused by different mechanisms. It can be explained by transfusion of
blood from the living fetus to the dead one, due to intravascular pressure differences. Another possible explanation is that vasoactive substances, from the dead fetus or its placenta are released into the circulation of the living one, which causes transient vasoconstriction or dilatation. Unfortunately, no Doppler ultrasound recordings had been made in this case before the fetus died.

The present report demonstrates that single fetal death in a twin pregnancy may have considerable impact on the circulation of the surviving one. The cerebral lesions found in the neonatal period might be the result of these haemodynamic effects. Doppler velocimetry makes it possible to demonstrate such acute circulatory changes.

References