The Outcome of Twin Pregnancies Complicated by Single Fetal Death After 20 Weeks of Gestation

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A retrospective study involving 972 twin births was conducted to evaluate the maternal and fetal outcomes of twin pregnancies complicated by single fetal death. The incidence of single fetal death in twin pregnancies after 20 weeks was 3.3%. Preterm birth rates for 37 and 32 gestational weeks were 81.3% and 41.6% respectively. The median interval between the diagnosis of fetal death and the delivery was 11 days (range 1–27 days). Eighteen (56%) infants were delivered by cesarean and 14 (43%) vaginally. Twin–twin transfusion syndrome (TTTS) was the cause of single fetal death in 8 of 32 twin pregnancies (25%). Ten of the surviving co-twins were lost in the neonatal period (31.3%) and half of those neonatal deaths were due to TTTS. TTTS is the major contributor for perinatal mortality in same-sex twins complicated by single fetal death. The death of one twin in utero should not be the only indication for preterm delivery, and in case of severe prematurity with a stable intrauterine environment; expectant management may be advisable until fetal lung maturation ensues.

The incidence of perinatal mortality and morbidity is unquestionably greater among multiple pregnancies than among singleton pregnancies. Intrauterine fetal death (IUFD) of one fetus is an uncommon association in multiple pregnancies: 2.6% in twins and 4.3% in triplet pregnancies, respectively (Johnson et al., 2002). Because of the rarity of the situation there are no established guidelines in the literature. If the surviving fetus is near term, delivery seems rational. If the single fetal death occurs before term a consumptive coagulopathy affecting the surviving fetus or the mother, risk of infection and even death of the remaining fetus are factors against waiting for maturity (Gaucherand et al., 1994; Axt et al., 1999; Pharoah & Adj, 2000). The purpose of our report is to review twin pregnancies with single fetal death and present fetal and maternal outcome.

Material and Methods

A retrospective evaluation was performed in all cases of twin pregnancy at SSK Bakirkoy Maternity and Children's Hospital from January 1, 2000 to November 31, 2002. During the study period, 972 of a total of 57,966 deliveries were twin pregnancies (1.6%). Thirty-two pregnancies were complicated by single fetal death and in seven pregnancies both fetuses were dead. There were no referrals as "twin pregnancy with single fetal death". However, two cases of TTTS were referred to our unit because of polyhydramnios in which all four fetuses were alive when the specific diagnosis was made in both pregnancies. All but one of the seven twin pregnancies complicated with IUFD of both fetuses were referred to our clinic from several healthcare units. Once the death of a twin was confirmed by ultrasonography, close antenatal surveillance of the pregnancy was performed including serial ultrasonographic examinations, cardiotocography (CTG) and blood and urine tests. The pregnancy was allowed to progress until spontaneous labor after 36 weeks or the first signs of fetal distress occured. Bedrest at home was encouraged after 28 weeks gestation. Intrauterine fetal growth restriction was suspected whenever estimated fetal weight was below the 10th percentile for gestational age. We based the prenatal diagnosis of twin–twin transfusion syndrome on monochorionic placentation with visualisation of a separating membrane, polyhydramnios-oligohydramnios sequence in the absence of other causes of abnormal amniotic fluid volume, size discordance, abdominal circumference difference, or weight discrepancy greater than 20%. Other commonly recognised findings of TTTS are nonvisualisation of donor's bladder, velamentous cord insertion, abnormal umbilical cord Doppler studies and hydrops or evidence of congestive heart failure. Prenatal management included treatment of preterm labor with tocolytics and maternal administration of steroids to enhance fetal lung maturation up to 34 weeks when indicated. Autopsies of the fetuses were performed unless it was against parents' wishes. The associated parameters including gestational age at fetal death, mode of delivery, birth

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weight of each fetus, fetal sex, maternal complications, neonatal mortality and morbidity and twin–twin transfusion syndrome were also studied.

Results

During the study period, 972 of a total of 57,966 deliveries were twin pregnancies (1.6%). Single fetal death after 20 weeks of gestation occured in 32 twin pregnancies (3.3%) with a frequency of 0.05% in all deliveries. In seven pregnancies (0.7%) both twins died in utero. In six of them both fetuses were found to be dead on admission. The remaining pregnancy was complicated by severe preeclampsia at 26 gestational weeks. Twenty-nine pregnancies were conceived spontaneously, three were conceived after ovulation induction. The mean maternal age was 28.1 ± 5.6 (range = 18–41). The mean gestational age at diagnosis of single fetal death was 31.1 ± 4.5 weeks (range = 21–38 weeks) and the mean gestational age at delivery was 32.5 ± 4.5 weeks (range = 21–39 weeks). The median interval between the diagnosis of fetal death and the delivery was 11 days (range = 1–27 days). Eighteen (56%) infants were delivered by cesarean, 14 (43%) vaginally. Table 1 shows the indications of cesarean deliveries. Mean birthweight for the surviving and dead fetuses was 1763 ± 753g (range 550–3200g) and 1171 ± 591g (500–2500g) respectively. In 25 of the 32 pregnancies (78%), the twins were of the same-sex. Preterm birth rates for 37 and 32 gestational weeks were 81.3% and 41.6% respectively. Twin–twin transfusion syndrome (TTTS) was the cause of single fetal death in 8 of 32 twin pregnancies (25%). In seven of the eight cases the diagnosis of TTTS was made prenatally and four of them were "stuck twins" (57%). Ten of the surviving co-twins were lost in the neonatal period (31.3%) and half of those neonatal deaths were due to TTTS. Three of the remaining neonatal deaths were due to respiratory distress syndrome. One infant died because of congenital cardiac malformation. Another infant born at 28 weeks of gestation, had periventricular echodensities on cerebral ultrasound, developed spasticity and died 2 weeks later. Table 2 presents causes of death among live births whose co-twin was a fetal death.

Seven women (21.9%) had anemia. In three pregnancies (9.4%) preeclampsia was diagnosed at the time of diagnosis of intrauterine fetal death. Six women (12.5%) developed polihydramnios. Maternal DIC did not occur in any case with single fetal death.

Table 1

Indication of Cesarean Deliveries in Pregnancies with Single Fetal Death

Indication	(*n*)
Breech presentation	7
Transvers lie	2
Fetal distress	4
Arrest disorder	4
Cord prolapsus	1

Discussion

Twins have higher morbidity and mortality rates than do singletons (Santema et al., 1995). The particularly high morbidity and mortality rates seen in monochorionic twins have been attributed to premature delivery, vascular anastomoses between twins, congenital anomalies and knotting of the umbilical cords (Petersen & Nyholm, 1999). The chorionicity rather than zygosity determines the outcome (Bajoria et al., 1999; Caroll et al., 2002; Stenhouse et al., 2002). Single fetal death at 20 weeks' gestation or more were uncommon in twin pregnancies (Axt et al., 1999). In our study the incidence of single fetal death was 3.3% which is consistent with the recent findings. Population-based studies showed that the in utero death rate of a twin pair is 2.6% (Johnson et al., 2002).

Table 2

Causes of Death Among Live Births Whose Co-twin Was a Fetal Death

Gestational age (weeks)	BW of fetal death (gr)	Route of delivery	BW of live birth (gr)	Sex of the pair	Cause of death in liveborn twin
30	1100	SC	1500	MM	TTTS
26	750	VB	650	MM	TTTS
27	970	VB	970	FF	TTTS
31	1000	SC	1400	MM	Congenital cardiac malformation
27	550	VB	900	MM	TTTS
28	600	VB	850	ULS	Pulmonary immaturity
27	900	VB	690	FF	TTTS
21	500	VB	550	ULS	Pulmonary immaturity
32	550	SC	1500	MM	Respiratory obstr.; neurologic impairment
25	500	VB	650	FF	Pulmonary immaturity

Note: SC, cesarean section, VB, vaginal birth, MM, male-male, FF, female-female, ULS, unlike sex, TTTS, twin to twin transfusion syndrome, BW, birthweight

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To evaluate the risk associated with monochorionic placentation we arranged the twin pairs by sex concordance as a rough approximation for zygosity and chorionicity. 78% of the twin pairs studied had the same sex. In our series, TTTS was the leading cause of single fetal death in same-sex twins (32%) and half of the neonatal deaths were due to TTTS. Discordant fetal growth, a single fused placenta and thin dividing septum can be the features of a dizygotic twin pregnancy. Prenatal diagnosis may be restricted to monochorionic twin pregnancies with amniotic fluid discordance because there are no known disorders in monochorionic twin pregnancies that were complicated by oligohydramnios/polyhydramnios sequence (except discordant fetal anomaly or infection). However, same-sex twins, single placental mass and a thin dividing membrane are all suggestive of monochorionic twins. These features are important particularly in cases of unreliable documentation of chorionicity.

Besides the IUFD of one twin, TTTS is another risk factor for neurological morbidity. Both donor and recipient survivors from TTTS pregnancies seem to be at risk of antenatally acquired cerebral lesions, with a reported incidence between 35% and 55%. However, even in the absence of either TTTS or single IUFD, antenatal necrosis of the cerebral white matter was reported on early neonatal brain scans in 23% of preterm monochorionic twins compared with 3% in preterm dichorionic twins, suggesting that the monochorionic placenta accounts for this difference (Denbow et al., 1998; Lewi et al., 2003; Sebire et al., 1997). Although we found neurological impairment in only one surviving fetus (3.1%) with periventricular echodensities on cerebral ultrasound, Glinianaia et al. (2002) reported a high incidence of neurodevelopmental morbidity (17.5%). Bejar et al. (1989) demonstrated that in multiple gestations necrosis of cerebral white matter leading to cavitary lesions, brain atrophy, and gliosis may occur with an incidence of 13.8%. The percentage risk of intracranial lesions at birth was greater in MC than in DC twins. In MC twins without TTTS, perinatal mortality was related to the type of vascular anastomosis. However, in the TTTS pregnancies, perinatal outcome of the surviving twin was dependent on whether the recipient or the donor twin died first (Bajoria et al., 1999). Damage to brain, liver, spleen, and kidneys might be a result of thromboplastic proteins transfused from the dead twin to the survivor's circulation through placental vascular anastomoses or of intrauterine blood pressure instability from death of the co-twin (Machin, 2001; Pharoah & Cooke, 1996; Pharoah 2002; Saito et al., 1999).

In our study, neonatal mortality was high (31.3%). This is mostly due to TTTS which was responsible for 25% of the single fetal deaths in our series. Glinianaia et al. (2002) found 8.4% of infant mortality in which 6 of 11 cases were TTTS. Is TTTS itself or extreme prematurity responsible for the morbidity and mortality in pregnancies complicated with single fetal death? This is a challenging question. It is difficult to quantify the impact of TTTS on neonatal mortality in extreme preterm infants. There is an excess morbidity in same-sex twins; TTTS as an antenatal factor may contribute to the preterm delivery. It is the general belief about TTTS that the earlier the gestational age the poorer the prognosis. This may partly be related to the severity of the condition beyond the prematurity consequences.

In a population-based study Johnson et al. (2002) reported a 26% infant mortality rate in twin pregnancies with single fetal demise. Among twins, remaining fetuses of same-sex twin pairs were at higher risk of death compared with those of opposite-sex twin pairs, particularly when the initial fetal death ocurred after 24 weeks' gestation. Johnson et al. (2002) reported that, of 3599 twin pregnancies complicated by single fetal death, 2855 (79%) involved same-sex twin pairs. Similarly, in our study 78% of the twin pairs, complicated with single fetal death; had the same sex.

Prompeller et al. (1994) stated that after the second trimester, single fetal death is associated with increased risk of intrauterine growth retardation, premature labor and perinatal mortality (13%). In this study, we found a 41.6% rate of preterm delivery (< 32 gestational weeks), which is a major contributor for perinatal mortality and morbidity.

Pritchard (1959) stated that in the case of a single fetal death in a twin gestation, disseminated intravascular coagulation (DIC) is theoretically possible with delayed delivery. It did not occur in our study, although in eight cases dead fetuses remained in utero for more than 3 weeks. Recent studies showed that close monitoring for maternal coagulopathy in pregnancies complicated with single fetal death is not compulsory. While some authors have reported high incidence of preeclampsia, only three women (9.4%) had preeclampsia in our series (Axt et al., 1999; Santema et al., 1995). In multiple pregnancies, the effect of the timing of an intrauterine death on the outcome of the surviving co-twin is still controversial. It must be emphasized that the accurate prenatal determination of chorionicity with postnatal confirmation and detection of TTTS is crucial for the management of twin pregnancies.

Our study has several limitations. The relatively small number of cases, absence of the definition of placentation type and of infant follow-up beyond 3 weeks are ones to be noted. Despite these limitations , it seems that TTTS is the major contributor for perinatal mortality in same-sex twins complicated by single fetal death. The death of one twin *in utero* should not be the only indication for preterm delivery, and in case of severe prematurity with a stable intrauterine environment; expectant management may be advisable until fetal lung maturation ensues.

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