RESEARCH ARTICLE

Single Intrauterine Fetal Demise in Twin Pregnancies and Pregnancy Outcomes

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Abstract

Aim and objective: To study the maternal and fetal outcomes in twin pregnancy with single intrauterine fetal demise.

Introduction: Single intrauterine fetal demise (SIUFD) in a twin pregnancy is known to be a serious complication of pregnancy. It is a relatively rare complication of multiple pregnancies (5% of all twin pregnancies). Death may occur anytime and increase mortality and morbidity of the survivor twin either secondary to the cause of death of the co-twin or to preterm labor, or both.

Materials and methods: The data are collected from a medical records department, review of literature, and labor ward parturition register, and patients were followed up in the wards. This study is designed as a prospective observational study and is done in Sri Ramachandra Institute of Higher Education and Research, Tamil Nadu, study period being from April 2017 to April 2019. Sample size was 206 twin deliveries.

Results: During the study period (2017–2019), 206 women had twin deliveries among a total of 9,951 deliveries occurred in tertiary center. Of these 206 twin deliveries, 12 (5.8%) cases were complicated by the death of one fetus. Among the 12 cases, four had gestational hypertension, two had diabetes, one had preeclampsia, two cases had placenta previa, two cases had deranged liver function tests, among that one was associated with acute fatty liver, disseminated intravascular coagulation, acute kidney injury, and atonic postpartum hemorrhage. The same patient underwent obstetric hysterectomy. Regarding the neonatal outcomes, there were six preterm deliveries, four term deliveries, and two neonatal deaths, due to extreme preterm birth. Management should be individualized, and conservative management is preferred by most of the obstetricians.

Conclusion: SFD in a twin pregnancy should be managed in a tertiary referral center, where intensive fetal surveillance and adequate neonatal support are available.

Keywords: Pregnancy outcomes, Single intrauterine fetal demise, Twin pregnancy.

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Introduction

Multiple pregnancies, of which 98% are twins, are associated with a higher risk of perinatal mortality when compared with singleton pregnancies. Fetal loss of a twin during the first trimester is not an uncommon event, loss of one twin in the first trimester does not appear to impair the development of the surviving twin.[1] However, fetal death occurring after mid gestation (17 weeks) may increase the risk of intrauterine growth restriction (IUGR), preterm labor, preeclampsia, and perinatal mortality. The causes of fetal death vary and include twin–twin transfusion, placental insufficiency, IUGR related to preeclampsia, velamentous insertion of the cord, cord stricture, cord around the neck, and congenital abnormalities.[2] Maternal coagulopathy, the most feared complication following twin demise, appears to be uncommon. However, coagulopathy has been reported to occur about 3–5 weeks following fetal demise. Monitoring of maternal coagulation factors is not necessary when fetal loss occurs prior to 13 weeks of gestation. At 14 weeks and more assess the coagulation profile and reassess after 2–3 weeks. In general, chorionicity rather than zygosity determines the risk of mortality and morbidity, hence determining the type of placentation by ultrasonography (USG) can help in predicting the outcome. Major morbidities are unlikely to occur in the surviving twin of a dichorionic gestation. Loss rates of up to 30–50% have been associated with monochorionic monoamniotic pregnancies.[3] There are multiple reasons for single intrauterine fetal demise (SIUFD), including fetal and maternal factors.

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Fetal Factors

Infection, chromosomal anomaly, structural anomaly, cord anomaly (entanglement, velamentous), and placental [twin-to-twin transfusion syndrome (TTTS), selective intrauterine growth retardation].

Maternal Factors

Hypertensive disorders (i.e., preeclampsia), thrombophilia, and abruption placenta.

Chorionicity, as previously described, is an important factor in the rate and outcome of SIUFD with monochorionic pregnancies having a much higher rate compared with dichorionic pregnancies.[3] One of the main reasons for this is the presence of a

communicating placental circulation and the potential risk of TTTS in monochorionic pregnancies. Here an unbalanced unidirectional arteriovenous shunt results in a net transfer of blood from one twin to another. The donor becomes hypovolemic that results in a decrease in the donor's cardiac output and an increase in the peripheral vascular resistance. This induces tissue hypoxia, acidosis, and a rise in erythropoietin production.[3] The recipient twin is hypervolemic with a significant risk of cardiac dysfunction. Both twins are at high risk of intrauterine death.

Bajoria et al. determined the outcome of twin pregnancies complicated by SIUFD in relation to vascular anatomy of the monochorionic placenta. They established that in twins without TTTS, the presence of superficial arterio-arterial (AA) anastomosis or veno-venous (VV) anastomosis had a higher incidence of intrauterine death, fetal anemia, and neurological handicap. It is hypothesized that these AA/VV anastomoses allow a relatively rapid transfer of blood from the live fetus to the dead fetus, causing neurological damage or fetal demise. This goes against the thromboembolic theory, as the gradient is such that thromboembolic material could not have flowed from the dead fetuses' circulation to the survivor. A favorable outcome was seen with multiple bidirectional arterio-venous (AV) anastomoses. None of these twins had significant anemia at birth and all had normal neurological development. It is hypothesized that a steady hemodynamic state can be achieved along the AV/VA channels with oppositely directed blood flow.

Single intrauterine demise may cause poor outcomes for the surviving fetus, especially in monochorionic twin pregnancies. Complications such as cerebral impairment, preterm labor and related sequelae, and subsequent death of the surviving fetus may occur in these cases. The best time for delivery, the frequency of antenatal tests, and the maternal effects are still under debate.[4]

Three patterns of brain pathology have been described in surviving twins of SIUFD.

Hypoxic ischemic lesions of white matter usually occur in the area supplied by the middle cerebral artery, leading to porencephaly, multicystic encephalomalacia, microcephaly, and hydranencephaly. Hemorrhagic lesions either isolated or in combination with ischemic lesions. They may lead to posthemorrhagic hydrocephalus. Anomalies secondary to a vascular disturbance include neural tube defects, limb reduction anomalies, and optic nerve hypoplasia. Neurological sequelae for the fetus is more common with SIUFD with monochorionic placentation.

Many other systems can be affected by SIUFD. Renal cortical necrosis, unilateral damage of a kidney, small bowel atresia, gastroschisis, aplasia cutis, and terminal limb infarction have all been described. These are less common than the central nervous system injury. Luu and Vohr estimated the probability of cerebral palsy in a twin infant to be 1.8% if both twins survive compared with 9.5% if one twin dies *in utero*.[5] The outcome of SIUFD during first trimester in dichorionic twins is usually favorable. SIUFD in dichorionic twins during second and third trimester leads to co-twin demise or neurological abnormality (4%) or preterm delivery. The incidence of preterm delivery, hypertensive disorders, and gestational diabetes in multifetal gestation is significantly increased when compared to singleton pregnancies. The death of one twin is also a shock to the parents and the attending obstetrician, who need to face the substantial fetal and maternal risks. A multidisciplinary approach, counseling, emotional support, and intensive fetal surveillance are mandatory.

Aim and Objective

To study the maternal and fetal outcomes in twin pregnancies with single intrauterine fetal demise.

Materials and Methods

It is an observational study done between April 2017 and April 2019. A total of 206 deliveries were studied. The study was done in sri ramachandra institute of higher education and research, Tamil Nadu. The inclusion criterion was twin pregnancies with single fetal demise. Outcomes are obtained from medical records and labor ward parturition register, and the patients were followed up in the wards. Mothers were monitored by doing all routine antenatal investigations, coagulation profile, fibrin degradation products (FDP), and D-dimer. Fetal monitoring was done by daily fetal movement count, biweekly nonstress test (if more than 32 weeks), weekly USG with biophysical profile, and color Doppler.

Results

Between April 2017 and April 2019, there were 9,951 deliveries. Among them, 206 were twin deliveries. Among 206, (Table 1) 12 had co-twin death, the incidence being 5.8%. In our study, four had first-trimester loss and eight had second-trimester loss. In first-trimester loss, the interval between demise and delivery was 26–28 weeks. In second-trimester loss, the interval was around 5 weeks. In this study among 12 cases, eight were primigravidae and four were multigravidae. There were four first-trimester losses. Among the 12 cases, eight had preterm deliveries and only four had term deliveries.

Maternal Outcomes—Among the 12 cases, (Table 1) three had malpresentation, two cases were associated with placenta previa, and two cases had deranged liver function tests, among them, one was associated with acute fatty liver, disseminated intravascular coagulation (DIC), acute kidney injury, and atonic postpartum hemorrhage (PPH). Obstetric hysterectomy was done for this patient due to atonic PPH. Four cases were associated with gestational hypertension. Two cases had diabetes and one had preeclampsia (Table 2).

Mode of Delivery—Seventy-five percentage of the cases underwent lower segment cesarean section (LSCS) (Table 1). Three being elective LSCS, indications were Doppler changes, placenta previa, and breech. There were six emergency LSCS, indications were malpresentation, fetal distress, DIC, placenta previa, and preeclampsia. Three cases had normal vaginal deliveries.

Neonatal outcomes—One was associated with demise twin having acrania congenital abnormality. There were six preterm deliveries, four term deliveries, and two neonatal deaths due to extreme preterm deliveries. Three cases were associated with SIUFD (Table 3).

Discussion

Our study showed that single fetal death (SIUFD) in twin pregnancy is not an uncommon problem with an incidence of 5.8%. In our study, all patients had dichorionic placenta. In dichorionic twins, the prognosis for the surviving twin is relatively good and prematurity is the main risk factor. We had eight preterm deliveries among the 12 cases, indicating the need for surveillance in tertiary care centers with neonatal intensive care unit facilities to prevent perinatal morbidity and mortality due to prematurity. To date, a first-trimester

Table 1: Maternal and fetal outcomes in twin pregnancy with SIUFD

Parity	*Diagnosis of IUD (weeks)*	*Delivery (weeks)*	*Mode of delivery*	*Associated comorbidities*	*Fetal outcome*
G2e1	30	34	Elective LSCS	Oligohydramnios With Doppler changes Gest HTN	2 kg preterm
Primi	26	31	Emg LSCS	IUGR at fourth centile, fetal distress, GDM and Gest HTN	1 kg preterm
Primi	29	33	Emg LSCS with subtotal obstetric hysterectomy	Deranged LFT Anemia, acute fatty liver, DIC, AKI, atonic PPH	2.4 kg preterm
G2p1l1	14	30	Transverse lie Emg LSCS	Congenital anomaly acrania Overt DM	1.3 kg preterm
Primi	28	33	Elective LSCS	Doppler changes Gest HTN	1.8 kg preterm
Primi	11	37	NVD	Encerclage at 20w	3.7 kg term
Primi	10	38	NVD	Gest HTN	2.5 kg term
G3p1l1a1	12	32	Breech Emg LSCS	PPROM Previous LSCS	1.8 kg preterm
Primi	28	37	Emg LSCS	Type 4 placenta previa	2.5 kg term
G4p1l1a2	17	37	Elective LSCS Breech	Type 2 placenta previa	2.48 kg term
Primi	20	26	Emg LSCS	Preeclampsia Deranged LFT Severe IUGR	550 g neonatal death
Primi	9	25	NVD	Encerclage at 14w PPROM with os open	990 g neonatal death

Gest HTN, Gestational hypertension; IUGR, intrauterine growth restriction; GDM, gestational diabetes mellitus; LFT, liver function tests; DIC, disseminated intravascular coagulation; AKI, acute kidney injury; PPH, postpartum hemorrhage; PPROM, preterm premature rupture of membranes; Emg, emergency.

Table 2: Maternal comorbidities

Gestational hypertension	4
Diabetes mellitus	2
Preeclampsia	1

Table 3: Neonatal outcomes

Preterm	6
Term	4
Neonatal deaths	2
IUGR	3

intrauterine death has not been found to have adverse effects on the surviving twin. A loss in the second or third trimester, however, is more complex. Effects of dead fetus on the surviving twin are unlikely in dichorionic gestation.[6] In the case of monochorionic twins, the prognosis is poor and associated with neurological damage in the survivor.

Antenatal ultrasonographic evaluation of chorionicity is thus important in assessing the potential risk. The observed survival difference between dichorionic and monochorionic twins has been attributed to the placental vascular anastomosis, which is rarely seen in dichorionic placentas. The reported frequency of vascular connections in monochorionic placentas ranges from 85 to 98%. In diamniotic twins, death of one baby can cause sudden rupture of a thin membrane between them again leading to sudden hypotension and death of the other.

Rarely SIUFD causes release of fibrin and tissue thromboplastins in circulation, causing DIC. Though it is a very uncommon complication, it can be fatal for both the mother and the fetus. In our study, no patient had a maternal coagulation disorder. The association between retention of the dead fetus in utero and maternal DIC was first noted by Weiner et al. in 1950 and substantiated by Pritchard and Ratnoff in 1955 for singleton pregnancies. They described the principal defect as a gradual reduction in the maternal fibrinogen level, especially if the time interval from the intrauterine death to delivery exceeded 5 weeks. The DIC may progress in a slow and chronic manner without being fulminant. The fibrinogen level returns to normal in all cases within 48 hours of delivery. The underlying mechanism of DIC is not known; there may be a breach between the maternal and fetal circulations, which allows the passage of tissue thromboplastins from the dead fetus and its placenta to the maternal circulation. The transferred thromboplastins activate the extrinsic coagulation pathway, and thereby, consume platelets and coagulation factors. There is widespread intravascular coagulation and generation of fibrin. The presence of fibrin activates the fibrinolytic system, whereby plasminogen is converted to plasmin that lyses fibrin into FDP. The inhibition of fibrin polymerization may contribute to the defective hemostasis. Depending on the intensity of the stimulus, hemostasis impairment may occur in a varying degree of severity.

"Vanishing twin syndrome" is described as a twin pregnancy that was diagnosed at one time, but with just one baby being

eventually delivered. Even when there are two viable fetuses identified in the first trimester, the disappearance rate for one of them can reach 29%.[7] Vaginal bleeding has been found to be the presenting symptom in 25% of the cases, whereas it occurs in only 7% of pregnant women in the general population.[7] Fetus papyraceous occurs in one (0.54%) of 184 cases of twin pregnancies. Unlike vanishing twin syndrome, fetus papyraceous occurs when the fetus dies later in pregnancy, which continues thereafter. The amniotic fluid and the fluid content of the dead twin's tissues and the placental tissue may be reabsorbed, thereby leaving the dead fetus compressed between the amniotic sac of its co-twin and the uterine wall. The degree of compression depends on the time span between fetal death and delivery; the larger the fetus, the more difficult it is to become a fetus papyraceous.

We had a survival rate of 75% as compared to other studies where the survival rate was 40%. In a study by Asian et al., the reported median time interval between SIUFD and delivery was 11 days, but we could prolong it up to 5 weeks. The mean gestational week at delivery was 32.7 weeks. The postpartum course was uneventful in all of our cases, and all live-born babies were normal and not having any deformity contrary to some studies. According to HHN Woo et al., death in the late second or third trimester is connected with significant mortality and morbidity on the surviving twin. It corresponds with our study that SIUFD in the first trimester gives a better prognosis for surviving twin.[2]

An early decision to perform a cesarean section owing to concerns of maternal coagulopathy should be avoided because it may cause prematurity-related problems for the fetus and increase morbidity for the mother.[4] In our hospital, cesarean section was performed only in those patients with obstetric indications (Doppler changes, malpresentation, fetal distress, DIC, placenta previa, previous LSCS with preterm premature rupture of membranes, and preeclampsia with severe IUGR) (Table 1). Seventy-five percentage of the cases underwent LSCS. The mode of delivery in most of the studies was cesarean section. Babah et al.[8] had successful induction of labor and vaginal delivery at 37 weeks after the continuation of conservative management for 5 weeks. Vaginal delivery is not contraindicated in cases of SIUFD. However, an obstructed labor can occur if the dead twin is presenting as transverse. In monochorionic twins complicated by SIUFD, cesarean section may avoid the risk of acute TTTS due to vascular anastomoses.[4] Deveer et al. reported that the mean gestational age at diagnosis of a SIUFD was negatively correlated with gestational age at delivery. Our findings were consistent with their study.[9] In the present study, no intrauterine mortality occurred in the surviving fetuses compared to other studies that reported that the frequency of mortality in the surviving fetus was 3% in dichorionic twin pregnancies.[3] In our study, there was significant association between SIUFD and hypertensive disorders of pregnancy and diabetes mellitus. We had four cases of gestational hypertension, one case of preeclampsia, and two cases of diabetes mellitus.

In postdelivery, the couple should be counseled regarding a postmortem for the dead twin, especially if the cause of death has not been found. The placenta should undergo specialist examination using "injection" studies for confirmation of chorionicity. A full examination of the surviving neonate should be carried out, especially neurological examinations including the possibility of cranial ultrasound and magnetic resonance imaging (MRI). This may help to confirm lesions that were seen in the antenatal period and to detect new neurological abnormalities. The surviving twin should also be placed under a pediatric follow-up to ensure that the normal developmental milestones are being met.[7]

Studies have suggested that the fetal outcome is mainly gestation-dependent and the goal should be to prolong pregnancy. There is a higher risk of preterm birth in twin pregnancies with SIUFD, so steroids should be administered <34 weeks to induce lung maturity. Most studies favor conservative management until 37 weeks' gestation, if fetal movements, cardiotocography, and USG show no abnormalities. If there are no other obstetric causes, delivery of dichorionic twin pregnancies with single fetus demise is not recommended before the 38th week.[10] It is recommended that all twin pregnancies with one dead fetus should be managed in tertiary referral centers with sufficient neonatal support. A management plan should be individualized. Intensive fetal surveillance is required and the determination of chorionicity, particularly in the first trimester, is crucial. Subsequent ultrasound scans serve to detect fetal anomalies and assess fetal growth and liquor volume. These measurements are complemented by regular nonstress testing, biophysical profiling, and Doppler ultrasonographic studies. Cranial sonography, if necessary by the transvaginal route, may provide additional information. Despite close surveillance, however, pitfalls remain. Neurological damage may occur in the surviving co-twin with normal antenatal ultrasound findings, reactive cardiotocography tracings, and an intact brainstem as detected by postnatal computed tomography. MRI has been shown to be helpful, and echoencephalography can detect antenatal necrosis of cerebral white matter as brain atrophy or cavities in the white matter by day 3 of life.

Conclusion

The sequelae of a SIUFD in a twin pregnancy depend on the gestation and placentation. Death in the late second or third trimester is associated with significant morbidity and mortality in the surviving twin. Therefore, all twin pregnancies with one dead fetus should be managed in tertiary referral centers with sufficient neonatal support. Intensive fetal surveillance is required and the determination of chorionicity should be done early in the pregnancy.

Limitations

In our study, we did not come across cases with monochorinocity, as SIUD in twin pregnancy is a rare event and the study period was limited to 2 years.

References

1. Jain D, Purohit RC. Review of twin pregnancies with single fatal death, maternal and fetal outcomes. J Obstet Gynaecol India 2014;64(3):180–183. DOI: 10.1007/s13224-013-0500-5.
2. Woo HH, Sin SY, Tang LC. Single fetal death in twin pregnancies : review of the maternal and neonatal outcomes and management. Hong Kong Med J 2000;6(3):293–300. PMID: 11025849.
3. Hillman SC, Morris RK, Kilby MD. Co twin prognosis after single fetal death: a systematic review and meta analysis. Obstet Gynecol 2011;118(4):928–940. DOI: 10.1097/AOG.0b013e31822f129d.
4. Yaman Tunç S, Ağaçayak E, Yaman Görük N, et al. Single intrauterine demise in twin pregnancies: analysis of 29 cases. Turk J Obstet Gynecol 2015;12(4):226–229. DOI: 10.4274/tjod.35493.

5. Luu TM, Vohr B. Twinning on the brain: the effect on neurodevelopmental outcomes. Am J Med Genet 2009;151C(2):142–147. DOI: 10.1002/ajmg.c.30208.
6. Kunaal S, Bangal VB, Sai B, et al. Intrauterine fetal demise of co-twin in multifetal pregnancy. Int J Biomed Res 2012;3(1):52–55. DOI: 10.7439/ijbr.v3i1.258.
7. O'Donoghue K, Rutherford MA, Engineer N, et al. Transfusional fetal complications after single intrauterine death in monochorionic multiple pregnancy are reduced but not prevented by vascular occlusion. BJOG 2009;116(6):804–812. DOI: 10.1111/j.1471-0528.2009.02128.x.
8. Babah OA, Olamijulo A, Ayanbode OS, et al. Conservative management of single fetal death in twin pregnancy at a tertiary health institution in southern Nigeria: a case report. IOSR J Dent Med Sci 2014;13(3):79–83. DOI: 10.9790/0853-13347983.
9. Deveer R, Engin-Ustun Y, Mert I, et al. Twin pregnancies with single fetal death: analysis of 38 cases. Fetal Pediatr Pathol 2013;31(1):71–75. DOI: 10.3109/15513815.2012.671446.
10. Chauhan SP, Scardo JA, Hayes E, et al. Twins: prevalence, problems, and preterm births. Am J Obstet Gynecol 2010;203(4):305–315. DOI: 10.1016/j.ajog.2010.04.031.