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Monoamniotic Twin Pregnancy

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Abstract. The course and outcome of 23 monoamniotic (MA) twin pregnancies, delivered in Tampere University Central Hospital during the years 1964-1984, were studied retrospectively and compared to 1056 diamniotic (DA) twin pregnancies. The frequency of MA twins was 2.1% of twin pregnancies. Polyhydramnion complicated the pregnancy in 26% of MA vs 6% of DA pregnancies. Two cases were defined as acute polyhydramnion. Preterm labour was stated in 70% of MA pregnancies and deliveries before the 34th week were 4 times more common in MA than DA pregnancies. The cesarean section rate was more than double in MA pregnancies (39%). Entanglement of the umbilical cords was noted four times, and prolapse of the cord in three vaginally delivered cases. Perinatal mortality was 28% in MA vs 5% in DA twins. The most common causes of death were respiratory distress syndrome, congenital malformation and fetio-fetal transfusion.

Key words: Monoamniotic twins, Congenital malformation, Perinatal mortality, Prematurity

INTRODUCTION

Monoamniotic (MA) twin pregnancies, derived from a splitting of the germinal disc when the amniotic membrane has developed, are rare and carry a high risk of perinatal mortality [5,12]. Vascular communications in monochorionic placentae, congenital malformations and prematurity, together with other factors, such as twisting and knotting of the umbilical cords, are found to play an important part in fetal wastage [7,25]. This article describes the course and outcome of MA twin pregnancies as

compared to the diamniotic (DA) twin pregnancies delivered in our hospital during the last 21 years.

MATERIAL AND METHOD

The case records of all twin pregnancies delivered in Tampere University Central Hospital between the years 1964 and 1984 were reviewed. Information obtained included characteristics of the mother, complications and management of pregnancy and labour, membrane status and abnormalities of the placenta and details of puerperium. Information concerning the infant included weight, sex, Apgar scores, mortality and morbidity. Differences between MA and DA pregnancies were tested by chi square test.

During the 21-year period there were 23 MA in a total of 1079 twin pregnancies delivered in the hospital, a frequency of 2.1% or 1:47. The mean gestational age at diagnosis of twin pregnancy was 28 (range 22 to 40) weeks for MA twins. In no case was the membrane status diagnosed before delivery.

CASE REPORTS

Details of MA twin pregnancies, compared to those of the DA ones, are shown in Table 1. As can be seen, mean maternal age was not significantly different in MA pregnancies, but the proportion of nulliparous women was significantly higher. All MA pregnancies were spontaneous, whereas 5.2% of DA ones were subsequent to ovulation-inducing treatment.

Antepartal maternal complications were common: only 4 mothers of MA twins remained free of disturbance. Over 50% were treated because of premature contractions. Polyhydramnion was noted in 6 cases, 26% of MA pregnancies vs 6% of DA ones ($P < 0.001$). The mean gestational age at delivery of MA pregnancies complicated by polyhydramnion was 29 weeks. Two cases were defined as acute polyhydramnion.

Table 1. Clinical Details of Monoamniotic and Diamniotic Twin Pregnancies

	Monoamniotic (N = 23)	Diamniotic (N = 1056)	P
Mean maternal age (yr)	27.5	28.3	
Nulliparity (%)	74	38	< 0.05
Polyhydramnion (%)	26	6	< 0.001
Delivery < 33 weeks (%)	43	11	< 0.001
Birthweight < 2500 g (%)	64	41	
Entanglement of the umbilical cords (%)	17		
Prolapse of the umbilical cord (%)	21	5	< 0.05
Cesarean section rate (%)	39	15	< 0.05
Perinatal mortality (%)	28	5	< 0.001
Congenital malformations (%)	15	5	< 0.001

In one case, therapeutic amniocentesis, with removal of 1000 ml and 1400 ml of amniotic fluid, was performed twice, at the 26th and 27th week. After the second amniocentesis, vaginal leakage of yellow amniotic fluid was observed and delivery was carried out by cesarean section. One of the twins survived. The second case was delivered at the 22nd week. The birthweights of the stillborn fetuses were 510 g and 1200 g and the cause of death was fetofetal transfusion. The umbilical cord of the donor showed a velamentous insertion and that of the recipient a single umbilical artery. The frequency of other complications, such as preeclampsia, anemia, urinary infection, hepatosis and threatened abortion, did not differ statistically between MA and DA pregnancies.

As shown in Table 1, delivery before the 34th week was almost 4 times more frequent in MA pregnancies, 25% of which, vs 4% of DA pregnancies ($P < 0.001$), were delivered even before the 32nd week. Low birthweight, less than 2500 g, was recorded in 64% of MA vs 41% of DA twins ($P > 0.05$). The figures for very low birth weight, less than 1500 g, were 27% for MA and 5% for DA twins ($P < 0.001$). Only 28% of MA twins could be sent to the station with the mother, as compared to 61% of DA twins ($P < 0.05$).

Complications of the umbilical cord were recorded frequently. Loops of the cord around the body or the neck were noted 10 times. In 4 pregnancies the cords were entangled. Two labours were terminated by cesarean section because of fetal distress. Only one infant was lost, the cause of death being congenital malformation. Two were delivered vaginally. One of these was delivered at the 24th week. The patient arrived in the hospital with the cervix fully dilated. The second stillborn twin was delivered together with the placenta within 5 min after delivery of the first twin, and the umbilical cords were twisted. The liveborn first twin was lost within one day because of prematurity. The other case was delivered at 32nd week. After delivery of the first twin the arm and the twisted umbilical cord of the second twin prolapsed. The infant was delivered within 8 min by spontaneous vertex, with Apgar scores 5 and 8 at 1 min and 5 min, but was lost within six days because of respiratory distress syndrome. The first twin also developed respiratory disorders but survived. True knot of the cord was noted once and velamentous insertion of the cord 4 times. Prolapse of the cord occurred 3 times during all 14 vaginally delivered cases. All prolapses were recorded in the case of second twins.

Placenta previa complicated one MA pregnancy. It was delivered at the 30th week by cesarean section because of anteparturial hemorrhage. One of the infants survived. Abruptio of the placenta was also noted once. The case was reported above.

Operative vaginal delivery was necessary twice. One first twin was delivered by vacuum extraction. Embryotomy during dystocic labour at the 33rd week was performed once. This was a case, not antepartally diagnosed, of conjoined twins of the type thoracoomphalopagus, with a combined birthweight of 3600 g. Manual removal of the placenta was necessary once. Postpartum hemorrhage, with a blood loss of more than 500 ml, was noted twice, both in association with cesarean section delivery. The cesarean section rate was more than twice increased, 39% vs 15% ($P < 0.05$). The indications were fetal distress (3 cases), breech presentation of the first twin (2 cases), placenta previa, previous cesarean section, fetus optatus and prematuritas, each once.

Puerperal complications were recorded in 7 mothers. The disturbances included

urinary infection, endometritis and anemia.

Of the MA pairs, 13 were male and 9 female; in the case of conjoined twins the sex was not recorded. The perinatal mortality of MA twins was 28.3% vs 5.0% of DA twins. Double survival was reported in 52%. Six MA twins were delivered stillborn and 7 were lost early neonatally. A further one was lost at the age of 22 days. Both twins were equally often stillborn but early neonatal loss involved 2 first and 5 second twins. The causes of perinatal death of MA twins are shown in Table 2. As can be seen, the

Table 2. Causes of Death in Monoamniotic Twins (N = 46)

Causes of stillbirth	N	Causes of early neonatal death	N
Congenital malformation	3	Congenital malformation	1
Feto-fetal transfusion	2	Respiratory distress syndrome	5
Abruption of the placenta	1	Asphyxia neonatorum	1
Total	6		7

most common cause of death was respiratory distress syndrome followed by congenital malformations. Lethal malformations were the case of conjoined twins besides one anencephalus and one hydrocephalus. The former was delivered at the 36th week with a birthweight of 1610 g, 840 g less than the normal female cotwin. The hydrocephalic twin was delivered at 33 weeks with a birthweight of 1950 g, 110 g less than the normal male cotwin. Asphyxia was stated as the cause of death in one second twin. The labour at the 39th week was ended by cesarean section because of fetal distress. The first twin was delivered in good condition but the second very depressed, Apgar scores 1 both at 1 min and 5 min, and was lost within four days. Velamentous insertion of the umbilical cord was recorded as the cause of hypoxia. Altogether, 7 infants were lost in 6 pregnancies complicated by polyhydramnion, a mortality of 58%. Respiratory distress syndrome was the cause of death in 3 of these cases, and congenital malformations in 4.

Special neonatal problems were noted in just over half of the liveborn MA twins. Of these infants, 13 developed respiratory disturbance, other problems being hypoglycemia, hypocalcemia and pneumonia. Congenital malformations were 3 times more common than in DA twins, as shown in Table 1. In addition to the lethal malformations reported above, 3 further infants, 2 male and 1 female, had cardiovascular malformations.

DISCUSSION

The frequency of MA twins observed in this study, 2.1% or 1:47, is close to that as reported earlier in Scandinavia by Simonsen [22], 1:40. However, the frequencies given in the literature differ widely, from 1:32 to 1:700 [3,25], and the true incidence may be difficult to determine because of nonrecognition or nonreporting of cases. The

incidence, of course, varies also on account of twinning rates in general, MA pregnancies being about 6% of monozygotic ones [2].

Mothers of MA twins were found to be more often nulliparous than mothers of DA twins. This is in keeping with the etiology of monozygotic (MZ) and dizygotic (DZ) twinning, the former being more related to chance, with maternal age and parity following the general distributions, whereas the frequency of DZ twinning rises with maternal age and parity [14].

More than half of the mothers with MA twins were treated because of premature contractions and preterm delivery was reported in 70% of cases. The highly significant increase in the number of markedly preterm labours calls for very early and active supervision and care to prolong gestation. The reasons for preterm labour are imperfectly understood. Two factors that may contribute, low parity and polyhydramnion, were found to be common in MA pregnancies. Polyhydramnion is found to be more common in twin than singleton pregnancies [11]. Although it is not found to be more common in MZ than DZ twin pregnancies [13], at least its acute form is a special complication of the MZ pregnancy [24]. Acute polyhydramnion is a very serious complication. Therapeutic amniocentesis to reduce the volume was not successful when tried in one of our cases, but there are reports of better outcome [4,21]. The risk of perinatal loss was high in pregnancies complicated by polyhydramnion, in agreement with Faaroqui et al [6], and not only due to prematurity but also to malformations. The finding that congenital malformations were quite common is in contrast with the common view that polyhydramnion with malformations in singletons but not in multiple pregnancies [10,15]. This may, however, be explained by the high incidence of malformations in MA twins overall, as found in this study in agreement with James [9].

The perinatal mortality of MA twin was 28.3%, almost 6 times higher than in DA twins. Further, double survival was stated in 52% of cases. The high fetal wastage was about of the same degree as found in many recent reports [7,12,19,25]. In the 1930s, Quingley [16], analysing 94 MA twin pregnancies, noted a perinatal mortality of 68% and a double survival of only 16%. Although recent advances in obstetric practice and newborn care surely improved perinatal survival, it may also be, as speculated by Wharton et al [25], that the mortality was earlier overestimated because healthy twins may not have been diagnosed as MA.

Respiratory distress syndrome due to prematurity and congenital malformations were found to be the most common causes of death. Malformations are found to be twice as common in twins than in singletons [8,11], and the general opinion is that the increase is due to MZ twins [20]. In agreement with this, the frequency of congenital malformations in this series of MA twins was 15% as compared to 5% in DA twins. It might also be stressed, as done by Simonsen [22], that because malformations, excluding the case of conjoined twins, were always found in only one twin of a pair, they cannot be genetic, nor due to some generalized intrauterine or environmental factor, but most probably to a local defect caused by the splitting of the embryo. James [9] has reported acardia to represent 7%, anencephalia 3%, and other malformations 7%, in the 20% of malformation found in MA twins. In this study, acardiac fetuses were recorded twice, but in pregnancies with a diamniotic placenta. Conjoined twins were noted once, which is close to the reported frequency 1:600 to 1:900 [23]. Feto-fetal

transfusion was found to be the cause of death in one twin pair. Unfortunately, no placental perfusion studies for the existence of intraplacental vascular communications were made in any of the placentae. Anastomotic communications are found almost universally in monochorionic placentae [18]. It has been estimated that in 5 to 15% of monochorionic twin pregnancies these communications may lead to the hematologic imbalance known as feto-fetal transfusion syndrome [17,18], and even to fetal death as in our case.

Complications of the umbilical cords, twisting and knotting, were noted in 17% and prolapse of the cord in 21% of cases. Cord problems were thus not as common as reported by Salerno [19] or Foglmann [7], 60-70%. According to Wharton et al [25], who noted problems only once in 18 MA twin pregnancies, the frequency in some reports may have been overestimated because of the tendency to report only complicated cases or misdiagnose uncomplicated MA pregnancies. Although twisting and knotting in this series was not responsible for any deaths, it most obviously was the cause of fetal distress during labour in two cases delivered by cesarean section. Traction of the twisted and thus shortened umbilical cord on the placenta could be thought to have contributed to abruption of the placenta in one case. Thus, if the diagnosis of MA twin pregnancy is made before delivery, and this ought to be possible by ultrasound in the first half of pregnancy [1], pregnancy and labour should be very carefully monitored for signs of occlusion of the umbilical cords.

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