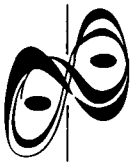

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The Placental Cause of Fetal Growth Retardation in Twin Gestations

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Abstract. The retardation of fetal growth in twin as compared to singleton gestations may be due to maternal and/or placental factors. The separate birthweights and related placental weights of 487 dichorial twin pairs were recorded, and the heavier placental weights of firstborns in comparison with second-borns were found to be related to the heavier birthweights of firstborns compared to second-borns. The lighter placental weights of firstborns compared to second-borns were found to be related to the lighter birthweights of firstborns compared to second-borns. Obviously, the placenta itself may may very well be the cause of the retardation of fetal growth in twin gestations.

Key words: Twins, Dichorial twins, Birthweight, Placental weight, Intrauterine growth

INTRODUCTION

From 32 weeks onwards, newborns from mutiple gestations are smaller than singletons [2, 5]. One author suggested an environmental cause for such fetal growth retardation after he found an accelerated growth after birth in twins, which reached median levels for singletons at 12 months of age [7]. There is much debate about the underlying environmental factors causing fetal growth retardation and whether these are placental and/or maternal. An earlier study found proportionally larger placentae in twins than in singletons [6]. The authors concluded the maternal supply line rather than the placenta proper is responsible for the retardation of fetal growth in multiple gestations. In a more recent study of 1460 twin children and their placentas [3], the present authors found the mean placental indices in twins to be alike or even lower than in singletons, which means that in twin gestations the placenta is not proportionally larger than in singletons. Therefore, the placenta proper cannot be excluded as the cause of fetal growth retardation in twins. A recent study [4] found that in dichorionic twin pairs, of the lighter cotwins,

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36.3% belonged to the heavier placenta, 49.5% belonged to the lighter placenta, and 13.7% had equal placental weight. Because those differences where not found to be of statistical significance, the authors concluded that, in dichorionic twins, birthweight discordance was not attributable to differences in placental weight. We reviewed our series of twins [2, 3] to study the relation between discordance of birthweight and discordance of placental weight in dichorial twins.

MATERIAL AND METHODS

The study is based on 1485 twin pairs with a menstrual age over 20 weeks, born at two hospitals in Amsterdam. The placental weights of 734 were recorded after all blood clots had been removed, the membranes were trimmed off, and the umbilical cord was cut within 2 cm and ligated after being allowed to bleed freely. The placenta was placed in a 4% formalin solution and weighed within a week. Placentation was determined from an examination of the membranes, and, if necessary, microscopic examinations were performed. 349 twin pairs (23.5%) were monochorial and 1136 twin pairs (76.5% of the study population) were dichorial [2, 3]. In 487 dichorial twins pairs the separate placental weights of the individual twin infants were known; the birthweights and placental weights were recorded at an accuracy of 5 g. The birthweights and the placental weights of the firstborns were considered to be heavier than, equal to or lighter than those of the second-borns. The heavier, equal or lighter firstborn birthweights were studied in relation to the heavier, equal or lighter firstborn placental weights. The Chi-square test was used for statistical analysis.

RESULTS

The mean birthweights and mean placental weights of the firstborn and second-born dichorial twin infants are given in Table 1. Obviously, firstborn infants show a slightly greater mean birthweight and placental weight than second-born infants of dichorial twins. The analysis of the relation between the discordance of placental weight and birthweight within dichorial twin pairs is given in Table 2. In 250 dichorial twins, the birthweights of firstborn infants were heavier than of second-borns, were alike in 5 twins and were lower than of second-borns in 232 twins. The placental weights of firstborn infants were heavier than those of second-borns in 288 twins, were alike in 16 twins and

Table 1 - Mean birthweights and mean placental weights of firstborn and of secondborn twin infants in 487 dichorial twin pairs

	Firstborn (g) (SD)	Secondborn (g) (SD)
mean birthweight	2422 (632)	2402 (620)
mean placental weight	400 (101)	380 (91)

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Table 2 - Birthweights and placental weights of firstborn twin infants, releated to those of the second-born twin infants in 487 dichorial twin pairs.

	Birthweight			
	firstborn heavier	firstborn and second-born alike	firstborn lighter	all
placental weight				
firstborn heavier	205	2	81	288
firstborn and second-born alike	6	0	10	16
firstborn lighter	39	3	141	183
all	250	5	232	487

were lower than those of second-borns in 183 twins. In Table 2, all twin infants are grouped according to their birthweights and their placental weights (those of firstborns being heavier than, equal to, or lighter than second-borns). From the Chi-square analysis applied to Table 2, it is evident that heavier placentas of firstborn twin infants as compared to second-borns are more often related to heavier birthweights and that lighter placentas of firstborn twin infants as compared to second-borns are more often related to lighter birthweights, at a statistical significant level ($p < .05$).

DISCUSSION

Birthweight is dependent on many factors, the most important being gestational age. The mean gestational age of twins is almost three weeks less than in singletons [2]. Monochorial twins have a shorter duration of pregnancy than dichorial twins by 10.6 days, very probably due to the higher incidence of polyhydramnios found in monochorial twins [1, 2]. Fetal sex (boys being heavier than girls) and maternal parity (children of multiparae being heavier than children of primiparae) exert their influence not only in singletons but also in twins [2]. Even the insertion of the umbilical cord is related to birthweight in both singletons and twins [2]. Marginal and velamentous insertions are particularly associated with lower birthweights. The lower birthweights of monochorial as compared to dichorial twins at the same gestational age can be ascribed to the higher incidence of unfavourable insertions of the umbilical cord in these infants as compared to dichorial twins [2]. Obviously, maternal, fetal and even placental factors may influence birthweight.

The cause of fetal growth retardation in twins as compared to singletons, which is apparent from the difference in birthweight from 32 weeks' gestational age onwards, may be maternal and/or placental. In our former studies, we found the placenta in multiple gestations not to be proportionally greater than in singleton pregnancies [2, 3]. Therefore we could not exclude the placenta proper as the cause of fetal growth retarda-

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tion in multiple gestations. We remarked in a previous study [3] that in singletons, children of multiparae are heavier than children of primiparae from 32 weeks' gestation onwards, where their mean placental weights already differ at 28 weeks' gestation and very likely before. Obviously, the fetal growth of children of primiparae as compared to children of multiparae and also that of twin infants compared to singletons is retarded, and is preceded by a retardation in placental growth. Indeed, early placental growth retardation may be responsible for lower birthweights.

Recent longitudinal echoscopic studies of placental growth in relation to fetal growth in singletons seem to confirm this hypothesis [8, 9]. Dichorial twins share the same environment and may have separate placentas with separate placental weights. The authors of a recent study were right to consider the relation between different birthweights and different placental weights in dichorial twins [4]. Their numbers were most probably too small to enable any statistical significant conclusion on the importance of placental weight in relation to fetal weight to be reached, however. In our sample of 487 dichorial twin pairs, we found a statistically significant relation between heavier placental weights and heavier birthweights, and also between lower placental weights and the lower birthweights of firstborns as compared to second-borns (Table 2). This finding may be considered to provide strong support for the hypothesis that the placenta proper may very well be the cause of fetal growth retardation in multiple compared to singletons gestations. Future longitudinal echoscopic studies on placental growth in multiple gestations versus that in singletons may confirm this hypothesis. It seems highly likely that it is placental crowding rather than fetal crowding of the uterus that is the real cause of fetal growth retardation in multiple gestations.

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