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Twin Pregnancies: An 11-Year Review

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Abstract. From 1971 to 1981, 16752 women were delivered at the University Women's Clinic in Heidelberg; 228 of these were twin pregnancies (1.36%). The relationships between sex, gestational age, birthweight, mortality, and fetal outcome were investigated. For the reason of grading, so-called χ^2 curves are used. These curves show the strength and the course of relationship between two parameters. Mortality of the twin (8.3%) depended on birthweight and on sex of the infant, but not on the mode of delivery. All twins were 'small-for-date' (25th weight percentile of single births). Starting at the 35th week of gestation, the increase in weight decelerated additionally. So, immaturity as well as twin-related factors led to the high mortality rate for twins. Fetal outcome was evaluated in respect to the birthweight and to the delivery interval.

Key words: Twin pregnancy, Birthweight, Gestational age, Infant mortality

INTRODUCTION

Twin pregnancies are risk pregnancies. Low birthweight, prematurity, and a higher perinatal mortality and morbidity rate are usual, though recent progress in antepartal and postpartal care has led to a decreased mortality rate. A 10-year study of twin births having been carried out in our clinic 20 years ago [1], we have now made this retrospective investigation over 11 years in order to study the effect of the progress in perinatal care within our clinic and in comparison with other studies.

MATERIALS AND METHODS

Within 11 years, from 1971 to 1981, 16,752 pregnant women were delivered at the University women's hospital in Heidelberg: 228 of these were twin pregnancies. That makes up an overall twin rate of 1.36%, or 1 twin birth in 73 maternities. We evaluated these twin deliveries in respect to gestational

age, birthweight, weight-percentile, Apgar values, umbilical artery pH value, and mortality. Furthermore, we evaluated the relationship between mortality and birthweight, and between mortality and mode of delivery. Finally, we tried to graduate the influence of birthweight and of the time delay between the delivery of the first and the second twin on fetal outcome by means of so-called χ^2 curves, which have the following advantages:

1) a very strong data reduction: each curve in Figs. 6, 7, 9, 10 replaces five tables, each consisting of four numbers and one χ^2 value (2×2 contingency table);
2) the highly impressive graphical representation of the relationship reflects the course of the relationship too;
3) it is possible to compare different parameters among each other and to define their grade of relatioship.

RESULTS

Birthweight and Gestational Age

As shown in Fig. 1, the second twin is slightly lighter than the first one, but not significantly (t = 2,246), whereas the difference between birthweight of all twins and overall birthweight is highly significant (t = 31,3), which is partly due to a shorter duration of pregnancy: about 54% of the twins were delivered between the 37th and the 39th week of pregnancy (Fig. 2).

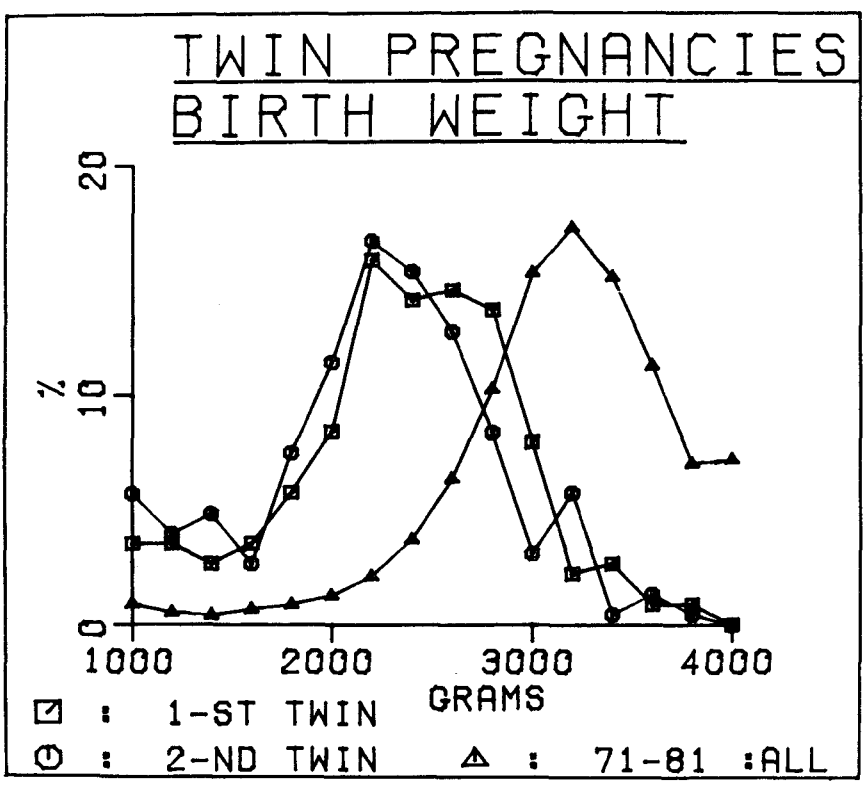

Fig. 1. Birthweight distribution of first and second twins and of all newborn infants (1971-1981). There is no significant difference between the mean birthweights of the first and of the second twin.

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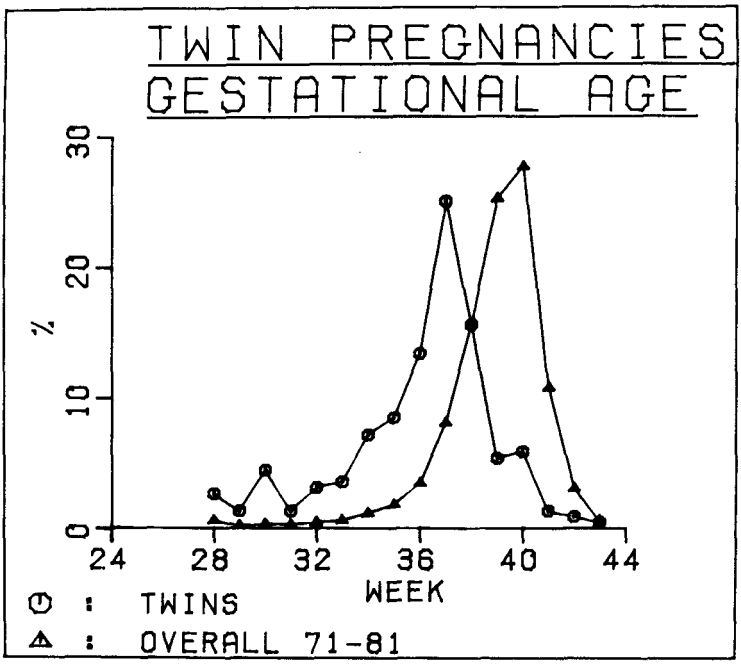

Fig. 2. Gestational age (completed weeks of pregnancy) at delivery.

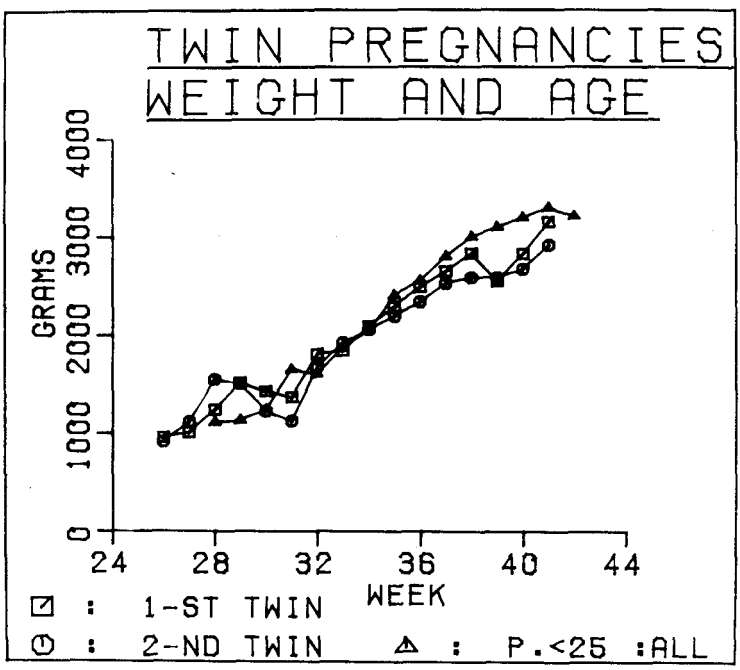

Fig. 3. Birthweight and gestational age in first and second twins and all newborn infants (1971-1981).

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But twins are not only delivered earlier, they are also 'small for date': their birthweight curve corresponds to the 25th weight percentile curve for all newborn infants delivered within this period and, starting at the 35th week of gestation, it is even found to be lower (Fig. 3). When evaluating the relationship between gestational age and mode of delivery, we found no significant difference between cesarean section and other modes of delivery.

Mortality

A very high percentage of the twins died (Table), 38 of the 456 infants (8.3%), most being from pairs in which both twins died, 30 of 38 infants (79%).

Table. Twin deliveries at the University Women's hospital, Heidelberg. Sex and mortality

Mortality	N	Infants	Sex	Surviv.	Death	
Total	38	(8.3%)	M.M	132	26	$\chi^2 = 19.8$
1st twin	4	(0.8%)	M F	117	3	$P < 0.001$
2nd twin	4	(0.8%)	F F	159	9	
Both	30	(6.6%)	?	10	0	

In 35% of cases both twins are male, in 38% both are female, and in 26% one is male and the other female. We found a highly significant difference ($\chi^2 \doteq 19.8$) between sex and mortality: 16.5% of the infants from the male pairs died, vs only 4.2% of those from pairs with at least one female [10, 11].

For all modes of delivery the mortality rate was about 8.3% (Fig. 4), except for twins in breech presentation that were delivered vaginally (mostly the second twin); here the mortality rate was 3.2%.

Mortality of course was strongly correlated to birthweight: 79% of all twins below 1000 g and 42% of those between 1000 g and 1500 g died (Fig. 5), while mortality decreased to below 2% for the twins weighing 2500 g and more.

Fetal Outcome

Fetal outcome is strongly dependent on birthweight. For a better understanding of the relationship between low birthweight and low Apgar score or low umbilical artery pH values, we subdivided the twins into two groups, one including the infants with a birthweight lower than a given limit, and the other including the rest. For each group we selected the number of infants with low Apgar score or low umbilical artery pH values. Calculation of χ^2 values was successively made for the 1 min, 5 min, and 10 min Apgar score with the birthweight limits of 1000 g, 1500 g, 2000 g, 2500 g, and 3000 g. A χ^2 curve is obtained when connecting the individual χ^2 values for each fetal parameter (2 × × 2 contingency table), and this reflects the significance of the relationship between that fetal parameter and the birthweight.

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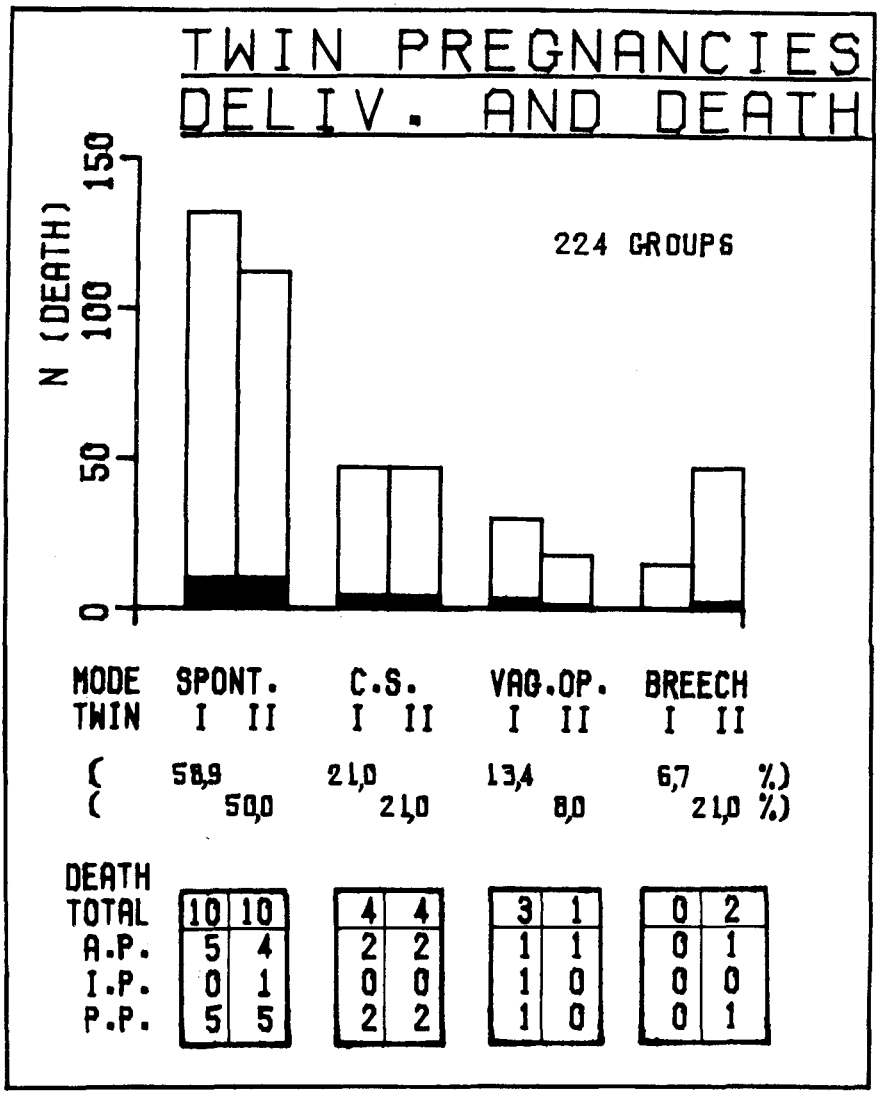

Fig. 4. Mortality and mode of delivery. Each pair of colums gives the numbers of first and second twins by mode of delivery. The black areas give the number of dead infants. These numbers are specified below. For all modes of delivery the mortality rate is about 8.3% (In 4 groups the mode of delivery was not known).

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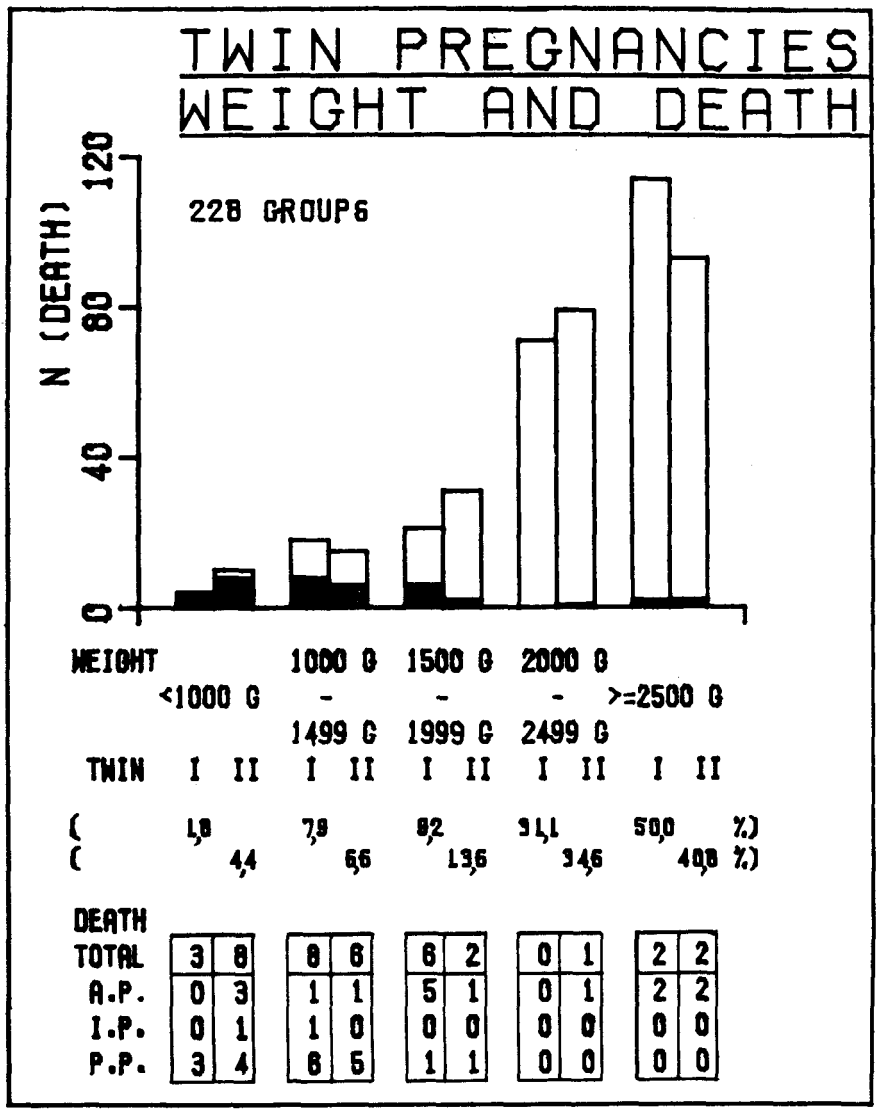

Fig. 5. Mortality and birthweight. Each pair of columns give the numbers of first and second twins by birthweight class. The black area gives the number of dead infants. In the lowest weight class 79% of all twins died, vs only 2% in the highest weight class.

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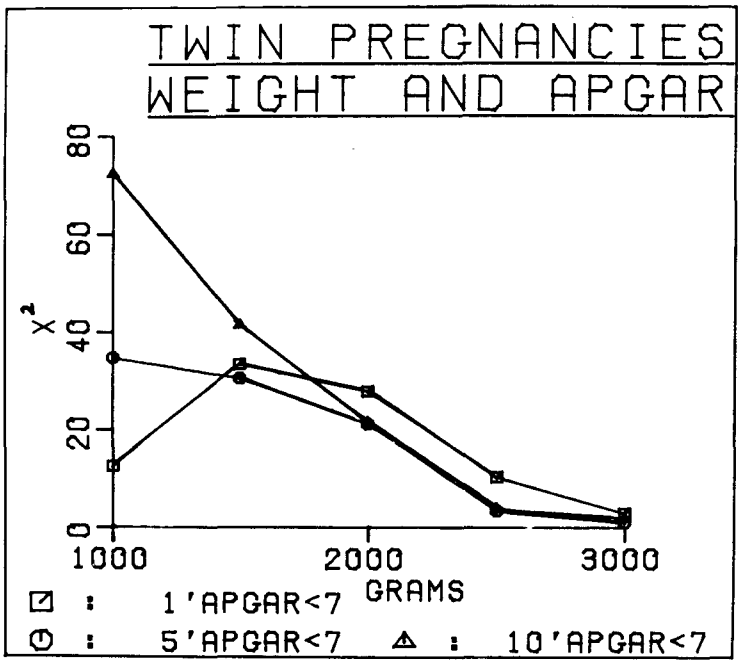

Fig. 6. Birthweight and Apgar score: χ^2 curves for the 1 min, the 5 min, or the 10 min Apgar score $\leqslant 7$. A χ^2 value above 6.64 corresponds to a significant difference ($P < 0.01$) and a χ^2-value above 10.8 to a highly significant difference ($P < 0.001$).

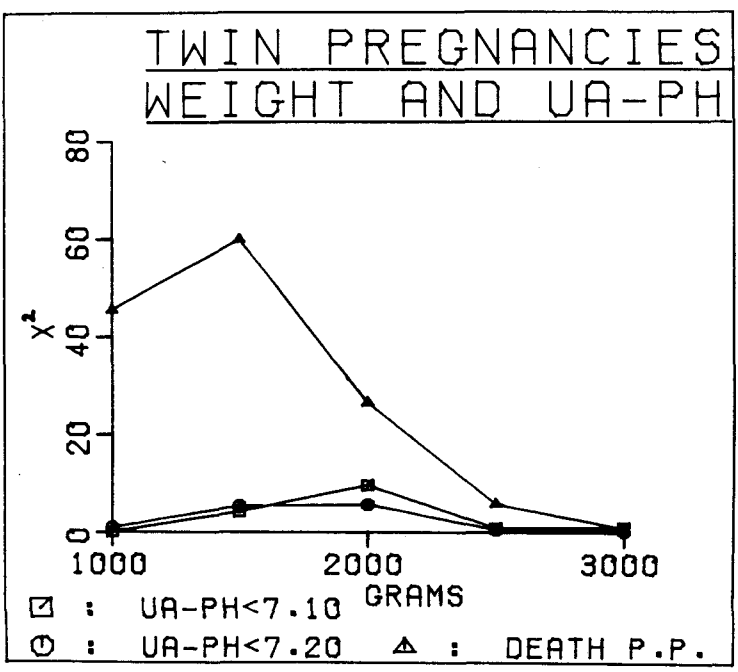

Fig. 7. Birthweight and umbilical artery pH value: χ^2 curves for the pH values of 7.10 and 7.20 and for postpartal death.

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The relationship between birthweight and Apgar score appears to be much stronger than that between birthweight and umbilical artery pH value (Figs. 6 and 7). The 10 min Apgar score is correlated to birthweight more than the 5 min score, and the latter more than the 1 min score. Highly significant ($P < 0.001$) differences in 1 min, 5 min, and 10 min Apgar scoring with a value less than, or equal to 7 can be seen between the groups over and under the birthweight limits of 2500 g, 2000 g, 1500 g, and 1000 g (Fig. 6). But only for a birthweight limit of 2000 g could we achieve a significant difference ($P < 0.01$) for an umbilical artery pH value of 7.20 (Fig. 7).

Next, we looked at the time delay between the delivery of the first and that of the second twin, but only for those cases where the second twin was delivered vaginally. More than 75% of the second twins were delivered in less than 15 min after the first twin. The length of the delivery interval clearly appears to influence the outcome of the second twin (Fig. 8). Similarly to what was done for the weight limits, we determined the delay limits of 5, 10, 15, 20, 25, and 30 min. For each fetal parameter, ie, the 1 min, 5 min, and 10 min Apgar scores, as well as the umbilical artery pH value, we calculated the χ^2 curves as explained before obtaining much lower χ^2 values (Fig. 9, 10). Only for the delay limit of 20 min did we obtain a significant difference ($P < 0.01$) for an umbilical artery pH value of 7.20. The Apgar scores are influenced much less by the delivery interval than by the birthweight (Figs. 6, 7).

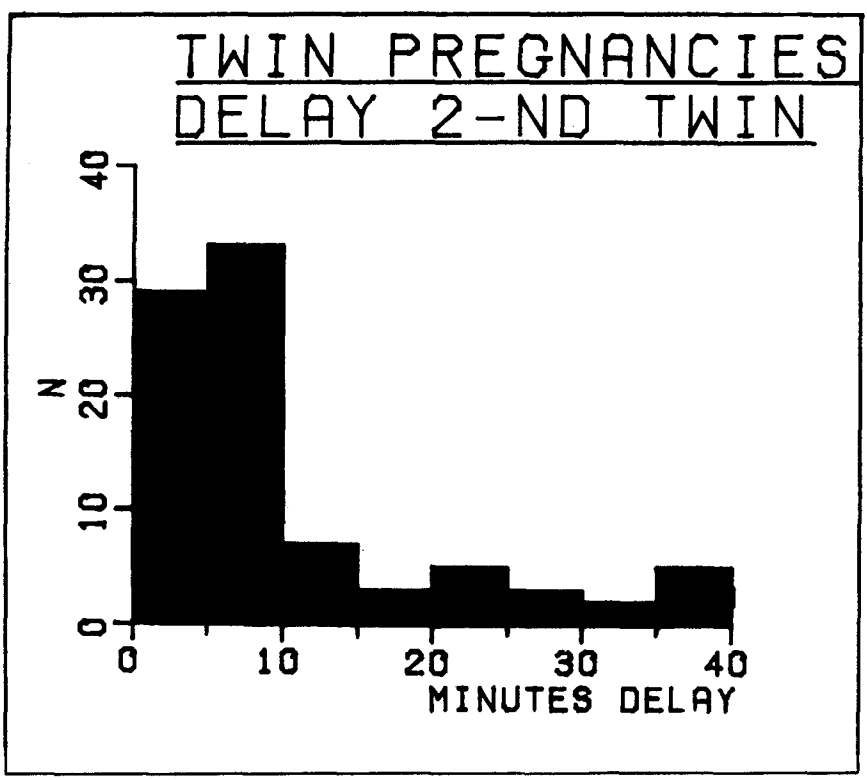

Fig. 8. Time delay of the second twin. The columns show the distribution of the time delay between the delivery of the first and that of the second twin, but only for those delivered vaginally.

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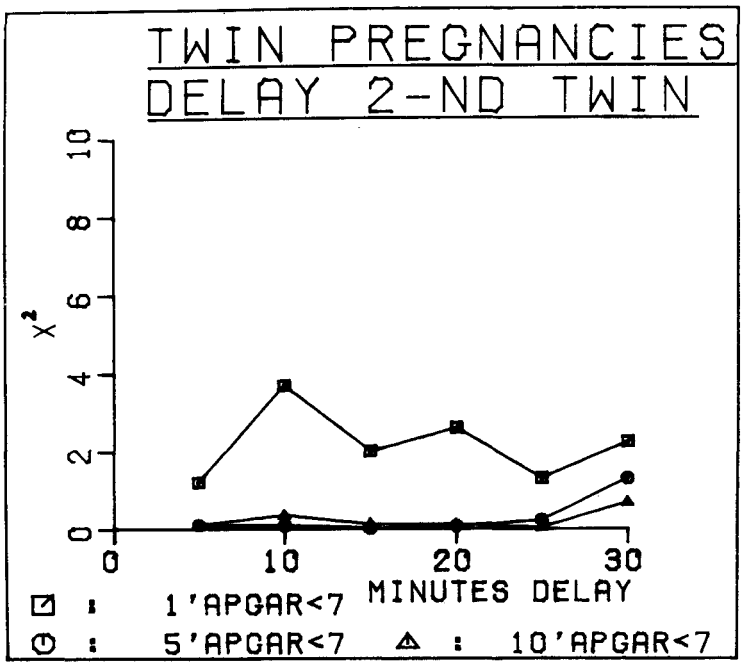

Fig. 9. Time delay of the second twin and Apgar score: χ^2 curves for the 1 min, the 5 min, and the 10 min Apgar score. All χ^2 values are below 6.64 and there is therefore no significant difference.

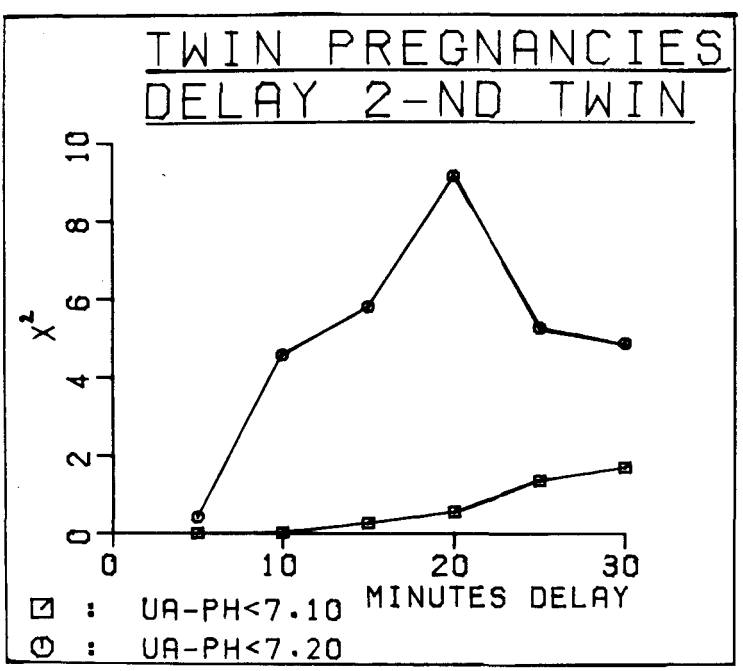

Fig. 10. Time delay of the second twin and umbilical artery pH value: χ^2 curves for the pH values of 7.10 and 7.20. The only significant difference is in the case of a delay limit of 20 min for pH value of 7.20.

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DISCUSSION

In 45% of cases the twin pregnancy ended in a preterm delivery (less than the 37th week), vs an overall rate of 9%. As pointed out in the literature, prematurity seems to be the most important factor of perinatal mortality [9], and in fact we found higher mortality in twin pregnancies (8.3%). Compared to the previous study at our hospital [1], this rate has been halved within two decades, which reflects improvements of prenatal and neonatal care as well as an increased rate of cesarean sections (20%): so we had a perinatal mortality rate of 3.2% for vaginal breech deliveries, which is much lower than the figures in the literature [10].

But twins were not only delivered earlier, they were also immature. This led to an intrauterine growth retardation in about 40% of the infants (birthweight < 10th percentile). We found no significant difference between the first and the second twin regarding the mean birthweight [7] or the mortality rate. But perinatal mortality depended strongly on the sex of the infant and its high rate appears in conclusion to result from: the intrauterine growth retardation for twins, the higher mortality rate for monozygotic twins [2, 8], and the higher mortality rate for male infants [11].

From the χ^2 curves (Figs. 6 and 7) it can be seen that Apgar scoring reflects very well the birthweight (maturity) of the infant. The effect of intrapartal managements is reflected by a weak relationship between the delivery interval and the umbilical artery pH-value ($P < 0.01$ for a limit of 7.20).

Because this does not apply to lower pH values and to the Apgar scores, severe damages were not caused by the length of the delivery interval [3,5].

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