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Diagnosis and Treatment of Twin Pregnancy

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Early detection is a prerequisite for the active management of twin pregnancy. Detection rate was not, or was only slightly, increased by improved anamnesis or more alert physical examination. General placental lactogen screening selected 95% of the twins but implied a subsequent ultrasonic screening examination of 16% of the pregnant population for the definitive diagnosis. A general screening programme with ultrasound detected 90% of the twin pregnancies (methodological error 1.7%; not participating 8%) in the mid-trimester. Extensive restriction of maternal physical activity from the 29th to the 36th gestational week by bed rest in hospital reduced perinatal mortality to the level of singletons and also decreased the incidence of neurological and mental handicap among the surviving twins. For the supervision of twin pregnancy, urinary estriol estimates predict birth weight rather than fetal distress. Monitoring with repeated ultrasonic biparietal diameter measurements seem limited in value; even large intertwin BPD differences are not indicators of fetal distress in the smallest twin. The decrease of perinatal mortality and morbidity among twins subjected to special antenatal supervision suggests that large gains can be made by early detection and antenatal hospitalization. The earlier finding that impairment of the intrauterine supply line is closely associated with neurological sequelae gives added importance to the reduction of CNS handicap and of growth-retarded fetuses observed during such a programme.

Key words: Twin pregnancy, Ultrasound, Early diagnosis, Monitoring, Treatment

INTRODUCTION

During the 1950s and 1960s, perinatal mortality and morbidity decreased radically in Sweden, parallel to the generally improved antenatal and neonatal care. The outcome of twin pregnancy did not display a similar improvement. Although increased attempts were made to detect multiple gestation through conventional examination by trained obstetricians, the detection rate remained low. As early diagnosis of twin pregnancy is

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a prerequisite for adequate antenatal care, our group felt it imperative to improve early diagnosis by applying methods other than the conventional obstetric examination. This paper discusses some methodological considerations in twin detection and our experience of extensive hospitalization for the management of twin pregnancy.

THE DIAGNOSIS OF TWIN PREGNANCY

More alert physical examination by the obstetrician increased detection rate from 40% to 60% antepartum from 1965 to 1972 [6]. The diagnosis of twin pregnancy was usually regrettably late; in most cases, too late for measures to be taken for the prevention of preterm delivery (35.5 weeks).

In 1977 Westin reported in a retrospective study [25] that 99% of the twin pregnancies had a symphysis fundus value (measured by tape) (SF) greater than 2 SD above the mean for singletons at least once during the pregnancy. This criterion made it possible to detect 50% of the twin pregnancies before the 25th week and 82% before the 29th week. The use of SF growth charts improved twin diagnosis to 86% before delivery.

Improved anamnesis proved of limited diagnostic value [19]. An evaluation of a detailed questionnaire answered by 5272 pregnant women failed to reveal any difference in the familial incidence of twins in those who delivered twins and those who delivered singletons.

Indirect biochemical methods are based on the fact that the total placental mass and fetal mass are greater in twin pregnancy than in singleton gestations. Placental or fetal products, hormones, proteins, peptides, and enzymes would therefore be expected to be elevated in the twin pregnancy. Lidbjörk [12] reported elevated alpha-fetoprotein (AFP) (2 SD above the mean) in 80% of twin pregnancies before the 20th week. In very early pregnancy (four to five weeks after the last menstrual period), Jovanovic [10] observed twofold higher levels of chorionic gonadotropin (hCG) by radioreceptor assay. Using the combination of placental lactogen (hPL) and hCG, Dont [3] had a diagnostic accuracy of 95% in mid-gestation. In 75% of all twin pregnancies, cystyl aminopeptides (CAP) were reported to be 2 SD above the mean [1].

A study by our group [6] showed that 95% of twin pregnancies had hPL values 1 SD above the mean for singletons at any time during the second half of pregnancy. However, the definitive diagnosis and exclusion of the 16% false-positive diagnoses demanded other methods. The diagnostic accuracy of all the indirect methods is impaired by various degrees of false-positive findings. Thus, other methods are needed for the definitive diagnosis. For such purposes, diagnostic ultrasound seems ideal. The irradiation risk prevents radiography from being used in a general screening; fetal ECG is not accurate enough and is too time consuming.

Sundén [22] and Morrison [16], using ultrasound, showed a very high detection rate in a group of women with clinically suspected twin pregnancies; therefore, in 1973, routine screening of the pregnant population with ultrasound was begun in the Department of Obstetrics and Gynecology in Malmö, Sweden. The main purpose was to improve the early diagnosis of twin pregnancy. During a six year period, 90% of the pregnant population was examined. Initially screening was done in the 28th week; now it is done in the 17th week. Of the 123 examined twin pairs born up to 31 December 1978, 98% were diagnosed at the first examination. No false-positive diagnoses were made.

Of the mentioned techniques for improved early diagnosis of twin pregnancy, meticulous anamnesis and improved general attention at the obstetric examination did not increase or only slightly increased the frequency of early diagnosis. Ultrasound is the method of

choice, with a very high precision at any time during pregnancy from the first trimester. All methods imply a general screening. Ultrasonic screening is probably less expensive than screening with the indirect biochemical methods using RIA kits. The precision of biochemical methods is not high enough to replace ultrasound in making the definitive diagnosis. Only tape measurements of fundal height (SF) seem to be less expensive than ultrasound screening, but they do not have sufficient diagnostic accuracy before the 29th week. The drawbacks of the SF method are probably greater than the figures suggest, as the undected twins are those in need of preventive measures: they are probably the smallest and perhaps the most malnourished fetuses in utero.

PREVENTION OF PRETERM DELIVERY

Immaturity at birth due to preterm delivery and/or low birth weight is one of the main reasons for the high perinatal mortality in twin pregnancy [9, 11]. In order to improve perinatal survival, prevention of preterm delivery is essential. Impaired fetal growth is associated with preterm delivery in singletons [17], and the uterine blood flow in twin pregnancy is lower than in singleton pregnancy [15]. The blood flow in the placenta decreases with increasing physical activity and increases with bed rest [15]. Maternal heart volume also increases with bed rest [23]. The positive effect of restricted activity on the outcome of twin pregnancy that has been reported during the past decades might be associated with an improved intrauterine nutritional status of the twins secondary to improved uterine blood flow caused by restrictions of maternal physical activity. Maternal physical activity can be influenced in various ways: The early diagnosis of twin pregnancy per se probably affects the social activity pattern during pregnancy. The early diagnosis will also alert the physician to look for early signs of complications such as hydramnios, preeclampsia, retarded growth, and preterm labour, which can be followed by restricted activity. Absence from work will probably reduce the activity, but the extreme measure for lessening activity is bed rest in hospital. To evaluate the effects of reduced maternal activity on the outcome of twin pregnancy, our group chose the extreme method, bed rest in hospital. From 1973 to 1978, 77% of the women with twin pregnancies were hospitalized between the 28th and the 36th weeks of gestation (mean, 55 days). The period of greatest risk for preterm delivery appeared between the time of possible extrauterine survival and the 33rd–34th week. Bed rest has to be instituted well before the time of the greatest risk (we did not consider prevention of late abortions essential from the socioeconomic standpoint).

In the group with early detection and bed rest, there were practically no births between the 29th and the 34th weeks, and the perinatal mortality was reduced to the level of singletons (below 1%). In the group without bed rest, perinatal mortality remained on the same level (8%) as before the investigation period. Between the period 1963/65 and 1973/78, there was an improvement in twin care throughout Sweden by the gradual introduction of diagnostic ultrasound, the use of fundal height measurements, and measures to prevent preterm delivery. This reduced the perinatal mortality of twins in Sweden to 5.4% in 1977.

The reduction of perinatal mortality occurred in parallel with improved obstetric and neonatal care. A reduction in the incidence of sequelae from 1963/65 to 1973/77 agrees well with other reports that neurological sequelae were reduced parallel to the reduction of perinatal mortality [21]. However, in our 1963/65 material, there was no association between preterm delivery and severe mental and physical handicaps among survivors. Recently, interest has focused on growth reduction in utero as a cause of neurological sequelae [8,

20]. In a group of twin pregnancies treated with bed rest, fewer twins were born small-for-gestational age or with low birth weight. It is still to be determined whether improved intrauterine growth also reduced the number of twins born with severe mental and physical handicaps.

MONITORING OF TWIN PREGNANCY

Available techniques for the assessment of fetal well-being and growth are the same for twin and singleton pregnancies. Tests of placental hormone production and of function of the fetal placental unit are elaborated for singleton pregnancies and cannot simply be transformed for application to twin pregnancy.

MacGillivray and others have reported that urinary estriol values are higher in twin pregnancy than in singleton pregnancies [4, 13]. Duff and Brown did not find lower estriol values after the intrauterine death of one fetus or in pregnancies with intrauterine growth retardation [4]. To study the capacity of urinary estriol estimates in predicting birth weight, 498 24-hour urinary estriol estimates were made according to the method of Brown et al [2] on 56 twin gravidae subjected to bed rest between the 28th and 36th gestational weeks. All pregnancies ran a normal course and came to term. According to Duff et al [4] the 50th% for estriol values of twins coincides with the 90th% for values of singletons, and the 10th% for twins approximately coincides with the 50th% for singletons. This led us to put twin pregnancies into three categories according to their estriol values: group A, twin pregnancies with urinary estriol levels above the 90th% of singleton (39%); group B, twin pregnancies with urinary estriol levels between the 50th% and the 90th% for singletons (43%); group C, twin pregnancies with urinary estriol values below the 50th% of singletons (18%). Three women with estriol values falling from one category to a lower one were excluded in the evaluation. The mean birth for the A, B, and C groups was 2875 g, 2460 g, and 2245 g, respectively (SD = 400 g). The distributions of birth weights among first and second twins were the same in all three groups. In the group with estriol values above the 90th% for singletons, 33 out of 44 (75%) twins had a birth weight above 2500 g; none was below 2000 g. In the intermediate B group, 19 out of 48 (38%) weighed above 2500 g, and four (8%) weighed less than 2000 g. In the group with estriol values below the 50th% for singletons (C group), only three of 20 (15%) weighed 2500 g or more, and four (20%) weighed less than 2000 g. Thus, although fetal jeopardy in twin pregnancies is not reflected by low urinary estriol values as in singleton pregnancies, estriol estimates make it possible to some extent to predict birth weight. Plasma hPL determinations were made on the same 57 twin pregnancies mentioned above. Neither single measurements nor the trends in serial hPL values had any relevance to fetal well-being or the outcome of pregnancy as far as twins are concerned.

All the placental or feto-placental-unit function tests rather reflect the combined well-being of both twins; intrauterine distress to one of the twins is not assessed. Monitoring of fetal growth by ultrasonic BPD determinations offers a selective method for individual measurements. In singleton pregnancy deviation from the normal mean values of the BPD in repeated longitudinal measurements is indicative of fetal distress in a high proportion [18]. For twin pregnancies, this does not seem to be the case. At our laboratory, 119 twin pairs were monitored longitudinally with 978 BPD measurements from about mid-gestation to term. The BPD growth is influenced by several factors besides gestational age, eg, fetal sex, zygosity, and twin order. In 80%, the first twin (defined as the one in the pelvic inlet) had the largest BPD value. An increasing intertwin difference of the BPD was not found to be associated with distress to the deviating twin. In our experience

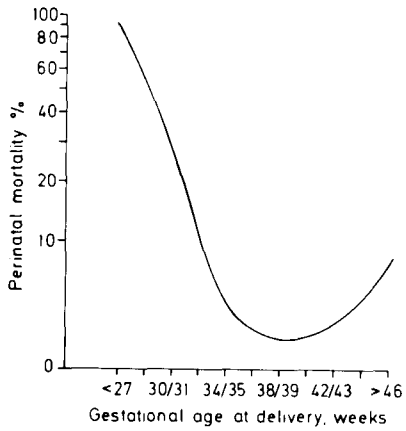

Figure. Perinatal mortality in relation to gestational age for 3477 twin pregnancies delivered in Sweden, 1973–1976.

of six years' longitudinal monitoring of intrauterine twin growth of the BPD, a deviating BPD value has never led to any clinical intervention. An extension of fetometry to measurements of fetal abdomen or trunk diameters might be of greater importance in predicting fetal birth weight than BPD measurements.

LABOUR AND DELIVERY

Numerous previous investigations have pointed to the importance of careful preparation and management of labour and delivery in multiple pregnancies. The observation that the second twin is much more vulnerable than the first has focused attention on the management of the delivery of the second twin. It must be noted that, even in early pregnancy, there are substantial differences between the first and the second twin that can contribute to the vulnerability of the second twin. Not only have intertwin differences of the fetal BPD been demonstrated [7], but also differences in plasma umbilical cortisol levels [5] and the lecithin/sphingomyelin ratio of the tracheal fluid have been observed [24]. In the 1960s, the care of the twin delivery seemed to be optimum at our unit. Neither perinatal mortality nor morbidity was found to be associated with the mode of delivery, time, and order between the twins, although the second twin had a 1-minute Apgar score below 7, or postpartum asphyxia three times more often than the first twin.

By comparing all twin pregnancies in Sweden 1973–77 (Figure), it is obvious that the perinatal mortality is lowest in twins delivered in the 38th week. We have taken this as substantiation for induction of most twin pregnancies in the 38th week. This means that in 85% of the twin pregnancies parturition at term was induced (17% sectio). All deliveries were monitored with external and/or internal fetal CTG, and at delivery, pediatricians, obstetricians, and anaesthetists were present.

CONCLUSION

For the diagnosis of twin pregnancy in sufficient time for measurements to be taken to prevent preterm delivery, a general screening programme seems to be necessary. Ultrasound is the method of choice. In a routine screening programme, the ultrasonic method had a sensitivity of 90%, the methodological error being 1.7%. Ultrasound is substantially more precise than other cheaper methods (SF measurements) or more expensive biochemical

methods. Early detection, together with bed rest for the prevention of preterm delivery, resulted in an almost complete disappearance of deliveries between the 29th and the 34th gestational week. This resulted in a reduction of the perinatal mortality to the level of singletons. This programme also reduced the incidence of infants delivered small-for-gestational age or with a very low birth weight. This might be interpreted as a facilitated intrauterine growth resulting from the bed rest programme, which seems to be important in order to avoid brain damage and to reduce neurological sequelae. The critical period during which bed rest appears to reduce perinatal mortality is between the 29th and 34th weeks of gestation. No optimum period for bed rest that can facilitate intrauterine growth has yet been determined.

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