ANALYTICAL STUDIES ON FETAL GROWTH
IN FETO-PLACENTO-MATERNAL SYSTEM

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INTRODUCTION

The diagnosis and management of intrauterine growth retardation (IUGR) remain an important problem of perinatal medicine, along with fetal distress. It is believed that fetal growth depends, in part, upon the function of the placenta, which must provide both oxygen and metabolic fuel to the fetus.

Placenta insufficiency, IUGR and late fetal distress have long been recognized as disorders in patients with pregnancy induced hypertension; however, the relationships among these disorders in pregnancy induced hypertension have not been well documented.

Thus, in order to investigate a possibility of the relationships among these disorders, we evaluated the placental function, fetal growth and neonatal condition of patients with pregnancy induced hypertension.

SUBJECTS AND METHODS

A total of 86 patients with severe pregnancy induced hypertension who delivered between the gestational ages of 20 and 41 weeks were selected for study.

All newborns had one and five minute Apgar score evaluations by both obstetrician and neonatologist. Perinatal mortality was defined as both intrauterine fetal death (IUFD: fetal death occurring after 28 weeks of gestation) and early neonatal death (END: neonatal death occurring within one week of delivery). Fetal distress was defined as a low Apgar score (≤6) at five minutes, and IUGR was defined as a birth weight below the tenth percentile for gestational age. The relative birth weight

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(RAW) was calculated by the following formula. RAW (%) = 100 x actual bird weight/standing bird weight in each gestational week.

Sera and 24-hour urine specimens from patients beyond 35 weeks of gestation were collected and stored at -20°C until assay. Serum PRL and urinary estradiol were measured using the latex agglutination photometric immunoassay system (LA-System).

RESULTS AND DISCUSSION

A high level of perinatal mortality (% UFD and % ENO) was observed in growth retarded fetuses of patients with pregnancy induced hypertension. Forty infants (46.5%) were classified as UGR and fifteen of them (27.5%) died during perinatal period.

Although the percentile method is widely used for the assessment of fetal growth in obstetrical practice, this method makes it difficult to express small differences in fetal growth. Therefore, relative birth weight was used instead of growth percentile in this study.

In order to assess the fetal-placental function, serum PRL and 24-hour urinary estradiol levels were evaluated by a Latex agglutination photometric immunoassay system which has been developed recently. The relation between fetal growth and the fetal-placental unit was investigated using relative birth weight and levels of these two hormones. A highly significant correlation was observed not only between PRL levels and fetal growth (r = 0.704, p < 0.001) but also between estradiol levels and fetal growth (r = 0.704, p < 0.001). These results suggest that placental function is of major importance with respect to fetal growth retardation in pregnancy induced hypertension.

Fetal growth in cases with low five-minute Apgar scores was retarded in comparison with normal fetal outcome (p < 0.001). It was also observed that the fetal growth was markedly retarded in cases of perinatal death (p < 0.001). Whether a case was eclamptic or non-eclamptic also affected fetal growth and perinatal mortality, although this factor was not as highly significant (p < 0.05).

The relationship between growth retardation and perinatal mortality is clearly demonstrated in this study. The growth
restarted fetuses which had weights of less than 70 percent of the relative birth weight showed higher perinatal mortality (47%) than those which had low mortality (19%) or below. All these observations suggest that fetal growth retardation, as well as placental function, is closely related to chronic fetal distress in patients with pregnancy-induced hypertension.

According to our previous study, almost all growth retarded newborns with weight of less than 70 percent of the relative birth weight showed some fetal distress signs during the antepartum fetal heart rate monitoring. However, almost all these distress fetuses had higher Apgar scores and good prognoses by cesarean section.

In addition to these studies, recent advances in medical technology now make it possible to estimate intrauterine fetal growth using ultrasonographic measurements.

On the basis of these concepts, we had intended to predict fetal distress by the antepartum evaluation of fetal growth using ultrasonography. A total of 36 patients with pregnancy-induced hypertension between the gestational ages of 28 and 41 weeks were examined for this purpose. Almost all of the cases for which we estimated the retardation of fetal growth showed fetal distress signs during antepartum fetal heart rate monitoring. If a level of 70% or less of fetal growth is determined to be abnormal, there were 8 true positive, 20 true negative, no false positive and 8 false negative cases. The sensitivity, specificity and predictive values of this prediction method were 52%, 100%, and 100%, respectively.

A great number of biochemical and biophysical evaluation methods for the diagnosis of fetal distress have been recently developed. Although an oxytocin challenge test has been confirmed as having good accuracy in diagnosing fetal distress, it is now unsuitable for screening large numbers of patients because it is time consuming. In our study, therefore, the fetal growth assessment was used as a screening test for fetal distress.

It is well known that growth retarded fetuses which have disproportionately larger heads, smaller abdominal viscera, and a lack of subcutaneous fat, have lower glycogen stores and higher incidences of metabolic acidosis. Not only a decrease in the placental oxygen supply, but also metabolic factors influencing
the fetus may be the cause of high morbidity or mortality rates of infants during the perinatal period.

According to the results obtained at both Kobe University and Gadjah Mada University, it might be concluded that chronic fetal distress often occurs in growth retarded infants found in patients with pregnancy induced hypertension; and these infants have a high perinatal mortality in cases of vaginal delivery. Therefore, cesarean section should be recommended for the delivery of any fetus whose growth is estimated at less than 70 percent of the relative birth weight.

Ostman Periode September-Desember 1987, Laboratorium Statistik
Jurusan Ilmu Kedokteran Masyarakat, Fakultas Kedokteran
Universitas Gadjah Mada menyelenggarakan:

KURSUS

KOMPUTER

PENDIDIKAN PROFESSIONAL DINK

CAHAYA PROFESIONAL

DI BEGAI 80-MEDI

Program-program yang terdiri:

1. Pengenalan Komputer (6 jam per tema)
   Biaya: Rp 430.000,-
2. Word Processing (12 jam per tema)
   Biaya: Rp 860.000,-
3. Data Base (8 jam per tema)
   Biaya: Rp 640.000,-
4. Teknik dan Pengenalan Statistik (9 jam per tema)
   Biaya: Rp 1.000.000,-

Semua program-program tersebut diikuti sekaligus menepati kebutuhan untuk yang berminat mengikuti kursus SPSS.

Kursus pada Agustus-September akan dimulai pada tanggal 10

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