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Klinik Araştırma

Clinical features and psychomotor development at one year of age in infants born from a mother with chorioamnionitis

Koryoamnionitli anneden doğan çocukların bir yaşındaki klinik izlem ve psikomotor gelişimleri

Semra HIZ[1], Uluç YİŞ[1], Erdener ÖZER[2], Pakize KARAOĞLU[1], Ayşe Ipek POLAT[1]

[1]Dokuz Eylul Universitesi Tıp Fakultesi Çocuk Nöroloji Bilim Dalı, İzmir
[2]Dokuz Eylül Üniversitesi Tıp Fakültesi Tıbbi Patoloji Anabilim Dalı, İzmir

ABSTRACT

Objective: The aim of this study is to evaluate the neonatal outcome and psychomotor development during infancy of the babies born from a mother with chorioamnionitis.
Methods: Cases were selected from the records of pathology department. The infants of the mothers with normal placental examination who had received histological diagnosis of chorioamnionitis. Perinatal characteristics, complications during their stay in neonatal intensive care unit and psychomotor development at one year of age were evaluated. Sixty cases were included in the study.
Results: Histologic diagnosis of chorioamnionitis was made in 30 cases. Thirty cases with normal placental examination served as the control group. The age of mother, risk factors during pregnancy, the method of delivery and gender of the cases did not differ between the two groups. However, the number of preterm births was significantly higher, and the mean gestational age and the mean birth weight of the cases were significantly lower in the chorioamnionitis group compared with the control group (p=0.001, p=0.046, p=0.001, respectively). The psychomotor development of the cases at one year of age did not differ between the two groups (p=0.154).
Conclusion: Although chorioamnionitis induces premature birth and complications in the neonatal intensive care unit, it does not seem to have any adverse effect on the psychomotor development of the infants at one year of age.

Key words: Chorioamnionitis, psychomotor development, infancy

ÖZET

Amaç: Bu çalışmanın amacı, koryoamnioniti olan annelerden doğanların yenidoğan dönemindeki izlemleri ve infant dönemlerindeki psikomotor gelişimlerini araştırmaktır.
Yöntemler: Olgular patoloji bilim dalının kayıtlarından seçildi. Plasenta görünümü normal olan ve histolojik olarak koryoamnionit tanısı alan annelerin çocukları çalışmaya dâhil edildi. Perinatal özellikler, yenidoğan yoğun bakım ünitesinde kaldığı dönemde gelişen komplikasyonlar ve bir yaşındaki psikomotor gelişimleri değerlendirildi. Çalışmaya 60 olgu alındı.
Bulgular: Otuz olguda histolojik olarak koryoamnionit tanısı mevcuttu. Plasenta muayenesi normal olan 30 olgu da kontrol grubu olarak alındı. Annenin yaşı, gebelik dönemindeki risk faktörleri, doğum şekli ve cinsiyet açısından bakıldığında her iki grup arasında anlamlı fark bulunmadı. Ancak kontrol grubu ile karşılaştırıldığında koryoamnionit öyküsü olanlarda preterm doğum oranları daha yüksek ve ortalama gestasyon haftası ve doğum ağırlıkları daha düşük saptandı ve istatiksel açıdan anlamlı idi (p=0.001, p=0.046, p=0.001). Bir yaşında değerlendirilen olguların psikomotor gelişimlerinde iki grup arasında anlamlı fark bulunmadı (p=0.154).
Sonuç: Koryoamnionit premature doğum ve yenidoğan yoğun bakım ünitesinde komplikasyonlara neden olabilse de bir yaşındaki psikomotor gelişim üzerine olumsuz etkisinin olmadığı görüldü.

Anahtar kelimeler: Koryoamnionit, psikomotor gelişim, infant

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Yazışma adresi: Doç. Dr. Uluç Yiş, Dokuz Eylül Üniversitesi Tıp Fakültesi Çocuk Sağlığı ve Hastalıkları, İzmir
e-mail: ulyis@yahoo.com

INTRODUCTION

Despite improvements in perinatal medicine, the exact etiology of cerebral palsy remains poorly understood. Most of the cases of cerebral palsy are considered to be due to prenatal factors. Chorioamnionitis (CA) refers to acute inflammation of the placental membranes. Meta-analyses have shown that CA is a risk factor for cerebral palsy [1-8]. It was postulated that CA is a leading cause of fetal inflammatory response and this inflammation contributes to neonatal brain injury and subsequent cerebral palsy [9,10]. In premature infants, CA reported to be associated with both cerebral palsy and cystic periventricular leucomalasia [4]. Full term infants exposed to CA has also been reported to exhibit an increased risk for cerebral palsy, but the number of the studies evaluating the association between CA and cerebral palsy in full term infants is limited. Because of heterogeneousity of the definitions of CA and statistical analysis, further studies are needed to delineate the association between CA and neurodevelopment.

The importance of placental pathology for the diagnosis and management of neonatal conditions has long been stated. However, placental pathology is rarely a part of the training for either obstetrician or pathologist. Routine placental examination has potential benefits including clarification of the causes of many adverse pregnancy outcomes, improvement of the risk assessment for future pregnancies and ascertainment of newborn risk for long-term neurodevelopmental sequel [11-14].

In this study, we aimed to evaluate the effect of chorioamnionitis on neonatal outcomes and psychomotor development and compare these features with infants born from mothers with normal placental examination.

MATERIAL AND METHODS

In the pathology department of Dokuz Eylül University, School of Medicine, about 1500 placentas after birth are routinely examined annually. Cases whose mother had a histological diagnosis of CA were randomly selected from these records of pathology department. Infants born from a mother with normal placental examination served as the control group. Patient informations were abstracted from the charts of the mothers and infants. Placental histology and birth characteristics including gestational age, birth weight, gender, way of birth, age of the mothers and neonatal outcomes were noted. Parents who accepted to participate to the study were called for psychomotor evaluation of the infant at one year of age. Denver II test was used for the assessment of the developmental level. The infants were divided into "normal", if the score was equal to or over of the mean value that was expected for normal children; and "abnormal", if the score was below the mean value expected for normal children.

The pathology slides were evaluated by a pathologist who was blinded to maternal and neonatal outcomes. Chorioamnionitis was defined histologically as the more or less linear aggregation along tissue planes of neutrophil polymorphs of maternal origin, in the subchorionic fibrin, chorion, amnion of the peripheral membranes or the fetal plate of the placenta [15].

For the evaluation of the results, the data were computed using microsoft excel worksheets and a Statistical Package for the Special Sciences (SPSS) version 11.0 software program. The differences between the groups were tested using the chi-square test , and Mann-Whitney U test. A p value of less than 0.05 was considered statistically significant.

RESULTS

Thirty cases whose mother had a histological diagnosis of CA and 30 cases with normal placental examination were included into the study. Table 1 shows the comparison of the characteristics of the infants with or without CA.

The gender of cases, the way of delivery, the mean age of mothers and the risk factors during pregnancy

Table 1. Comparison of the characteristics of the infants with or without chorioamnionitis.

	Chorioamnionitis (n=30)	No chorioamnionitis (n=30)	p value
Birth weight (g) mean±SD (range)	2307.66±1039.29 (710-3845)	3259.83±3840.43 (2560-4125)	0.001
Gestational age (wk) mean±SD (range)	34.30±5.24 (24-40)	38.26±1.38 (33-40)	0.046
Male sex (n,%)	15 (50.0%)	14 (46.7%)	0.798
Number of preterms (n,%)	14 (46.7%)	2 (6.6%)	0.001
Need for neonatal intensive care (n,%)	12 (40.0%)	0 (0.0%)	0.001
Cesarean section (n,%)	23 (76.7%)	23 (76.7%)	1.000
Risk factors during pregnancy * (n,%)	7 (23.3%)	6 (20.0%)	0.756
Age of mother (y) mean±SD (range)	31.36±4.33 (21-41)	30.33±5.41 (19-41)	0.449

* *Hypertension of the mother, history of recurrent aborts, in vitro fertilization, Rh incompatibility*

did not differ between the two groups (p=0.798, p=1.000, p=0.449 and p=0.756, respectively).

The mean birth weight of the cases was 2307.66±1039.29 (710-3845) g in the CA, and 3259.83±3840.43 (2560-4125) g in the control group. The difference between the mean birth weight of the groups was statistically significant (p=0.001).

The mean gestational age of the infants in the CA group was 34.30±5.24 (24-40) weeks. Of the 30 cases in the CA group, 14 (46.7%) were born prematurely. In the control group, the mean gestational age of the cases was 38.26±1.38 (33-40) weeks. Of them, only 2 cases (%6.6) were born prematurely. In the comparison of the mean gestational age of the cases and the number of the preterm births between the study and control groups statistically significant difference was found (p=0.046, p=0.001, respectively).

Twelve patients (40%) and in the CA group were admitted to neonatal intensive care unit where none of the cases without CA had to take intensive care (p=0.001). Twelve of 14 cases (85.7%) who were born prematurely in the CA group stayed in the neonatal intensive care unit with a mean of 16.86±33.01 (2-150) days. Five infants (35.7%) developed retinopathy of prematurity. Four infants (28.6%) needed ventilatory support and 3 of them (21.4%) developed bronchopulmonary dysplasia. Three infants (21.4%) had varying degrees of intraventricular haemorrhage. Three preterm infants (21.4%) demonstrated neonatal convulsions and one of them (7.1%) needed chronic anticonvulsant medication.

In regard to neurodevelopmental level of the infants assessed by Denver II test at one year of age, 2 (6.6 %) of the cases in the CA group demonstrated psychomotor retardation, where none of the infants had psychomotor retardation in the control group. The psychomotor development at one-year of age did not differ between the groups (p=0.154).

In the CA group, 13 mothers (43.3%) demonstrated clinical features of chorioamnionitis besides histologic findings. All of these mothers had a premature birth. Two cases with psychomotor retardation were related to the mothers who had 'histologic plus clinical' CA whereas neurodevelopment of infants whose mother had "only histologic" CA was normal.

DISCUSSION

Chorioamnionitis has received increasing attention as a risk factor for cerebral palsy. Chorioamnionitis is suggested to be a risk factor for cerebral palsy in both premature and full term infants, studies regarding the role of CA on neurodevelopment are heterogeneous. The most important source of heterogeneity is the lack of uniformity in the definition of clinical CA. Clinical criteria are based primarily on the presence

of maternal fever which may be due to other causes such as epidural analgesia or infections other than CA. Therefore, the role of the histologic examination of the placenta becomes more important. In our study, only 13 mothers (43.3%) in the CA group demonstrated clinical findings of CA whereas 17 (56.7%) mothers had no clinical findings in the presence of histologic CA.

The most striking outcome in our study was the significantly higher rate of prematurity in the CA group (46.7% versus 6.6%). Accordingly, the mean birth weight and the mean gestational age in the CA group were also significantly lower. These results were in accordance with previous studies in the literature which reported that CA was a leading factor for prematurity and low gestational age [16-19]. The decreased mean birth weight in our study was due to the prematurity, because none of the full term infants in CA group were small for their gestational age.

It has been reported that CA is associated with higher incidence of adverse neonatal outcomes [20,21]. In our study, 40% of the cases in the CA group needed neonatal intensive care all of which were born prematurely. Among them, five infants developed retinopathy of prematurity, four infants needed ventilatory support, three of them developed bronchopulmonary dysplasia, three infants had varying degrees of intraventricular hemorrhage and three infants demonstrated neonatal convulsions. We suggest that the increased morbidity rate in the CA group was related to prematurity, because none of the full term infants showed any adverse outcome in the CA group.

In full term and preterm infants, an increased risk for cerebral palsy has been reported in both clinical and histologic CA but it is unclear if CA may contribute independently to cerebral palsy [22,23]. In our study, the psychomotor development of the infants in the CA and control groups did not differ significantly at one-year of age. At that time, it is difficult to diagnose cerebral palsy. However, Denver developmental test is a reliable tool for assessing the psychomotor development and has the advantage to identify infants with psychomotor retardation at an early stage. It just provides evaluation of the patient's current developmental stage, but it does not predict future rate of development. Bayley infant neurodevelopmental screener and Ankara developmental screening inventory may be more significant for this study, but these tests can not be applied in our clinic. Our results suggest that CA may have no influence on the psychomotor retardation of the infants at one-year of age. None of the cases who were born at term in the CA group had developmental delay and only two patients who were born prematurely had psychomotor retardation. Maternal placental histopathologic examination of the patients psychomotor retardation revealed the presence of histologic CA. Cranial radiologic examination of those patients also showed intraventricular hemorrhage during stay in the neonatal intensive care unit.

In conclusion, CA leads to increased rate of prematurity and neonatal morbidity in accordance with low birth weight and gestational age. Our results did not demonstrate a clear association between psychomotor retardation and CA and we suggest that CA may not contribute independently to psychomotor retardation in infants. For the evaluation of the independent effects of prematurity and CA on the psychomotor development, further studies with more subjects are needed.

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