УДК: 616-007.271-053.1-036.22(045)

Ibragimov Khasan

Head of simulation training department, PhD

Samarkand State Medical University

PREDICTORS OF CONGENITAL DIAPHRAGMATIC HERNIA IN NEWBORNS

Abstract

This study aimed to identify perinatal and maternal risk factors associated with CDH. A retrospective case-control design was applied using data from 66 patients with CDH, admitted to the Regional Children's Multidisciplinary Medical Center in Samarkand between January 2004 and December 2019. Logistic regression analysis revealed that preterm birth (OR 3.79; 95% CI: 2.01–7.21), low birth weight under 2500 grams (OR 3.32; 95% CI: 1.65–5.89), maternal age ≥35 years (OR 3.51; 95% CI: 1.49–6.12), and being small for gestational age (OR 3.71; 95% CI: 1.87–6.69) were significantly associated with increased risk of CDH. Findings suggest that prematurity, intrauterine growth restriction, and advanced maternal age are independent predictors of CDH.

Keywords: CDH, risk factors, preterm, weight, gestational age.

Ибрагимов Хасан

Заведующий кафедрой симуляционного обучения, PhD

Самаркандский государственный медицинский университет

РЕДИКТОРЫ ВРОЖДЕННОЙ ДИАФРАГМАЛЬНОЙ ГРЫЖИ У НОВОРОЖДЕННЫХ

Целью данного исследования было выявление перинатальных и материнских факторов риска, ассоциированных с ВДГ. Был проведен ретроспективный анализ методом «случай-контроль» на основе данных 66 пациентов с диагнозом ВДГ, госпитализированных в Региональный детский многопрофильный медицинский центр в Самарканде в период с января 2004 по декабрь 2019 года. Результаты логистического

регрессионного анализа показали, что преждевременные роды (ОР 3,79; 95% ДИ: 2,01–7,21), масса тела при рождении менее 2500 грамм (ОР 3,32; 95% ДИ: 1,65–5,89), материнский возраст ≥35 лет (ОР 3,51; 95% ДИ: 1,49–6,12), а также малый для гестационного возраста плод (ОР 3,71; 95% ДИ: 1,87–6,69) достоверно увеличивали риск развития ВДГ. Полученные данные свидетельствуют о том, что недоношенность, задержка внутриутробного развития и пожилой материнский возраст являются независимыми предикторами ВДГ. *Ключевые слова: ВДГ, факторы риска, недоношенность.*

Introduction. An condition known as congenital diaphragmatic hernia (CDH) is characterized by a rupture of the diaphragm, which enables an abdominal organs to penetrate into the chest. CDH is an uncommon aberration that causes severe morbidity and death in afflicted newborns [1, 2]. The incidence of CDH ranges from 2.0 up to 7.0 per 10000 births in different countries. The pathophysiology of congenital diaphragmatic hernia is not well known; nevertheless, it is believed that genetic factors and early environmental variables during pregnancy are the primary culprits. Embryogenesis and fetal development between the third and sixteenth weeks of pregnancy are critical times for the occurrence of developmental defects that may lead to congenital diaphragmatic hernia (CDH). This indicates that CDH risk factors must be exposed to the developing fetus at an extremely early stage [3].

Materials and Methods. We used a case control study design in this study. Data for 66 patients with CDH were obtained from the registry of Regional Children's Multidisciplinary Medical Center of Samarkand. All patients were under hospital admission between January 2004 and December 2019. Data for the case-control study was acquired by the physicians through interviews with the mother. This data was recorded using a data collection form

that included over 90 variables related to the information on maternal and neonatal characteristics.

Results. For this study, there were 66 CDH patients and 198 controls. Table 1 shows the demographic characteristics of the cases and controls. In CDH cases, 28.9% of women were 35 years or older, compared to 12.6% in controls ($p<0.001$). In 19.7% of the instances, postnatal diagnosis was accomplished after the first day of life. Preterm births accounted for 43.9% of the cases. In comparison to 13.6% of controls, 39.4 % of cases were undersized for gestational age ($p<0.001$). CDH patients had an average birth weight of 2621±532 grams, compared to 2969±482 grams for controls ($p<0.001$). 36.7% of the cases had low weight (<2500 grams) at birth. CDH patients had an average gestation age of 35.8±5.4 weeks at delivery, compared to 37.8±3.1 weeks for controls ($p<0.001$).

According to the univariate analysis, mothers age of 35 years or older had a higher risk of CDH (OR, 2.87; 95 % CI, 1.42-5.79), preterm neonates were more likely to be affected by CDH (OR, 3.39; 95 % CI, 1.77-6.48). Also neonates with CDH tend to weigh less than 2500 grams at birth (OR, 3.95; % CI, 2.06-7.6), and be small for gestational age (OR, 4.12; 95 % CI 2.17-7.8) (see Table 2). There was no link established between CDH and cigarette smoking (active/passive), maternal age, or BMI. We discovered that maternal age of 35 years or older was associated with a higher probability of having a CDH newborn using logistic regression (OR, 3.51; 95 % CI, 1.49-6.12). CDH-affected neonates were also more likely to be born prematurely (OR, 3.79; 95 % CI, 2.01-7.21). Multivariate analysis also found that a neonate's birth weight of less than 2500 grammes was linked to a higher risk of CDH (OR, 3.32; 95 % CI, 1.65-5.89), as well as being small for gestational age (OR, 3.71; 95 % CI, 1.87-6.69). There was a statistically significant difference between the patients with CDH and the controls in that a considerable majority of the CDH patients were male. Additionally, women who were 35 or older were at an elevated chance of

having a child affected by CDH. The case-control study did not discover any evidence of a connection between CDH and maternal smoking while pregnant. In the case control research, there was shown to be no connection between CDH and maternal BMI.

We did not examine the role of the ethnicity in this study as majority of cases were uzbek Asians. However, some studies pointed out the potential association between ethnic groups, male gender and risk of CDH. There were also potentially modifiable such as maternal age and cigarette smoking during pregnancy [2,11]. This study supports findings on the elevated risk of CDH and maternal age while no associations were found between smoking exposure and CDH.

Birth weight less than 2500 gram was associated with increased odds of CDH (36.7% vs 12.6%; $p<0.001$, OR, 3.32; 95% CI, 1.65-5.89). Gestational age was also an independent risk factor for CDH. Acording to the results, being small to gestational age is linked with elevated odds of having CDH (39.4% vs 13.6%; $p<0.001$; OR, 3.71; 95% CI, 1.87-6.69). The observed rate of small gestational age in this study was three times the rate (15%) reported by Zenilman et al. [13]. The rate of traditional delivery was statistically significantly lower among cases (28.8%) when compared to the control group (52.5%, $p<0.001$).

Conclusion. Preterm delivery, small for gestational age, and low birth weight were risk factors for congenital diaphragmal hernia. As to results, the chance of having a child born with CDH rises with the mother's age. Detection of these newborn and maternal characteristics may prompt consideration of CDH as an early diagnosis, therefore enhancing the prognosis of these patients, particularly in developing countries where awareness of this condition is limited. The results of this research demonstrate the significance of enhancing prenatal diagnosis. This would lower overall mortality and morbidity among pediatric patients with CDH. Determining a clear etiology and possibly modifiable risk

variables in order to find techniques for primary prevention of this syndrome need more research and effort particularly in low income and developing countries.

References

1. Burgos, C. M., Frenckner, B., Luco, M., Harting, M. T., Lally, P. A., Lally, K. P., & Congenital Diaphragmatic Hernia Study Group. (2019). Prenatally versus postnatally diagnosed congenital diaphragmatic hernia–Side, stage, and outcome. Journal of Pediatric Surgery, 54(4), 651-655.

2. Paoletti, M., et al. (2020). Prevalence and risk factors for congenital diaphragmatic hernia: A global view. Journal of Pediatric Surgery, 55(11), 2297-2307.

3. Kaya, T. B., et al. (2021). Isolated congenital diaphragm hernia associated with homozygous SLIT3 gene variant in dizygous twins. European Journal of Medical Genetics, 64(7), 104215.

4. Gupta, V. S., et al. (2021). Mortality in congenital diaphragmatic hernia: a multicenter registry study of over 5000 patients over 25 years. Annals of Surgery.

5. Barroso, C., & Correia-Pinto, J. (2018). Perioperative complications of congenital diaphragmatic hernia repair. European Journal of Pediatric Surgery, 28(02), 141-147.

6. De Bie, F., et al. (2020). Early surgical complications after congenital diaphragmatic hernia repair by thoracotomy vs. laparotomy: a bicentric comparison. Journal of Pediatric Surgery, 55(10), 2105-2110.

7. Akhmedov Yu.M, et al. (2021) Preoperative preparation of children with diaphragmatic hernia. Journal of hepato-gastroenterology research. №3 (volume II), 2021, 49-54.

8. Schulz, F., et al. (2021). Parental risk factors for congenital diaphragmatic hernia–a large German case-control study. BMC pediatrics, 21(1), 1-8.