IMPACT OF MATERNAL HYPERTENSION ON THE INTRAUTERINE GROWTH RESTRICTED NEONATE

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ABSTRACT

OBJECTIVE

INTRAUTERINE GROWTH RESTRICTION AND MATERNAL HYPERTENSION COMPLICATE A SIGNIFICANT PROPORTION OF PREGNANCIES AND TOGHETHER THEY SIGNIFICANTLY CONTRIBUTE TO THE INCREASE OF MATERNAL AND NEONATAL MORBIDITY AND MORTALITY. OUR STUDY AIMED TO ASSESS MATERNAL AND NEONATAL COMPLICATIONS ASSOCIATED WITH MATERNAL HYPERTENSION AND INTRAUTERINE GROWTH RESTRICTION.

MATERIAL AND METHOD

WE ANALYZED IN A RETROSPECTIVE STUDY ALL PATIENTS THAT GAVE BIRTH IN THE BUCHAREST UNIVERSITY EMERGENCY HOSPITAL, THAT WERE DIAGNOSED WITH INTRAUTERINE GROWTH RESTRICTION AND MATERNAL HYPERTENSION BETWEEN 2010-2012. THE DATA WE COLLECTED CONTAINED INFORMATION ON MATERNAL HEALTH (DEGREE OF HYPERTENSION ASSOCIATED WITH BIRTH COMPLICATIONS, OTHER MORBIDITIES AND TYPE OF BIRTH) AND NEONATAL STATUS (BIRTH WEIGHT, GESTATIONAL AGE, APGAR SCORE AND ASSOCIATED DISEASES).

RESULTS

A HIGHER INCIDENCE OF INTRAUTERINE GROWTH RESTRICTION A HIGHER RATE OF CESAREAN SURGERY, PREMATURE BIRTHS AND A HIGHER FREQUENCY OF THROMBOEMBOLIC COMPLICATIONS WAS OBSERVED IN PATIENTS WITH ASSOCIATED HYPERTENSION, AS WELL AS AN INCREASED FREQUENCY THROMBOCYTOPENIA, NEUTROPENIA, AN INCREASED NEED FOR INTENSIVE POSTNATAL CARE AND RESPIRATORY DISTRESS WAS ASSOCIATED IN THEIR CHILDREN.

CONCLUSIONS

COMPLICATIONS INCREASE AS WELL IN SEVERITY AND NUMBER WITH THE INCREASING RATE OF MATERNAL HYPERTENSION. CORRECT DIAGNOSTIC OF INTRAUTERINE GROWTH RESTRICTED NEONATES IS IMPORTANT IN ORDER TO MONITOR AND MANAGE THE COMPLICATIONS ASSOCIATED WITH MATERNAL HYPERTENSION AND IT INVOLVES A CLOSE COLLABORATION BETWEEN NEONATOLOGIST, OBSTETRICIAN AND FAMILY DOCTOR.

KEY WORDS: MATERNAL HYPERTENSION, INTRAUTERINE GROWTH RESTRICTION, PREECLAMPSIA

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INTRODUCTION

Intrauterine growth restriction (RCIU) is an important public health problem in both industrialized and developing countries, leading to the association of a high degree of perinatal morbidity on short and long term and increased mortality. The incidence of fetal growth restriction varies depending on the population under examination (including geographic location and standard curves used as reference) and is estimated by the World Health Organization to be between 8-26% in the general obstetric population.[5]

Maternal hypertension complicates a high number of pregnancies and significantly contributes to maternal, fetal and neonatal morbidity and mortality, with a prevalence of 6-22%.[6]

World Health Organization evaluated in systematic reviews maternal mortality worldwide and found that in developed countries, 16 percent of maternal deaths were caused by hypertensive disorders, exceeding the other main causes: hemorrhage -13%, abortion - 8% and sepsis - 2 percent, estimating that world wide 60,000 women die each year due to preeclampsia.[7]

The definition of hypertension in pregnancy comprises several distinct entities in terms of etiopathogenesis and clinical approach, resulting in different outcome and prognosis. According to updated ESC guidelines the following forms of hypertension are defined:

1.Pre-pregnancy hypertension or chronic hypertension, diagnosed before 20 weeks or even earlier, known and/or treated and that persists 42 days postpartum;

2. Gestational hypertension, diagnosed de novo after 20 weeks of pregnancy. When it is associated with proteinuria, then it is considered to be preeclampsia. And the most severe form of preeclampsia, associating seizure is eclampsia.

3. Pre-existing hypertension with preeclampsia overlap

4. Unclassified antenatal hypertension (with reclassification after 42 days postpartum).[8]

In addition to hypertension being a risk factor in the development of intrauterine growth restriction, intrauterine growth restriction is an independent risk factor in the development arterial hypertension in adulthood[9] so that the two entities make a really vicious circle. Given that one of the criteria for the diagnosis of intrauterine growth restriction is low birth weight according to gestational age, several studies have reported an inverse relation between body mass and high blood pressure both in children[10] and in adults[11].

1. World Health Organization 2005 World Health Statistics 2005. Geneva: World Health Organization

[6] Report of the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy American Journal of Obstetrics and Gynecolology. 2000;183:S1–S22

[7] Khan KS et al: WHO analysis of causes of maternal death: A systematic review. Lancet 367:1066, 2006.

[8] ESC Guidelines on the management of cardiovascular diseases during pregnancy. European Heart Journal (2011) 32, 3147–3197

[9] Mzayek F. et al. The association of birth weight with developmental trends in blood pressure from childhood through mid-adulthood. In: American Journal of Epidemiology. 2007, 166(4), p. 413-420.

[10] Gamborg M. et al Birth weight and systolic blood pressure in adolescence and adulthood: meta-regression analysis of sex- and age-specific results from 20 Nordic studies. In: American Journal of Epidemiology. 2007, 166(6), p. 634-645.

[11] Gamborg M. et al. Life course path analysis of birth weight, childhood growth and adult systolic blood pressure. In: Epidemiol. 2009, 169(10), p. 1167- 1178.

Due to the abundant and controversial data in the medical literature we decided to evaluate the maternal and neonatal consequences of maternal hypertension associated with intrauterine growth restriction.

MATERIAL AND METHOD

The medical data of all patients who gave birth between 1 January 2010 - 31 December 2012 in the Obstetrics and Gynecology Clinic in the Bucharest Emergency University Hospital were evaluated. Inclusion criteria were the diagnosis of neonatal intrauterine growth restriction and maternal hypertension. Twins or triplets were excluded. Intrauterine growth restriction was defined as fetal weight below the tenth percentile. Data collected included information on maternal health (degree of hypertension , associated complications of birth and type of birth) and status of newborns (GN, VG, associated diseases and Apgar score). Patients who had other comorbidities associated and twin pregnancy were excluded. The data were obtained from observation charts of patients and newborns.

Statistical analysis was performed using SPSS version 19 and Microsoft Excel.

We used descriptive analysis (mean, median, maximum, minimum, standard deviation, variance) and Crosstabulation for checking Apgar score frequency among patients with low weight for gestational age.

RESULTS

Out of 12948 patients that gave birth between 1st January 2010 – 31st December 2012, 2847 were included in the study. Out of the 2847 patients diagnosed with intrauterine growth restriction, 34% (968/2847) were diagnosed with maternal hypertension. The analyzed sample showed that 71,7% (694/968) of the cases had gestational hypertension, 25,6% (248/968) preeclampsia, 1,8% (18/968) eclampsia and 0,9% (9/968) developed HELLP. (Figure 1)

Statistical analysis showed that the mean gestational age was 34.51±1.187 in the sample that was diagnosed with hypertension and intrauterine growth restriction (Table 1). In the comparison group the mean gestational age was 37,51±1,125 (Table 2)

Distribution of births by gestational age showed that the highest frequency was 36.6% (355/968) among those with intrauterine growth restriction and maternal hypertension for a gestational age of 36 weeks as opposed to the comparison group where the highest frequency was 39,7% (746/1879) for a gestational age of 37 weeks.

Mean Apgar score at 1 minute was 7.63 ± 0.892 and 8.16 ± 0.523 for 5 minutes in the growth restricted group as opposed to the comparison group where the mean Apgar score at 1 minute was 8.73 ± 0.461 and 9.31 ± 0.674 for 5 minutes.

We found an increase in values from 1minute Apgar scores to 5 minutes for each group.

The complications associated were more frequent and more severe, both for the mother and the newborn, in the group that had been diagnosed with both intrauterine growth and hypertension as opposed to the group that had only intrauterine growth restriction. (Figure 2), (Figure 3). Also the cesarean rates were higher in the group with both pathologies, 66,6% (645/968) as opposed to 58,9% (1107/1879) in the comparison group.

DISCUSSIONS AND CONCLUSIONS

The incidence for intrauterine growth restriction varies according to the cut-off limit for weight and according to the World Health Organization it varies between 8-26% [1]. The intrauterine growth restriction incidence was higher underlining the negative effect of maternal hypertension on neonatal outcome.

In the case of these neonatal patients with RCIU, caesarean section was imposed in 645 cases out of which 376 in maternal interest (iterative caesarean operations, cases of preeclampsia, maternal hypertension exacerbated by pregnancy previa etc.), and 269 in interest of the fetus and the benefic effects of this attitude were translated by the fact that out of 2847 pregnancies monitored with ultrasound, none resulted in utero fetal death.

The postpartum neonatal adaptation was better in the comparison group, with no maternal hypertension, with a higher mean for 1 minute Apgar score as well as for the 5 minute Apgar score.

The neonatal evolution of newborns was generally good, with an increase in value of Apgar Scor from 1 minute to 5 minutes, in both groups, indicating a close collaboration between the obstetricians, the neonatologists and the anesthesiologist.

The complications associated to the first group had a higher frequency that the complications associated to the second group confirming the data from literature, that maternal hypertension[12] in association with intrauterine growth restriction increases both maternal and fetal morbidities.[13]

[12] Srinivas, S K et al. "Rethinking IUGR in Preeclampsia: Dependent or Independent of Maternal Hypertension?" Journal of Perinatology 29.10 (2009): 680–684. PMC. Web. 14 Dec. 2014.

[13] Muhammad T. et al. Maternal factors associated with intrauterine growth restriction. J Ayub Med Coll Abbottabad. 2010 Oct-Dec;22(4):64-9.

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9. Report of the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy American Journal of Obstetrics and Gynecolology. 2000;183:S1–S22
10. World Health Organization 2005 World Health Statistics 2005. Geneva: World Health Organization

Figure 1 Distribution of hypertension in the analyzed sample

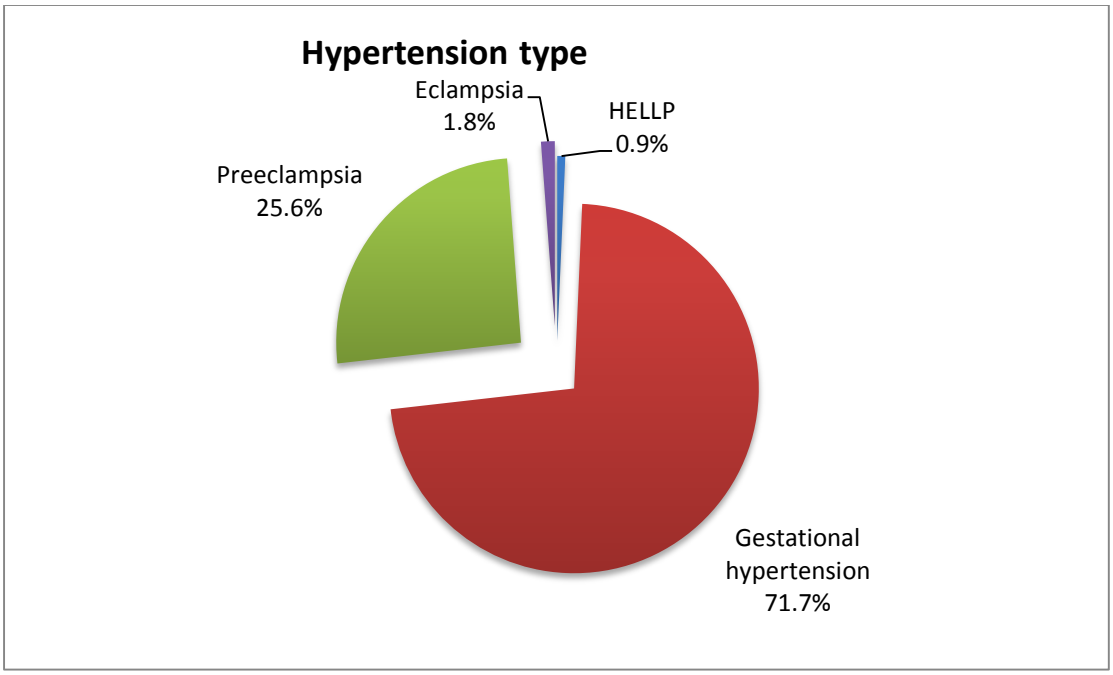

Table 1: Frequency of gestational age in the HTA IUGR group

N	Valid	968
	Missing	0
Mean		34,51
Std. Deviation		1,187
Minimum		29,00
Maximum		40,00

Table 2: Frequency of gestational age in the IUGR group

N	Valid	1879
	Missing	0
Mean		37,51
Std. Deviation		1,125
Minimum		31,00
Maximum		40,00

Figure 2. Frequency of associated maternal complications

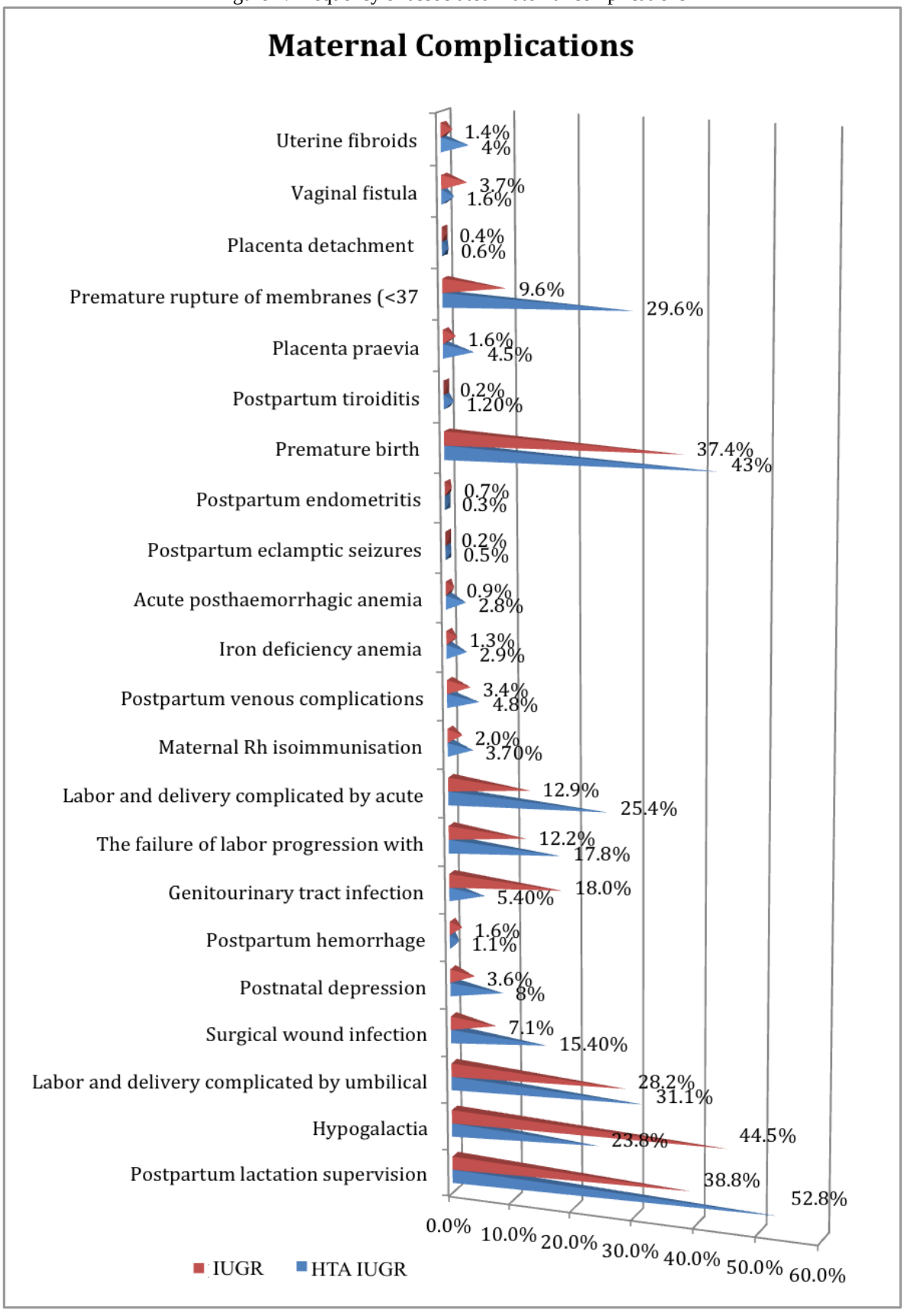

Figure 3. Frequency of associated neonatal complications