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Managing arterial hypertension in pregnancy. A case report with self-assessment questionnaire

Roxana Oana Darabont*

"Carol Davila" University of Medicine and Pharmacy - Cardiology Department of the University Emergency Hospital, Bucharest, Bucharest, Romania

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Abstract

Hypertensive disorders, including pre-eclampsia, are the most frequently encountered cardiovascular complications in pregnancy, affecting 5-10% of all pregnancies worldwide and constituting one of the most important cause of maternal and perinatal morbidity and mortality. We are presenting the case of 32 years old patient, with history of diabetes mellitus. She benefited of medical supervision throughout the pregnancy. In week 19 borderline values of blood pressure (140/90 mmHg) and microalbuminuria have been recorded and in week 20 blood pressure raised to values of 155/105 mmHg and overt proteinuria (≥ 300 mg/24) has been installed. The glycemic control was still maintained, CBC, renal function, uric acid and the transaminases were in normal range. However, in week 30 she developed severe rest dyspnea, epigastric pain and front-occipital headache. The laboratory work-up was indicating a raise of blood sugar to 235 mg/Dl, with no other abnormalities. In this context the medical team composed by obstetricians and cardiologists has decided to perform immediately the cesarean session. We are bringing to attention this case mostly for didactical purposes and by means of a self-assessment questionnaire we will address the diagnostic work-up and the therapeutic approach in this category of patients.

Keywords: pre-eclampsia, pregnancy, gestational hypertension

Introduction

Hypertensive disorders, including pre-eclampsia, are the most frequently encountered cardiovascular complications in pregnancy, affecting 5-10% of all pregnancies worldwide and constituting one of the most important cause of maternal and perinatal morbidity and mortality [1, 2]. Considering the importance of this problem in clinical practice we have chosen to present a case report of hypertensive disorder in pregnancy. By means of a self-assessment questionnaire we will address the diagnostic work-up and the therapeutic approach in this category of patients.

Case Presentation

A patient of 32 years old, with history of diabetes mellitus since the age of 26, treated with oral

*Correspondence to: Roxana Oana DARABONT, MD, PhD
University of Medicine and Pharmacy "Carol Davila" – Cardiology Department of the University Emergency Hospital Bucharest 169 Splaiul Independentei,
5th District, Bucharest 031042, omania.
Tel.: +40723441315, email: rdarabont@yahoo.com

antidiabetic medication, decides to have a pregnancy. According to current recommendations she starts the treatment with insulin in order to obtain a HbA1c < 6.5% in the preconception stage and to avoid congenital abnormalities and macrosomia in the fetus or preeclampsia [3]. After 3 month of optimal glycemic control she remains pregnant. She has no history of arterial hypertension or renal injury before pregnancy, nor a family history of pre-eclampsia. Body mass index was in the range of normality.

She benefited of medical supervision throughout the pregnancy. Proteinuria was checked at the beginning of the pregnancy with the purpose to rule out a previous renal disease. It is currently accepted that pregnant women can be screened for proteinuria with the dipstick test followed by the spot albumin-to-creatinine ratio, if the former is indicating urine protein ≥1+. Values < 30mg/mmol are practically ruling out proteinuria [4, 5]. The test had normal results at that stage. In week 16 of pregnancy she started to present subclinical signs of placental suffering revealed by a high resistive index in the uterine artery at Doppler ultrasound [6]. In week 19 borderline values of blood pressure (140/90 mmHg) and microalbuminuria have been recorded and in week 20 blood pressure raised to values of 155/105 mmHg and overt proteinuria (≥ 300 mg/24) has been installed. The glycemic control was still maintained, CBC, renal function, uric acid and the transaminases were in normal range.

Question 1

Which of the fallowing is most accurate regarding the type of hypertensive disorder in the presented case?

A. Gestational hypertension;
B. Pre-eclampsia;
C. Pre-existing hypertension;
D. Pre-existing hypertension plus superimposed gestational hypertension with proteinuria;

Correct answer: B - pre-eclampsia

Comment. The definition of hypertension in pregnancy is based on office BP values: systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg [1 -2, 7] and is classified as mild (140–159/90–109 mmHg) or severe (≥160/110 mmHg), different from the common classification grading [8]. It is considered hypertensive emergency an increase of blood pressure to values ≥ 170 mmHg for systolic blood pressure or ≥ 110 mmHg for diastolic blood pressure [1].

According to the European guidelines hypertensive disorder in pregnancy comprises:

- **Gestational hypertension:** develops after 20 weeks of gestation and usually resolves within 42 (6 weeks) days post-partum;
- **Pre-eclampsia:** gestational hypertension with significant proteinuria (>0.3 g/24 h or albumin-to-creatinine ratio ≥ 30 mg/mmol);
- **Pre-existing hypertension:** precedes pregnancy or develops before 20 weeks of gestation. It usually persists for more than 42 (6 weeks) days post-partum and may be associated with proteinuria;
- **Pre-existing hypertension plus superimposed gestational hypertension with proteinuria;**
- **Antenatally unclassifiable hypertension:** this term is used when blood pressure is first recorded after 20 weeks of gestation and hypertension is diagnosed; re-assessment is necessary after 42 days (6 weeks) post-partum [1, 8].

It is worth to mention that in the still valid guidelines of the American College of Obstetricians and Gynecologists are described only four causes of hypertensive disorders in pregnancy (gestational hypertension, pre-eclampsia, chronic hypertension and chronic hypertension with pre-eclampsia) and, more importantly, the definition of pre-eclampsia is not based only on the occurrence of proteinuria. In the absence of proteinuria pre-eclampsia can be defined as gestational or pre-existing hypertension in association with one of the following complications: thrombocytopenia (less than 100 000/microliter), impaired liver function (elevated blood levels of liver transaminases to twice the normal concentration), new development of renal insufficiency (elevated serum creatinine greater than 1.1 mg/dL or a doubling of serum creatinine in the absence of other renal disease), pulmonary edema, or new onset cerebral or visual disturbances [2].

Pre-eclampsia is a disease of placentation in which spiral arteries do not undergo physiological remodeling into the myometrial segment through trophoblast invasion leading to utero-placental

ischemia with the advance of pregnancy [9]. The utero-placental ischemia is responsible for two categories of effects: some of these can affect the fetus - intrauterine growth retardation (25% of cases), prematurity (27%) or intrauterine death (4%) and others the mother - mediated by a systemic endothelial dysfunction which can explain the occurrence of high blood pressure, renal dysfunction, multiple organ failure or disseminated intravascular coagulation [1-2, 9-10].

Eclampsia is commonly defined as new onset of grand mal seizure activity and/or unexplained coma during pregnancy or postpartum in a woman with signs or symptoms of preeclampsia, the substrate of these manifestations being represented by the development of intracranial hypertension [11, 12].

Question B

The risk of this patient to develop pre-eclampsia was:

A. Low;
B. High.

Correct answer: B - High

Comment: According to the current guidelines the risk of pre-eclampsia is defined high or moderate depending on certain factors.

The risk is considered high if the following factors are associated:

- hypertensive disease during a previous pregnancy;
- chronic kidney disease
- autoimmune disease such as systemic lupus erythematosus;
- antiphospholipid syndrome;
- **type 1 or type 2 diabetes;**
- chronic hypertension.

The risk is graded moderate in case of:

- first pregnancy;
- age 40 years or older;
- pregnancy interval of more than 10 years;
- BMI of >_35 kg/m2 at first visit;
- family history of pre-eclampsia;
- multiple pregnancy [1].

In the context of a pregnancy with high-risk for pre-eclampsia a preventive treatment with acid-acetylsalicylic 150 mg/day was initiated on week 12, with the purpose to be maintained until week 36. Although the triggers of pre-eclampsia are not well defined until present the available data are supporting the benefits of this drug for the avoidance of pre-eclampsia [13].

The patient continued to be monitored for the safety of the fetus and started the treatment for the arterial hypertension. However, in week 30 she developed severe rest dyspnea, epigastric pain and front-occipital headache. At this moment the medical team including obstetricians and cardiologists has decided to perform the cesarean session. The laboratory work-up was indicating a raise blood sugar to 235 mg/dl, with no other abnormalities.

Question 3

What are the medical conditions that support the diagnosis of severe pre-eclampsia and the need to perform a caesarean section in this case?

A. Proteinuria;
B. Severe rest dyspnea;
C. The rise of blood pressure values;
D. The occurrence of front-occipital headache;

Correct answer: B and D

Comment: We need to emphasize that the early onset of pre-eclampsia represents, above all other factors, a risk of severe evolution for this case. Pre-eclampsia is categorized as "early - onset" pre-eclampsia if it is diagnosed before 34 weeks of gestational age and it is particularly associated with poor placentation and fetal growth restriction [14, 15]. Moreover, the patient started to present manifestations of target organ damage as acute heart failure and cerebral disturbances known as factors of severe prognosis, along with other complications which did not occurred in this case, such as thrombocytopenia, impaired liver function or the new development of renal insufficiency. Not least, the epigastric pain, as one in the right upper quadrant, should have drawn attention to a possible bleeding in the hepatic parenchyma.

The only way to cure pre-eclampsia is to proceed to the delivery and to extract the dysfunctional placenta, but the right timing for this decision must be evaluated by a multidisciplinary team of physicians and by taking into consideration the impact of pre-eclampsia consequences on mother and on the

child, as well. Caesarian session must be immediately realized if there are signs of fetal distress and/or life-threatening manifestations in the mother.

Until delivery the patient was treated for high blood pressure.

Question 4

Which of the assertion about women with a history of pre-eclampsia is correct?

A. They have a higher long-term risk do develop cardiovascular complications then women with uncomplicated pregnancies;
B. It is assumed that they don't carry a higher cardiovascular risk on long term;
C. They have a higher risk to develop high blood pressure with time;
D. After delivery their blood pressure return to normal and the risk to develop arterial hypertension with time is similar to the risk of women in the general population.

Correct answers: A, B and D

Comment: According to current guidelines, based on the best reliable data addressed to fetal safety, methyldopa (750-1500 mg/day) and labetalol (not more than 800 mg/day) represent the first-line treatment of high blood pressure in pregnancy, while the dihydropyridine calcium-channel blockers (most data available for nifedipine) are allowed to be added as a second line treatment [1, 16-19]. Beta-blockers appear to be less effective than calcium antagonists and may induce fetal bradycardia, growth retardation, and hypoglycemia. Consequently, their type and dose should be carefully selected, with atenolol best avoided. ACE inhibitors, ARBs, direct renin inhibitors, verapamil and diltiazem are contraindicated due to adverse foetal and/or neonatal outcomes. The plasma volume is reduced in pre-eclampsia, therefore diuretic therapy is not beneficial, except for the occurrence of oliguria when low-dose furosemide may be considered [1, 2].

Question 5

Which of the assertion about women with a history of pre-eclampsia is correct?

A. They have a higher long-term risk do develop cardiovascular complications then women with uncomplicated pregnancies;
B. It is assumed that they don't carry a higher cardiovascular risk on long term;
C. They have a higher risk to develop high blood pressure with time;
D. D. After delivery their blood pressure return to normal and the risk to develop arterial hypertension with time is similar to the risk of women in the general population.

Correct answers: A and C

Comment. According to a surveillance that lasted 4 to10 years women with history of pre-eclampsia have a higher risk do develop in the future myocardial infarction, stroke and cardiovascular death [20]. Also, a metanalysis has revealed that women with history of pre-eclampsia have an estimated relative risk of 3.39 to develop subsequently arterial hypertension [21].

Therefore, patients with complicated pregnancies by pre-eclampsia must be carefully monitored for the occurrence of arterial hypertension or other cardiovascular complications.

Conclusions

Pre-eclampsia is the most severe hypertensive disorder in pregnancy. It is a disease of placentation leading to utero-placental ischemia with the advance of pregnancy, with potentially severe consequences on fetus and on mother, as well. Although the triggers of pre-eclampsia are not well defined and understood until present epidemiological data are indicating the conditions mostly associated with the risk of pre-eclampsia. Preventive treatment with acid acetylsalicylic might be useful in these categories of patients, but mostly important is the careful monitoring of any pregnancy in order to diagnose on time this complication. Physicians must be aware about the safety of antihypertensive treatment in pregnancy, alpha-methyldopa and labetalol being the ones that best passed the test of time.

Conflict of interests

The authors declare that there are no conflicts of interest.

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