

FETAL AND POSTNATAL OUTCOME IN EPH-GESTOSIS

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Editors**

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Fetal and postnatal outcome in EPH-gestosis

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To Massimino Salvadori
in fond remembrance

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PREFACE

This volume — which I have the honour to present — contains the proceedings of the 13th Meeting of the Organisation Gestosis held in Venice at the Cini Foundation from September 28 to October 1, 1981. The Meeting was attended by nearly 300 scientists; the lectures and free communications were given by authors and workgroups from 20 different countries from all over the world.

The most original and up-to-date material available on the pathophysiological and clinical aspects of EPH-gestosis are included. However, as the Meeting mainly dealt with the fetal and postnatal outcome in EPH-gestosis, we let this inspire us to give the book its title.

A great many neonatologists, pediatricians and neuropsychiatrists of international repute participated. They brought the results of their experience, enabling us to link — for the first time — our knowledge of fetal medicine with that of postnatal life.

I am glad that a basic and exciting subject like fetal and postnatal outcome in EPH-gestosis, which has always interested me immensely, will now officially gain due recognition through this volume. After hearing the speeches at the Conference, my impression is that it will take many years of continuous work and a change in our mentality concerning the methods used for classification and evaluation of fetal and postnatal defects, before we can come to a definitive conclusion about this worrying problem regarding the future of the fetus of the gestotic mother.

First of all, I deem it particularly useful to organize collaborative and comparable studies, like, for instance, the one we carried out together with 9 Italian Obstetrical Centers and related neonatologic, pediatric and psychoneurologic services (Catania, Firenze (2), Genova, Roma (2), Parma, Padova and Torino). On the other hand, I am glad to see that the General Secretariat of the Organisation Gestosis has created, after the 13th Meeting, a Committee of Experts to review the nomenclature and standardization of the low-weight infant.

In EPH-gestosis — a moment of pregnancy — of great biological and clinical importance for the mother, the interest of the physician and scientist is now focused on the effects of the syndrome on the conceptus and its physical and mental future. This volume, the result of growing recognition of the continuity between fetal and postnatal life, both in physiological and pathological conditions, represents quite a valid example taking a central position in the area of preventive social medicine.

B.A. Salvadori

President of the Organisation Gestosis

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INAUGURAL ADDRESS

HAEMODYNAMICS IN EPH-GESTOSIS

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Blood Volume Expansion (BVE), which usually occurs during the first pregnancy, may be regarded as the most peculiar phenomenon in the maternal body.

Even when considered secondary to a reduction in Total Peripheral Resistance (TPR) and Uterine Peripheral Resistance (UPR) such an increase in blood volume requires a wide availability of the vascular tree; this problem is usually neglected.

Experimental works on the distribution of blood volume in various circulatory districts (7) demonstrate that 80% of the total volume lies in the venous vessels. The per cent capacity in the various portions of the vascular bed was:

- 1) - in large elastic arteries which form the arterial reservoir: 10.1%;
- 2) - in arterioles and precapillary sphincters which offer most of the peripheral resistance to flow: 4%;
- 3) - in capillary and probably postcapillary venules: 4.7%;
- 4) - in veins which form the venous reservoir: 80.1%;
- 5) - shunt vessels (2) may be added.

Therefore, we can distinguish:

- a) - resistance vessels which control tissue blood flow and closely link TPR and Arterial Pressure (AP), i.e. arterioles, precapillary sphincters as well as postcapillary venules;
- b) - capacity vessels, i.e. essentially the venous reservoir even if a small part is formed by arterial territory (Fig. 1).

The Filling Pressure (FP), intended as a systemic pressure after the heart has stopped, is not equivalent to any of the above-mentioned districts. This pressure has been measured in fibrillating animals before the appearance of the vasomotor reflexes and after obtaining some balance (equilibrium) by pumping blood from the arterial into the venous districts (3).

FP, even though a mathematical abstract, is of enormous haemodynamic importance, since it is correlated on the one hand to blood volume increase and on the other to an increase in Cardiac Output (CO) through venous return.

In pregnancy, when the blood volume expands, the FP increases and regulates venous return and CO. This regulation comes about in such a way that, notwithstanding the BVE, the FP has to increase without reaching the excessive values that will fatally involve AP elevation. The possibility of maintaining the FP within certain limits depends, however, on the capacity of the vascular tree (compliance), especially of the venous reservoir

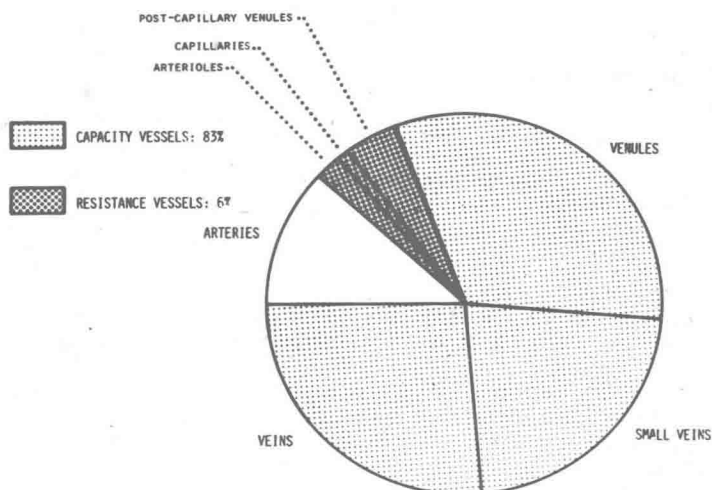


Fig. 1. Blood volume (in per cent) in capacity vessels and resistance vessels (Drawn from Wiedemann's data, 1963).

mentioned above as capacity vessels in which we could imagine structural, anatomical and functional properties. Dilatability or elasticity do not seem to be appropriate terms - compliance may be better. Vessels of the venous system have a compliance 18-30 times greater than those of the arterial system (4).

Coming back to pregnancy haemodynamics, one hardly ever supposes that the BVE will meet with obstacles perhaps owing to vascular limitation. This may be due to misunderstanding and overestimating the importance of reduction in TPR. However, vascular resistance and vascular compliance are two distinct issues with regard to the anatomical site in which the haemodynamic phenomenon takes place. We still have to demonstrate that reduced TPR could cause BVE and also that an increase in compliance could cause an increase in BVE. The model represented by an arteriovenous fistula - as in haemodialysis - reminds us that there is not always an increase in CO (5,6) and therefore not necessarily a BVE.

Many other factors of a biochemical nature, especially mineraloactivity, could influence the increase of blood volume in pregnancy and by definition we could imagine a situation in which maximum BVE clashes with minimum vascular compliance.

At this point, in order to meet up with the excessive increase of the FP, one could rely on renal filtration and an increase in 'urinary output' for reducing the BVE (1). This may occur as a consequence of the increase in CO and AP which in normal pregnancy are slight, since a small increase of AP is followed by a marked diuresis (1). Another mechanism probably starts when the renal function is insufficient and even earlier, the 'spilling' of fluid through the capillary walls into the interstitial spaces.

Owing to BVE the 'system reaches a balance in this succession: