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Plasma prostacyclin and thromboxane concentrations in 160 normotensive, hypotensive, and preeclamptic patients during pregnancy, delivery, and the post partum period

Klaus Goeschen[1], Eberhard Henkel[2], and Oliver Behrens[1]

[1]Department of Obstetrics and Gynecology, [2]Institute of Clinical Chemistry II, Medical School Hannover, Fed. Rep. of Germany

1 Introduction

Since the identification of prostacyclin (PGI_2) and thromboxane (TxA_2) in the seventies [13] there is clear evidence that prostanoids play an important role in the regulation of the circulation. PGI_2 is mainly synthesised in the endothelium and in the smooth muscles of the vascular wall and is one of the strongest dilatatory substances in arteries, veins and capillaries. PGI_2 causes a significant decrease in blood pressure [13, 23] and is a very potent inhibitor of the aggregation of thrombocytes. Thus, it is an antagonist of thromboxane (TxA_2), which is produced in the thrombocytes and has a strong constrictor effect on blood vessels. Besides, PGI_2 has an anti-arteriosclerotic effect by direct stimulation of cholesterol catabolism, leading to a release of cholesterol from the vascular wall, which is then removed by HDL proteins [17]. Furthermore, PGI_2 is considered to have a cytoprotective function [17].

PGI_2 is not stable in aqueous solution at physiological pH. However, 6-keto-prostaglandin $F_{1\alpha}$, which results from non-enzymatic hydrolysis, serves as a stable marker in plasma, urine and amniotic fluid [21]. TxA_2 has a very short half-time too and only its stable metabolite TxB_2 is a good marker. The importance of PGI_2 and TxA_2 for utero-placental perfusion was realized very early and has been demonstrated in a number of animal experiments [review in 11].

In humans, no correlation has been found between plasma concentrations of 6-keto-prostaglandin $F_{1\alpha}$ and blood flow in the umbilical artery [31]. There are conflicting results in regard to plasma concentrations of PGI_2 and TxA_2 during pregnancy, delivery and in the postpartum period; elevated, normal as well as decreased blood concentrations are reported in patients with normal or high blood pressure [2, 4, 10, 12, 15, 18, 27, 28, 30].

The ratio of PGI_2 and TxA_2 proved to be a more precise indicator of the circulatory situation compared to the absolute values alone. In fact, an increase of the ratio in favor of TxA_2 correlates better with the incidence of pregnancy induced hypertension (PIH) than the concentration of a single prostanoid [5, 14, 15].

It was the purpose of this study to measure plasma concentrations of prostanoids during pregnancy, delivery and in the postpartum period and to compare these in patients with preeclampsia, hypotension and normal blood pressure.

2 Study population and methods

The study protocol was approved by the Institutional Human Rights and Medical Ethics Committee. All patients gave informed consent to participation. The study group consisted of 160 women attending the Department of Obstetrics of the Medical School of Hannover, Germany.

All women had no history of hypertension. Blood pressure was recorded in the sitting position with