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Physical activity during pregnancy: maternal haemodynamics and obstetrics outcomes

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Objective. Physical isometric activity causes a pressure overload and subsequent a physiological concentric ventricular hypertrophy; isotonic activity, due to a volumetric overload, leads to balanced four-chambers dilatation. Similar modifications also occur during pregnancy. Objective of this study is to evaluate haemodynamic changes and perinatal outcomes in pregnant women according to the quote of MET/h/week-1 spent during pregnancy.

Materials and Methods. This prospective multicentric study includes health pregnant women at term; exclusion criteria are maternal-foetal diseases or indication for elective CS.

To the women enrolled a validated "Pregnancy physical activity questionnaire" (PPAQ) has been administrated and the cohort has been divided in two groups: above and below the PPAQ value corresponding at the 75th centile (= 287.72 MET × h/week-1). Haemodynamics has been eval-

uated through USCOM. Obstetric and neonatal outcomes have been collected by electronic clinical charts.

Results. Maternal baseline in two groups shows that more nulliparous and more ART-concepted pregnancy less physical activity group.

Maternal haemodynamics in two groups differs by an higher VPK ($p = 0.003$) and trend for a lower SV ($p < 0.074$) in more physical activity group. In this group, also a lower rate of obstetric lacerations ($p = 0.002$) has been described as well as a trend for a lower rate of operative delivery intervention ($p = 0.075$).

Conclusions. The study describes that higher level of physical activity during pregnancy positively affects labour, reducing the risk of vagino-perineal tears, and the rate of obstetric intervention, without affecting maternal-fetal complications. USCOM parameters vary according to the quote of MET/h/week-1 spent.

Study of the prevalence, associated factors and impact of maternal perinatal depression in women Alexandria 2022

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Objective. Depression is one of the most common mental health problems occurring in women during their childbearing years.

The aim of the work is to study prevalence, impact of maternal perinatal depression in Alexandria.

Materials and Methods. This study was conducted on 300 mothers at the postnatal ward in El-Shatby Maternity Hospital from April 2022 until October 2022. Females with past history of depression before pregnancy or females who receive medications inducing depression were excluded. The participants were asked to complete the questionnaire that includes the Edinburgh Postnatal Depression Scale (EPDS) as a screening test to obtain information concerning the current frame of mind at antepartum, partum and postpartum periods.

Results. The prevalence of perinatal depression was 22.3%. It was found that there is a significant negative moderate cor-

relation between socioeconomic status and perinatal depression ($r = -0.42$). The present study revealed that about two thirds (60.7%) of postpartum women had low socioeconomic level. Also, less than one fourth (20%) of parents had high education and only one fourth (25.3%) of postpartum women were working. There was a statistically significance difference between the number of previous abortions and perinatal depression ($p = 0.04$).

Conclusions. The prevalence of perinatal depression among the studied women was 22.3% of studied group. The significant factors identified in this study can be targeted to reduce the occurrence of perinatal depression among pregnant women in Alexandria through appropriate health interventions which includes perinatal depression screening, counselling, and the provision of support for pregnant women during antenatal care as well as lifestyle modification.

Changes in arterial stiffness and cardiac function: comparison between preeclampsia and normal pregnancy

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DOI: 10.36129/jog.2024.S42

Objective. Preeclampsia (PE), a pregnancy-specific condition characterized by high blood pressure (BP), is associated with significant changes in arterial stiffness and cardiac function. In this study, we compared such changes between PE and normotensive pregnant women.

Materials and Methods. Between May 2019 and February 2022, pregnant women were enrolled in this study in a prospective manner. Echocardiography, pulse wave velocity (PWV), pulse wave analysis (PWA), and carotid artery ultrasound were evaluated for the entire study population. The PE group met the criteria for PE based on Williams Obstetrics 25th edition.

Results. Among 60 pregnant women, there were 35 in the PE group and 25 in the control group. Most PWV parameters and central BP indices were significantly higher in PE than in

control patients. Among the PWA indicators, augmentation pressure and augmentation index were higher in PE than in control patients. LV mass index, E/septal E', and LA diameter were statistically significantly higher in PE patients than in controls. Circumferential strain of the carotid artery was higher in controls than in PE patients, while carotid distensibility was higher in the PE group.

Conclusions. PE was associated with increased arterial stiffness and decreased LV diastolic function. The severity of PE can vary, and the extent of changes in arterial stiffness and cardiac function depend on the individual patient. Regular monitoring of BP, arterial stiffness, and cardiac function is crucial in the management of PE to ensure the well-being of both the mother and the foetus.

Nightmare pregnancy complicated with preeclampsia, severe depression and hyperemesis gravidarum

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Objective. A challenging case of medical management in a pregnancy complicated with severe anxiety-depression syndrome and persistent hyperemesis.

Materials and Methods. 43 years old pregnant woman with pre-existent grade 3 hypertension presented for uncontrolled blood pressure under 1 g of Methylodopa, severe intolerance at Nifedipin, hyperemesis and high indexes of pulsatility on uterine arteries ultrasound. She was obese and diagnosed with severe anxiety and depression under treatment temporarily stopped with sertraline. Pregnancy was obtained by IVF (tubar infertility).

Results. Pregnancy was a roller coaster requiring team management and challenging therapeutic decisions among resistant hypertension, vaginal bleeding, persistent hyperemesis,

worsening psychiatric disorder, anaemia and pharmacological interactions. Constant multidisciplinary monitoring by telemedicine offered the chance to give birth by C-section at 37 weeks (for late preeclampsia) to a 3040 g newborn, APGAR 5-8 with mild pulmonary artery stenosis and favourable evolution.

Conclusions. Selection, dosage and timing of antihypertensive treatment is challenging with associated hyperemesis gravidarum. Management of depression and anxiety along pregnancy requires attention although standardized screening psychiatric methods are lacking, and prevention of postpartum depression is the essential goal. Frequent monitoring a hypertensive pregnant by telemedicine gives per se a favourable outcome.

Marfan syndrome with aortic dissection in immediate postpartum: a case report

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This case report details the presentation of Marfan Syndrome (MS) with aortic dissection during the immediate postpartum period in a 27-year-old female. Afflicted with a confirmed diagnosis of Marfan Syndrome, a family history of consanguinity, and recent caesarean section, the patient experienced sudden chest pain, dyspnoea, and elevated blood pressure seven days postpartum. Diagnostic imaging, including echocardiography and CT angiogram, revealed a Stanford Type B/DeBakey Type IIIB aortic dissection.

Prompt admission to the Intensive Care Unit ensued, and the patient underwent surgical interventions, including a ne-

phrostomy and aortic endoprosthesis with left subclavian artery embolization. Over a 20-day hospitalization, the patient exhibited clinical improvement despite initial challenges in blood pressure control.

This case underscores the heightened risk of aortic dissection in the postpartum period for Marfan Syndrome patients, emphasizing the necessity of timely diagnosis, multidisciplinary care, and surgical intervention. Increased awareness among healthcare providers is crucial for early detection and intervention in this vulnerable population.

Associations between maternal nutritional status, haemodynamic parameters and delivery outcomes in low-risk pregnancies: a prospective observational study

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Objective. Cardiovascular adaptations represent the most relevant physiological changes of the maternal body during pregnancy, ensuring adequate utero-placental blood perfusion for intrauterine growth and development. Additionally, maternal nutritional status represents a pivotal predictor of pregnancy outcomes.

Materials and Methods. This prospective observational study investigates the associations between maternal characteristics and nutritional habits at term, haemodynamic parameters, and pregnancy outcomes. Healthy women with singleton uncomplicated pregnancies were enrolled at 36-41 gestational weeks. At enrolment, a nutritional score (0-10) based on ten questions with binary yes/no answers was calculated to quantify maternal adherence to a healthy diet and lifestyle. Maternal haemodynamic parameters were assessed by using the Ultrasonic Cardiac Output Monitor (USCOM), including cardiac output (CO), systemic vascular resistance (SVR) and Smith-Madigan inotropy

index (SMII). Pregnancy outcomes were recorded at delivery. Associations between maternal characteristics and nutritional score, haemodynamic parameters, and pregnancy outcomes were investigated by using multi-adjusted generalized linear models.

Results. 143 pregnancies were enrolled. Pregestational body mass index was positively associated with SVR ($\beta = 43.16$, $p < 0.001$) and negatively associated with CO ($\beta = -0.07$, $p < 0.001$) and SMII ($\beta = -0.02$, $p = 0.02$). Additionally, a positive association was detected between the nutritional score and SMII ($\beta = 0.05$, $p = 0.005$). Finally, CO was positively associated with birth ($\beta = 7.48$, $p = 0.05$) and placental ($\beta = 44.27$, $p < 0.01$) weight, while RVS showed a negative association with birth ($\beta = -0.01$, $p = 0.02$) and placental ($\beta = -0.06$, $p = 0.02$) weight.

Conclusions. This study shows that maternal derangements in nutritional status and habits are associated with a compromised haemodynamic profile at term, with additional impact on intrauterine growth.

The modern maternal haemodynamic features for prediction of preeclampsia

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Objective. Annually due to PE 500,000 babies and 76,000 mothers had been dying in the world. Preeclampsia (PE) survivors will have at twice the risk of heart disease and stroke, and four times the risk of high blood pressure in the future. The objective is to evaluate the predictive values of the circulatory syndromes of the cardiovascular system (CVS) induced by gestational endotheliopathy.

Materials and Methods. Investigations of the circulatory syndromes of CVS and haemodynamic supporting of pregnancy was carried out in the first trimester in 114 women with physiological pregnancy (PhP) and in 132 pregnant women with gestational endotheliopathy (GE). We determined of circulatory syndromes by correlation of minute volume of blood while standing/lying – I type (hypokinetic condition) and III type (hyperkinetic condition) of haemodynamics. The haemo-

dynamic risk was determined in accordance with the index of haemodynamic nonoptimality (IHN).

Results. According to our investigations the optimization of haemodynamical supporting in PhP was mechanism of vasodilator “slippage” of arterial vessels from the systemic vasoconstriction as the haemodynamic equivalent of endothelial activity. The predictors of PE in pregnant women were hyperkinetic type of circulation (by an anthropo-physiological ratio of standing/lying), integral indicators of functional depreciation of the circulatory syndromes of CVS – haemodynamic risk (by IHN > 30%), circulatory syndromes of arterial or venous blood insufficiency in abdominal and pelvic regions.

Conclusions. Our results obtained that the predictors of PE were haemodynamic syndromes of insufficiency and circulatory limitation in the standing position.

The new methodology for appraisal of maternal haemodynamics

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The idea for this study is based on endothelial-dependent adaptation of haemodynamic circulation in pregnancy. It is important to understand that all organism mechanisms providing pregnancy depend, foremost, on the haemodynamic system and the priority role of the perfusion complex (volume-tube-pump-pressure-blood flow) – pumping function of heart. Multicentral description of “haemodynamic model” of the examined conditions (not pregnant and pregnant women) was made basis on antropo-physiological research of the circulatory state of the CVS, using the diagnostic system ANTROPOS-CAVASCREEN, which is an innovative diagnostic complex for analysing the performance of various blood circulation sections using non-invasive methods.

With the examined modes for BP was analysed expression of circulatory syndromes of HF at them haemodynamical-

ly identified by diagnostic algorithm worked out by us, as a system estimation of pumping function of heart (PFH) in the circulatory state of the CVS. PFH additionally was estimated by trimester measuring of cardiac output and cardiac index on body weight separately in standing and lying positions. By antropo-physiological ratio of CO upright/lying typological description of dynamic organization of the circulatory state of the CVS was made. The last was presented by three types of blood circulation: type I or hypokinetic state, with the decrease of BP in standing position (93% and less) comparing to its size in a prone position; type II or eukinetic state, with BP of 94-106% from standing to lying position; and type III or hyperkinetic state, with increase of BP up to 107% or more in the upright position.

The features of the prevention of preeclampsia in pregnant women with gestational endotheliopathy in the first trimester

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Objective. The purpose of our clinical study is to evaluate the clinical effectiveness of L-arginine in the prevention of preeclampsia and reduction of other perinatal risks in patients with preclinical gestational endotheliopathy.

Materials and Methods. A comparative clinical study was performed at the clinical base of National Pirogov Memorial Medical University. 174 pregnant women with preclinical gestational endotheliopathy (GE), approved by laboratory and instrumental research (microalbuminuria and endothelium-dependent vasodilatation) participated in the study. Patients were divided into clinical subgroups: 31 pregnant women with GE in subgroup (A) received acetylsalicylic acid (ASA) at a dose of 75 mg per day, 33 patients with preclinical GE from subgroup (B) received L-arginine at a dose of 4-4.2 g per day. 52 pregnant women with preclinical GE who re-

fused prophylactic treatment were included in the subgroup (C). The clinical effectiveness of the therapy was assessed by comparing the number of cases of perinatal pathology in the I, II and III trimesters and complications during childbirth (cases of spontaneous abortion, premature birth, placentation anomaly, preeclampsia, perinatal loss, placental dysfunction, intrauterine foetal distress, the dynamics of blood flow in the uterine-placental-fetal system).

Results and Conclusions. The use of L-arginine as an alternative preventive therapy for the development of preeclampsia and other perinatal pathology made it possible to significantly reduce the number of cases of preeclampsia (RR 0.19, 95%CI 0.05-0.77, $p = 0.02$) and developmental placental hyperplasia/hypoplasia (RR 0.17, 95%CI 0.04-0.68, $p = 0.01$), compared to patients who did not receive any preventive strategy.

Plasma renin concentration throughout healthy and hypertensive pregnancy: a systematic review and meta-analysis

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Objective. Pregnancy is characterized by profound circulatory changes and compensatory adjustments in the renin-angiotensin-aldosterone system (RAAS). Differences in the regulatory response of the RAAS may antedate or accompany vascular complicated pregnancy. Therefore, we aim to delineate the trajectory of active plasma renin concentration (APRC) in healthy and complicated pregnancies.

Materials and Methods. We performed a systematic review and meta-analysis on APRC during normotensive and hypertensive pregnancies, for which we searched PubMed (NCBI) and Embase (Ovid) databases. We included only studies reporting measurements during pregnancy together with a nonpregnant reference group measurement. Risk of bias was assessed with QUIPS. Ratio of the mean (ROM) and 95% confidence intervals (CI) of APRC values between pregnant and nonpregnant women were estimated for predefined intervals

of gestational age using a random-effects model. A meta-regression analysis was used to analyse APRC over time.

Results. In total, we included eighteen studies which provided APRC values of 465 healthy pregnancies, 244 complicated pregnancies and 410 nonpregnancies. As compared to nonpregnancy, APRC significantly increased as early as the first weeks of healthy pregnancy and stayed consistently increased throughout the whole pregnancy (ROM 2.77; 95%CI 2.26-3.39). In contrast, APRC in hypertensive complicated pregnancy was not significantly different from nonpregnancy (ROM 1.30; 95%CI 0.96-1.76).

Conclusions. Our findings show that healthy vascular adaptation in pregnancy is accompanied with an increase in APRC levels. In hypertensive pregnancies this increase in APRC is not observed, which might suggest that renin released is suppressed by the high blood pressure in these pregnancies.

On the pathogenesis of preeclampsia: a new pre-pregnancy risk factor for preterm and term preeclampsia and evidence from recurrences supporting their common origin

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Objective. A fundamental characteristic of any disease is the heterogeneity of its manifestation since general processes are modified through individual responses. A common pathogenesis for preeclampsia regardless of gestation is entirely plausible, as no single feature, including placental changes of varying severity and timing, is unique to preterm or term-onset cases.

This study aimed to discover any distinctive pre-pregnancy signs that may have gone unnoticed and to analyze preeclampsia onset in recurrences.

Materials and Methods. Ukrainian study comprised 103 women who had been diagnosed with preeclampsia including 15 recurrent cases and 408 women with uncomplicated pregnancies. In addition to a questionnaire addressing known risk factors, participants were interviewed in meticulous detail to document any disorders

or conditions that they or their first-degree relatives had ever experienced.

Results. A notably high frequency of cholelithiasis, a previously unreported risk factor, was found: a 17-fold prevalence in women with preeclampsia (29.1% versus 1.7%, $p < 0.0001$) and an 8.8-fold increase among their mothers (45.6% versus 5.2%, $p < 0.0001$). There was no difference in the rate of gallstones in patients with preterm or term preeclampsia using gestation at onset or birth. And there was no correlation between gestational age at diagnosis or delivery in recurrent cases of preeclampsia.

Conclusions. Cholelithiasis emerges as a novel risk factor for preeclampsia, warranting confirmation in diverse populations. The lack of association of the disease onset in recurrences, consistent with findings we revealed in analogous cases in the literature, reinforces the concept of a singular pathogenesis for preeclampsia.

The multifaceted aspects of diabetes in pregnancy: prevalence, complications, and management strategies

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DOI: 10.36129/jog.2024.S51

Diabetes in pregnancy, commonly referred to as gestational diabetes mellitus (GDM) or pre-existing diabetes, poses significant risks to maternal and foetal health. This abstract explores the multifaceted aspects of diabetes during pregnancy, emphasizing its prevalence, complications, and management strategies. The global rise in diabetes incidence has parallely increased the occurrence of diabetes in pregnancy, with estimates suggesting that a substantial proportion of pregnant women experience some form of glucose intolerance.

Maternal complications associated with diabetes in pregnancy include an elevated risk of preeclampsia, caesarean section, and the development of type 2 diabetes postpartum. Foetal complications range from macrosomia and birth injuries to neonatal hypoglycaemia. Furthermore, the long-term health

implications for offspring extend into childhood and adulthood, predisposing them to metabolic disorders.

Early detection through glucose screening and timely intervention play pivotal roles in managing diabetes in pregnancy. Lifestyle modifications, nutritional counselling, and insulin therapy are integral components of the comprehensive care approach. The collaboration between obstetricians, endocrinologists, and dietitians is essential to optimize maternal glycaemic control and minimize adverse outcomes for both mother and child.

In conclusion, diabetes in pregnancy is a complex health issue with far-reaching consequences. A holistic approach encompassing early screening, vigilant monitoring, and collaborative management strategies is crucial to mitigate the associated risks and improve overall maternal-foetal outcomes.

Association between glycometabolic compensation and pregnancy-associated plasma protein A in pregnant women with pregestational diabetes

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Objective. In women with pregestational diabetes mellitus (DM), the estimation of aneuploid risk needs adjustment for maternal serum values of pregnancy-associated Plasma Protein A (PAPP-A), a key regulator of insulin-like growth factor bio-activity. To date, it is unclear whether there is a correlation between glycometabolic compensation and plasma markers used for aneuploidy risk estimation. We aim to investigate whether glycated haemoglobin (Hb1Ac) values influence PAPP-A levels.

Materials and Methods. A retrospective analysis was conducted. Pregnant women with type 1 and type 2 DM, who had performed the combined test at our Fetal Medicine and Surgery Department were included in the analysis. Correlation coefficients between PAPP-A and Hb1Ac in the pregestational period and during the various trimesters of pregnancy were evaluated.

Results. 90 women were enrolled. PAPP-A (2.4 versus 1.4; $p = 0.003$) was higher in women with type 1 DM. A significant correlation was found between PAPP-A and first-trimester Hb1Ac ($R = -0.29$; $p = 0.02$). At multivariate analysis adjusting for possible confounders (ethnicity, BMI, maternal age, parity), in women with type 2 DM PAPP-A decreases by 0.03 units for each unit increase in Hb1Ac and increases by 2.7 for Hispanic women compared with Caucasians. In women with type 1 DM, the correlation between PAPP-A and pre-gestational and first-trimester Hb1Ac was significant ($R = -0.67$ and $R = -0.54$, respectively; $p = 0.001$).

Conclusions. Our preliminary data suggest that glycometabolic compensation influences PAPP-A levels and therefore it may be considered as part of accurate risk estimation of aneuploidies during first-trimester screening.

Can venous pulse transit time at supracardiac level predict clinical deterioration in early-onset preeclampsia? Report of two cases

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Objective. Early-onset preeclampsia is characterized by a significant lower venous pulse transit time at supracardiac level compared to uncomplicated pregnancy. The objective is to investigate the time onset of abnormal venous pulse transit time at internal jugular veins relative to onset and course of early-onset preeclampsia.

Materials and Methods. Consecutive combined Doppler-Electrocardiogram measurements at the internal jugular veins were performed in two pregnant women, and plotted against the normal reference range.

Results. In the latent phase of disease, jugular vein pulse transit times were within the normal range. However, a

drop-in venous pulse transit time was observed in both women, respectively 10 and 6 days before deterioration of early-onset preeclampsia, indicating termination of pregnancy.

Conclusions. In those two case reports, a decrease of venous pulse transit time in pregnancy preceding severe deterioration of early onset preeclampsia was observed. This raises an intriguing question: might the clinical value of maternal venous Doppler-ECG assessment of the jugular veins be similar to that of foetal ductus venosus assessments? Larger prospective studies are needed.

Preeclampsia and perinatal neurological health: insights from haemodynamics, oxidative stress and s100b protein

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Objective. This study aimed to investigate the impact of maternal haemodynamics in preeclampsia, oxidative stress markers, S100B protein on nontraumatic perinatal central nervous system disorders.

Materials and Methods. A case-control study conducted between 2007 and 2014, involving 705 pregnant women, with 339 diagnosed with preeclampsia (baseline group) and 366 without (control group). Gestational age was between 28+0 w.g. to 41+6 w.g. Maternal haemodynamic changes were assessed, and oxidative stress markers, were measured. The S100B protein was evaluated as a potential prognostic marker for perinatal neurological conditions. The study included retrospective and prospective analyses.

Results. Preeclampsia incidence correlate with personal, historical, obstetric, and somatic factors. Maternal haemody-

amic alterations in preeclampsia, such as early onset hypertension (< 32 w.g.; $p < 0.0001$), increased blood pressure variability (≥ 30 mm Hg; $p < 0.003$) and hypertension persistence (> 3 weeks, $p < 0.0001$) influenced the risk of nontraumatic perinatal neurological lesions. Elevated levels of oxidative stress markers were associated with both preeclampsia and neurological conditions. Notably, S100B protein levels exceeding $1.95 \mu\text{mol/L}$ demonstrated a significant prognostic value for nontraumatic perinatal neurological disorders, with high sensitivity and specificity.

Conclusions. This study optimizes the management of preeclampsia-complicated pregnancies by incorporating an algorithm that considers key prognostic factors thereby reducing perinatal neurological impairment risks. The study's findings hold significance for improving maternal-foetal health outcome.

Assessment of skin microvascular function in pregnancy using laser speckle contrast imaging

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Objective. To assess variations in skin microvascular response during pregnancy by employing laser speckle contrast imaging (LSCI) coupled with post-occlusive reactive hyperaemia (PORH), and to compare results with those of non-pregnant healthy controls.

Materials and Methods. Thirty-two pregnant women were prospectively enrolled in the first trimester. Microvascular skin blood flow was recorded in each trimester (T1, T2 and T3) using LSCI. Skin perfusion was measured at baseline, during a 3-min occlusion obtained with an inflated pneumatic cuff, and after occlusion release (peak flux). Changes in these parameters throughout gestation were evaluated. Recordings from T1, T2 and T3 were then compared to parameters obtained in thirty-two non-pregnant controls.

Results. Baseline flux significantly increased from T1 to T3 ($p = 0.03$). The peak flux after occlusion release and the

base-to-peak flux significantly increased from T1 to T3 (median change 29.06 Perfusion Units, 95%CI 19.48-40.1, $p < 0.0001$, and mean change 40.77%, 95%CI 13.34-68.2, $p = 0.005$, respectively), and both parameters were higher in T3 compared to controls ($p < 0.001$). The base-to-peak flux was also higher in T1 and T2 compared to controls ($p < 0.01$). The time to reach peak perfusion since cuff release and the half recovery time decreased from T1 to T3 ($p < 0.01$) and were lower in pregnant women at T3 compared to controls ($p < 0.001$).

Conclusions. Microvascular reactivity improves from the first to the third trimester and is heightened in pregnant compared to non-pregnant women. Using LSCI, we presented measures of microvascular function in pregnancy, that can be utilized to explore deviations from the typical microvascular response in conditions such as preeclampsia.

Maternal cardiac morphometry of late SGA pregnancies at 6 months after delivery

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Objective. To compare maternal cardiac geometry at 6 months postpartum in a high-risk cohort, based on the development of late SGA.

Materials and Methods. A prospective observational study was conducted among a cohort of high-risk pregnancies of placental dysfunction followed up to 6 months postpartum; maternal cardiac morphometry was compared based on the presence of late SGA irrespective of concomitant Preeclampsia (PE).

Late SGA was defined as a BW below the 10th centile according to local curves. PE definition was based on ISSHP criteria. Parasternal long axis, apical 4-chamber and 5-chamber views were performed.

Mean and standard deviation (SD) were calculated; medians were compared by quantile regression, adjusted by maternal BMI.

Results. 38 patients were included (23 cases *vs* 15 controls). 62.3% women were initially nulliparous. Mean maternal age was 35.6 years (SD 4.6) and mean BMI at 6 months postpartum was 25.7 (SD 4.7) ($p > 0.05$). 60.5% were Caucasian.

Mean end-diastolic (ED) left ventricle (LV) septum thickness and posterior wall thickness were greater, whereas mean ED LV diameter was smaller in the SGA group ($p < 0.05$).

Mean ED and end-systolic (ES) volumes in the left atrium (LA) and LV were smaller among the SGA group. When adjusted by BMI, the differences were statistically significant except for LV and ES LA volume. No differences were found on LV mass.

Conclusions. Mothers with a SGA pregnancy have thicker left ventricular walls and smaller left cavities at 6 months postpartum.

Preeclampsia and foetal congenital heart disease: which role for maternal haemodynamic assessment? A case report

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Objective. We present a case of pregnancy, with a foetus affected by DiGeorge syndrome with cardiac involvement, complicated by extremely preterm preeclampsia (PE).

Materials and Methods. To assess the foeto-maternal wellbeing in a case of extremely preterm PE, foetal doppler and cardiotocography (CTG) monitoring were associated not only to maternal blood exams and arterial pressure surveillance, but also to maternal haemodynamic evaluation (Ultrasound Cardiac Output Monitor, USCOM®).

Results. A 42-year-old woman was admitted to our High-Risk Pregnancies Unit, at 25 gestational weeks for preeclampsia. At the admission, maternal and foetal condition were stable with a good maternal blood pressure and no other sign of maternal organ involvement more than proteinuria and placental dysfunction. USCOM showed mildly elevated systemic vascular resistance (SVR, 1,213 dynes \times sec/cm⁵, 83° pc) and normal

stroke volume (SV, 87 ml, 53° pc). After two weeks, an initial deterioration of foetal doppler was associated with worsening maternal blood-pressure requiring more than one drug for adequate maternal stabilization and haemodynamic profile (SVR 1,934 dynes \times sec/cm⁵, 99° pc; SV 56 ml, 6° pc). At 30 weeks, the further worsening maternal haemodynamic profile with increase of SVR (2,380 dynes \times sec/cm⁵, >99° pc) and SV reduction (52 ml, 4° pc) preceded of only few days the urgent caesarean section for pathological CTG associated with absent reversed end diastolic flow in umbilical artery.

Conclusions. In a case of extremely preterm preeclampsia, our case demonstrates that maternal haemodynamic profile deteriorates simultaneously with the worsening of maternal and foetal condition, confirming the relevance of the global assessment of materno-placental-foetal axis in assessing these cases.

Early third trimester maternal cardiac function in high-risk pregnancies of placental dysfunction

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Objective. To compare maternal cardiac function at 27-28 weeks in high-risk pregnancies based on the development of late PE or SGA.

Materials and Methods. A cohort of high-risk pregnancies was prospectively constructed.

Maternal echocardiography was performed at 27+0-28+6 weeks. Parasternal long axis, apical 4-chamber and 5-chamber views were evaluated. SBP, DBP and MAP were measured.

Late SGA was defined as BW below 10th centile according to local curves. PE definition was based on ISSHP criteria.

Three non-exclusive groups were defined: group 0 with no PE nor SGA; group 1 with PE (\pm SGA); and group 2 with SGA (\pm PE). Group 0 was compared to group 1 and group 2.

Results. We included 350 high-risk pregnancies (59 SGA, 22 PE). Mean maternal age was 35 years (SD 5.2), mean maternal pre-pregnancy BMI 24.6 kg/m² (SD 5.3) and mean GA at

the examination was 28.1 (SD 0.86). Non-exclusively, 12 (3.4%) had chronic hypertension and 9 (2%) maternal cardiopathy.

In PE group, compared to uncomplicated pregnancies, SBP and MAP were significantly higher, no differences were found regarding peripheral vascular resistance. Stroke volume was significantly lower.

In SGA group, compared to uncomplicated pregnancies, no differences were found regarding BP, but peripheral vascular resistance was significantly higher. Cardiac output was significantly lower.

Those parameters showed low performance for the prediction of late PE and SGA (UAC 0.78 (0.68-0.88), 0.68 (0.60-0.76)).

Conclusions. At 27-28 weeks, maternal cardiac haemodynamics showed differences between uncomplicated and PE or SGA pregnancies, but with a low predictive performance.

Early third trimester maternal cardiac morphometry in high-risk pregnancies of placental insufficiency

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Objective. To compare maternal cardiac morphometry at 27-28 weeks in high-risk pregnancies according to the development of late PE or SGA.

Materials and Methods. A cohort of high-risk pregnancies meeting RCOG criteria was constructed.

Maternal echocardiography was performed at (27+0 -28+6weeks). Parasternal long axis, apical 4-chamber and 5-chamber views were evaluated. SBP, DBP and MAP were measured. Left atrium and Left ventricle (LV) volumes were estimated using an image analysis platform, blindly to the perinatal outcomes.

SGA was defined as a BW < 10th centile according to local curves and PE according ISSHP guidelines.

Three non-exclusive groups were defined: group 0 with no PE nor SGA; group 1 with PE (\pm SGA); and group 2 with SGA (\pm PE). Group 0 was compared to group 1 and group 2. The

differences between groups were paired-wisely analysed by quantile regression of the median, adjusted by maternal height.

Results. 350 pregnancies were included: 22 pregnancies with PE (\pm SGA) and 59 pregnancies with SGA (\pm PE). Mean maternal age was 35.5 years (SD 5.2) and mean pre-pregnancy BMI 24.6 kg/m² (SD 5.3). Mean GA at the examination was 28.1 (SD 0.86). Non-exclusively, twelve patients (3.4%) had chronic hypertension and 9 (2.6%) maternal heart disease.

In SGA group, left atrium diastolic volume and LV diastolic volume were significantly lower (16.3 vs 19.0 ml, $p = 0.00456$ and 128.3 vs 143.6 ml, $p = 0.00624$, respectively) and LV end-diastolic diameter was smaller (4.3 vs 4.6 cm; $p = 0.0007$).

Conclusions. At 27-28 weeks, high-risk pregnancies subsequently developing late SGA showed smaller volumes of the left heart.

Haemodynamic and impedenzometric profile in low-risk pregnant women at term with excessive gestational weight gain: a pilot study

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Objective. We showed that excessive GWG (eGWG) associates with adverse outcomes among low-risk pregnancies, similarly to women with excessive pregestational BMI (epBMI). Yet, the underlying mechanisms are still unclarified. We hypothesized that abnormalities in haemodynamics and body composition could play a potential role.

Materials and Methods. A prospective cohort study including women with a singleton, low-risk gestation at term (11/2021-3/2023). Maternal haemodynamics and body composition were evaluated by USCOM-1A and impedance balance Inbody 270. GWG was defined according to 2009 NAM guideline. Women with normal pBMI (npBMI 18.5-24.9 Kg/m²) and adequate (aGWG) or excessive GWG (eGWG) were considered. Also, we included women with epBMI (≥ 25 Kg/m²) and eGWG (epBMI/GWG).

Results. We enrolled 147 npBMI women: 88 aGWG and 59 eGWG. Twenty-four patients showed epBMI/GWG. Gestational age at enrollment was 38-41 weeks. As compared to aGWG, women with eGWG showed higher SV and CO MoM (0.67 *versus* 0.60, $p = 0.004$; 0.72 *versus* 0.63, $p = 0.001$), with values similar to epBMI/GWG patients (0.72, $p = 0.354$ for SV; 0.74, $p = 0.319$ for CO). Body composition assessment showed similarly higher TBW levels in eGWG and epBMI/GWG *versus* aGWG (38.5 and 37.8 *versus* 35.3 L, $p < 0.001$). Also, abdominal fat mass % and visceral fat levels were increased in eGWG *versus* aGWG (253 *versus* 215%, $p < 0.001$; 12 *versus* 10, $p < 0.001$).

Conclusions. Low-risk, term pregnant women with npBMI and eGWG display haemodynamic and impedenzometric features that resemble those observed in women with epBMI/GWG. This could represent a mechanism underlying the risk of adverse outcomes, thus deserving further exploration.

Low-dose aspirin in the prevention of preeclampsia in twin pregnancy

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Objective. To identify risk factors for hypertensive disorders of pregnancy (HDP) in multiple gestations and to evaluate the effectiveness of low dose aspirin administration in preventing HDP in a large cohort of multiple pregnancies.

Materials and Methods. This retrospective study included twin pregnancies followed up by the Twin Pregnancy Care Unit of Sant'Anna Obstetric-Gynecological Hospital in Turin between 2015 and 2023. Low dose aspirin (100 mg/die) was administered to a subgroup of women from 16 to 32 weeks of GA. We compared maternal characteristics of twin pregnancies complicated by HDP and uncomplicated ones. We compared incidence of HDP and perinatal outcomes of women who were administered low dose aspirin and of those who were not.

Results. Among the 668 pregnancies included in our dataset, 91 (13.6%) developed HDP. Women who developed

HPD were significantly older (36.8 years *vs* 33.1 years, $p < 0.001$), more often nulliparous ($p = 0.010$, OR 2.3) and more frequently used artificial conception ($p < 0.001$, OR 2.9). Maternal BMI, ethnicity and chorionicity were not significantly associated with HDP. Women who were administered ASA ($n = 248$) had a lower incidence of overall HDP ($p < 0.001$, OR 0.38), gestational hypertension ($p = 0.007$, OR 0.42) and preeclampsia ($p < 0.001$, OR 0.36). No difference was found in the incidence of sIUGR and in neonatal outcomes between the two groups.

Conclusions. Multiple pregnancy is a risk factor for HDP per se; nulliparity, artificial conception and maternal age are independent additional risk factors for HDP. Prevention with low dose aspirin is effective in reducing incidence of HDP in multiple pregnancy.

Preeclampsia-Spectrum hypertensive disorders of pregnancy: therapeutic approaches and prognosis

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Objective. Preeclampsia is a disease exclusive to pregnancy and the immediate postpartum period, occurring in 8% of pregnancies worldwide, associated with considerable maternal and foetal morbidity. The objective is to review pregnancy hypertension clinical treatments guidelines at UHOG "Mbretëresha Geraldinë".

Materials and Methods. Our review takes into consideration deliveries from 2015-2021 at UHOG. There were in total 43,820 women out of whom 1,071 were diagnosed with preeclampsia, from which 675 had taken aspirin and a low dose of calcium since the 16th weeks, because they had PE in their past pregnancies.

838 (78.2%) of them delivered with caesarean section and around 21.8% with natural delivery.

Results. Preeclampsia prevention with aspirin and low calcium intake before 16 weeks among patients with previous PE seem to be beneficial for prevention of severe PE.

Recent data about heparin with low molecular weight are still conflicting.

Antihypertensive treatment: severe hypertension, most commonly done with intravenous labetalol and oral nifedipine.

Non severe hypertension with oral labetalol (in particular), methyldopa, or nifedipine.

Eclampsia treatment and prevention done with MgSO₄. It is also used among women with severe preeclampsia. MgSO₄ compared with placebo more than halved the risk of eclampsia. MgSO₄ is recommended for imminent preterm birth like a neuroprotection.

The likelihood of caesarean delivery at less than 28 weeks of gestation could be as high as 97%, and at 28+32 weeks of gestation as high as 65%.

Conclusions. Prevention and treatment of preeclampsia are crucial in saving lives and the following were consistently recommended.

Investigating the correlation between activation of the Nitric Oxide pathway and inhibition of the NLRP3 inflammasome in endothelial cells in preeclampsia

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Objective. Different pathways have been proposed for pathogenesis of Preeclampsia, NO pathway as a complex molecular pathway, plays a key role in endothelial dysregulation. The NLRP3 inflammasome and its components activate NF- κ B, which is considered as the “holy path” in the pathogenesis of many vascular disorders through IL-1 β including preeclampsia. We investigated the inhibition of possible inflammation by drugs affecting this pathway, such as (sGC)stimulators-riociguat.

The objective is to analyse the role of the NLRP3 Inflammasome and the Nitric Oxide pathway in Preeclampsia and to investigate the potential anti-inflammatory effects of riociguat.

Materials and Methods. This experimental research was carried out at the University of Heidelberg in Germany - Department of Clinical Pharmacology, in primary human cells: HUVEC as well as HPAEC. The cultivation of cell cultures is done according to strict tools and protocols. The cells were

divided in four groups and were treated with different concentrations of TNF α , and/or ATP and/or Riociguat. We measured Caspase-1, IL-1B and riociguat concentrations. ANOVA was used to calculate the correlation between the groups, and Tukey test to clarify differences.

Results. We had significant results from three groups but the comparison between control and highest RCG 50 μ M concentration and TNF α has shown a statistically significant difference of $p = 0.0013$.

The analysis of the RCG plates considering only the highest concentration of RCG (50 μ M) have shown an activation of the inflammasome. However, addition of RCG has no effect on this activation.

Conclusions. A possible correlation between NO and NLRP3 pathways should be considered to observe surrogate markers for early detection of inflammatory response, further research and different concentrations of riociguat should be investigated.

Correlation between maternal haemodynamic profile and lung interstitial oedema in postpartum patients with severe preeclampsia

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Objective. To assess potential correlation between maternal haemodynamic profile and lung interstitial oedema in postpartum patients with severe preeclampsia.

Materials and Methods. We included 21 patients with severe features of preeclampsia at four days postpartum. Two main parameters, which differentiate haemodynamic profile of preeclampsia, *i.e.* cardiac output (CO) and peripheral vascular resistance (PVR), were assessed by echocardiography. Cardiac output was calculated by multiplying stroke volume by heart rate. Stroke volume was obtained by using pulse-wave Doppler method and calculated as the product of left-ventricular outflow tract area and left-ventricular outflow tract velocity-time integral. Peripheral vascular resistance was calculated by dividing mean arterial blood pressure by CO. Lung ultrasound Echo Comet Score (ECS) was used as a marker of lung

interstitial fluid. It was obtained using the 28-rib interspaces technique. Any correlation between ECS and CO or PVR was assessed by Kendall's tau ($p < 0.05$ significant).

Results. Cardiac output ranged from 3.2 to 7.1 L/min (median 4.6 L/min), PVR from 1,178.0 to 2,734.0 dynes \times sec/cm⁵ (median 1,834.0 dynes \times sec/cm⁵), and ECS from 0 to 40 (median 7). There was a significant inverse correlation between CO and ECS (Kendall's tau = -0.334, $p = 0.04$). Moreover, higher PVR was significantly associated with higher ECS (Kendall's tau = 0.340, $p = 0.03$).

Conclusions. Increased lung interstitial fluid in early postpartum period in preeclampsia is associated with low CO and high PVR. These results indicate that patients with severe preeclampsia who present with a low CO/high PVR haemodynamic profile are at higher risk of postpartum lung oedema.

Associations between blood pressure variability and perinatal outcomes

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Objective. This study aimed to investigate the impact of maternal haemodynamics in preeclampsia on nontraumatic perinatal central nervous system disorders.

Materials and Methods. A case-control study conducted between 2007 and 2014, involving 705 pregnant women, with 339 diagnosed with preeclampsia (baseline group) and 366 without (control group). Gestational age ranged between 28+0 weeks gestation (w.g.) and 41+6 w.g. Maternal haemodynamic changes were assessed, focusing on systolic blood pressure variability.

Results. Significant associations were observed between systolic blood pressure fluctuations and perinatal outcomes. In preeclamptic pregnancies, there was a higher prevalence of blood pressure parameter fluctuations, during the pre-delivery period. The presence of at least one systolic blood pressure spike greater than 30 mm Hg was detected in 54.3% of cases

in the preeclamptic group compared to 30.0% in the control group. When comparing the presence of 2 or more cases of systolic blood pressure fluctuations ≥ 30 mmHg, significant differences were observed. In preeclamptic women with nontraumatic perinatal brain lesions, 14 cases were recorded (40.0%) 95%CI 23.8-56.2, while in preeclamptic women without nontraumatic perinatal brain lesions there were 8 cases (11.4%) 95%CI 4.0-18.8. The differences were confirmed by χ^2 11.5, GL 2, $p < 0.003$.

Conclusions. Fluctuations in blood pressure values during pregnancy, especially in preeclamptic cases, may exacerbate foetal hypoxia and increase the risk of perinatal central nervous system damage. The study underscores the importance of monitoring maternal haemodynamics in preeclampsia to mitigate adverse perinatal outcomes.

Accelerated macrovascular atherosclerosis after preeclampsia: a meta-analysis

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Objective. Preeclampsia leads to a two-to-eight fold increased risk of ischemic heart and cerebral disease. The underlying atherosclerotic process is progressive and starts at a young age. When detected early, preventive medication can be initiated to prevent an ischemic disease later in life. This meta-analysis aims to determine macrovascular prevalence of subclinical atherosclerosis over time in women after preeclamptic compared to non-preeclamptic pregnancies.

Materials and Methods. A systematic search identified studies reporting prevalence of atherosclerosis on CT or ultrasound in both formerly preeclamptic and non-preeclamptic women. Newcastle-Ottawa scale assessed quality. Logistic regression calculated odds ratios (OR) as measure of effect size for atherosclerosis prevalence. The random effects model with pooled results gave the overall odds ratio.

Meta-regression determined effect of maternal age on atherosclerosis prevalence.

Results. Ten studies included 13,177 women with average age 48.7 years (range 33.2-59.5). Four studies used ultrasound (carotid) and six used CT (coronary). Overall, preeclampsia related to increased risk of atherosclerosis (OR 1.57 (95%CI 1.39-1.78)) with a prevalence of 30%. Atherosclerosis prevalence increases more with maternal age in formerly preeclamptic women (> 10% per decade) compared to non-preeclamptic women suggesting accelerated atherosclerosis. This increased risk is significant from age 44 onwards.

Conclusions. Formerly preeclamptic women are at increased risk of early-onset atherosclerosis and have accelerated rates of atherosclerosis at relatively young age. Early risk evaluation with timely interventions should be implemented in the formerly preeclamptic group to reduce the CVD burden.

Patterns of cardiac remodelling in foetuses with late-onset growth restriction and their assessment using speckle tracking foetal echocardiography

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Objective. To investigate the patterns of cardiac remodelling in foetuses with late-onset foetal growth restriction (FGR) and evaluate the foetal cardiac function with respect to the cardiac remodelling phenotype using speckle tracking foetal echocardiography (STE).

Materials and Methods. Prospective study conducted on singleton pregnancies complicated by suspected late-onset FGR. 2D ultrasound clips of the 4-chamber view of the foetal heart were prospectively collected. The offline STE echocardiographic assessment and measurement of the cardiac biometric indices were performed by one single member of the research team.

Results. 54 cases and 166 ultrasound clips were included. Morphometric assessment revealed the presence of three cardiac remodelling phenotypes: phenotype 1, corresponding to a morphologically normal heart (13 cases, 24%); phenotype 2, corresponding to a morphologically elongated heart (23 cases,

43%); phenotype 3, corresponding to a morphologically globular heart (18 cases, 33%). The comparison of the STE parameters showed a higher left ventricular strain in phenotype 1 compared to phenotype 2 [LV MyoGLS (-18.14 ± 3.90 vs -16.74 ± 2.80 , $p = 0.02$), LV EndoGLS (-22.12 ± 4.29 vs -20.34 ± 3.35 , $p = 0.02$)] and a higher LV MyoGLS in phenotype 1 compared to phenotype 3 (-18.14 ± 3.90 vs -15.48 ± 4.15 , $p = 0.01$). Additionally, the RV MyoGLS was higher in phenotype 1 compared to phenotype 2 (-15.94 ± 3.78 vs -13.61 ± 3.91 , $p = 0.01$) and in phenotype 1 compared to phenotype 3 (-15.94 ± 3.78 vs -13.40 ± 4.16 , $p = 0.01$).

Conclusions. This study has shown the existence of three cardiac remodelling phenotypes in foetuses with late-onset FGR. Morphological phenotypes are associated with differences in terms of right and left ventricular strain which can be demonstrated using STE.

Maternal and foetal outcomes in pregnancies from women with congenital heart disease (ACHD)

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Objective. Pregnancies in adult congenital heart defects (ACHD-ESC guidelines) are susceptible of cardiovascular and obstetrical complications. Cardiac dysfunction may compromise utero-placental flow and contribute to impair obstetrical and neonatal outcome. The aim of this study was to evaluate maternal and neonatal outcomes in ACHD according to mWHO classes.

Materials and Methods. This is a retrospective study of pregnancies in ACHD followed at ASST Papa Giovanni XXIII, Bergamo from 2016 to 2023. Data on cardiac, maternal, obstetrical and neonatal outcomes were collected and categorized according to mWHO class. Neonatal and maternal outcomes were analysed by Fisher test. A P-value < 0.05 was considered statistically significant.

Results. 49 pregnancies were included. Mean maternal age at delivery was 30 (19-43). 7 (14.3%), 12 (24.5%), 19 (38.8%) and 11 (22.4%) women were included in I, II, II-III and III

mWHO classes, respectively. A-V septal defects (7; 14.3%), tetralogy of Fallot (9; 18.4%), and moderate aortic stenosis (7; 14.3%) were the most represented. Mean gestational age at delivery was 37+6 weeks (30-41). 49% underwent caesarean section (CS), 58% of these for cardiac indication. 16.3% were complicated by FGR. 6 patients showed a clinical worsening after delivery (12.5%), 2 requiring admission to intensive care unit. There were no maternal deaths. Comparing outcomes according to mWHO classes, class III pregnancies showed a significantly higher risk of iatrogenic preterm birth ($p = 0.02$), elective CS ($p = 0.07$), hypertensive complications ($p = 0.05$) and neonatal respiratory distress ($p = 0.03$) when compared to other classes.

Conclusions. Pregnancy complications in women with CHD are frequent, particularly in higher mWHO classes. In ACHD, pregnancy should be accurately planned and a multidisciplinary counselling should be offered.

Providing anaesthesia for caesarean section surgery to a pompe disease patient

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Background. Pompe disease, alternatively recognized as an acid maltase deficiency or glycogen storage disease type II, is a genetic disease transmitted in autosomal-recessive way. It emerges due to a shortage of the enzyme acid-A-glucosidase within lysosomes. Consequently, PD leads to the buildup of glycogen in multiple body tissues, particularly in skeletal, cardiac, and smooth muscles. The morbidity of PD varies depending on patient's age when the symptoms first appear, the degree of complexity of harm to skeletal, cardiac, and respiratory muscles, and the speed of disease progression.

Case presentation. A 29-year-old pregnant woman, known to have juvenile pompe disease, was admitted for a scheduled caesarean section. Her symptoms first emerged when she was

20 years old. She commenced enzyme replacement therapy with alglucosidase alpha, administered intravenously at a dose of 20 mg/kg over a 5-hour infusion every 2 weeks. The pregnancy was not planned, yet the patient consistently received enzyme replacement therapy throughout the gestation period. However, pulmonary function tests conducted while standing and sitting indicated significant restrictions.

Conclusions. In 1963, the connection between the inherited shortage of the lysosomal enzyme acid A-glucosidase and PD was initially established. This particular enzyme plays a vital role in breaking down glycogen into glucose. Insufficient GAA results in glycogen buildup within lysosomes, primarily within muscle cells, triggering a gradual decline in muscle function.

Correlation of global cardiac sphericity index and neonatal outcomes of appropriate for gestational age fetuses, small for gestational age fetuses and growth restricted fetuses delivered at term in Dr. Jose Fabella memorial hospital: a prospective cohort study

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Objective. To evaluate and compare the Global Cardiac Sphericity Index (GCSI) of AGA fetuses, SGA fetuses, and growth-restricted fetuses scanned at term in the Dr. Jose Fabella Memorial Hospital, Maternal High Risk and to determine the correlation between the GCSI of these three groups of fetuses and their neonatal outcomes.

Materials and Methods. The study prospectively evaluated and compared the global cardiac sphericity index of AGA, SGA, and growth-restricted fetuses. Pregnant women at term seen at the Out-Patient Department and scanned at the Maternal High-Risk Clinic of the Dr. Jose Fabella Memorial Hospital then eventually delivered from March to May 2022 were included.

Results. Global cardiac sphericity index was measured with 147 fetuses (106 AGA, 38 SGA and 3 growth restrict-

ed fetuses). The results indicated that the GCSI of AGA fetuses were higher than that of the SGA and growth restricted fetuses. In this study found that there is significantly higher frequency of abnormal GCSI among SGA and growth restricted fetuses. This study also found that there is no statistically significant correlation between the GCSI measurements of these three groups of fetuses and their neonatal outcomes.

Conclusions. Abnormal global cardiac sphericity index was found in fetuses with an estimated foetal weight < 10th percentile (more specifically in growth restricted fetuses than in those who are just SGA) as compared with appropriate for gestational age fetuses. However, the correlation between an abnormal GCSI in any of these three groups of fetuses and their neonatal outcome needs further investigation.

Postpartum maternal cardiac adaptation in smallness-for-gestational age (SGA) pregnancies and its correlation with biomarkers of cardiovascular risk

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Objective. To evaluate in women at high risk for placental insufficiency maternal cardiac geometry adaptation from the early-third trimester to 6 months postpartum (6MPP), by the occurrence of smallness-for-gestational age (SGA), and to assess the correlation between the maternal cardiac adaptation and cardiovascular biomarkers.

Materials and Methods. A high-risk placental insufficiency cohort was prospectively evaluated at 28 weeks and 6MPP using echocardiography. Structural cardiac parameters included left atrium (LA) and ventricle (LV) volumes, and septum and posterior LV wall thickness. Cardiovascular risk biomarkers were collected at 6 MPP including a lipidic profile, VCAM-1, and NT-proBNP. SGA was defined as birthweight < 10th centile (local curves).

Delta values (28 weeks – 6 MPP) were compared by quantile regression between SGA and AGA, adjusted by maternal BMI.

Spearman correlation was performed between cardiac morphology changes and biomarkers.

Results. 62.3% women were initially nulliparous. Mean maternal age was 35.6 years (SD 4.6).

No significant differences were found in LA and LV volumes between groups. SGA pregnancies had significantly lower BMI-adjusted delta values of the septum thickness (-0.06 *vs* 0.07 mm; *p* = 0.003), LV posterior wall thickness (-0.078 *vs* 0.138 mm; *p* = 0.026), and LV mass (-3.55 *vs* 27.81 g; *p* = 0.002). LV posterior wall thickness at 6 MPP was negatively and significantly correlated with HDL and Apolipoprotein A1 levels whereas a positive significant correlation was found with TG/HDL ratio.

Conclusions. SGA pregnancies exhibited at 6 months postpartum increased LV posterior wall and septum thicknesses, and this finding correlated with an impaired lipid and atherogenic profile.

Haemodynamic adaptation profiles after spinal anaesthesia for caesarean section: an UltraSonic Cardiac Output Monitoring study

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Objective. There is scarce data that allows anaesthesiologists to identify patients who may suffer from side effects and haemodynamic impairment after spinal anaesthesia. To identify baseline characteristics and the trend in haemodynamic variables in patients with poor *versus* normal adaptation. Poor adaptation was defined as a drop in cardiac index (CI) of at least > 20% after spinal anaesthesia. We also sought to study if MAP/HR and SVR follow the same trend in the 'poor adaptation' and 'normal adaptation' groups.

Materials and Methods. Retrospective observational study. USCOM measurements were performed in seven different moments analysing key haemodynamic parameters: CO, SVR, SV, MAP, HR, SMII, PKR. Spinal anaesthesia dosage was standardized, and no preload or preventive ephedrine were administered. Comparisons between groups by ANOVA.

Results. 54 women were enrolled. In the poor adaption group BMI was significantly higher and IUGR fetuses were more frequent. SMII dropped significantly, CI had a significant drop before returning to baseline. Conversely, in the normal adaptation group CI increased without dropping until the end of the surgery, with SVR and PKR showing a significant drop. MAP was reduced until the end of surgery in both groups. Only 52.4% of patients with a MAP/HR ratio < 1.1 had SVR < 1,300 dynes × sec/cm⁵.

Conclusions. Patients with normal adaptation had the greatest variation of haemodynamic parameters to compensate anaesthesia. MAP was not sufficient to describe haemodynamics variation and MAP/HR cannot be a substitute parameter for SVR to identifying patients with vasodilated circulation.

An hypertensive crisis post caesarean section valuated by UltraSonic Cardiac Output Monitoring (USCOM): a case report

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Background. Cardiac output (CO) is a better indicator of uteroplacental flow compared to non-invasive blood pressure (BP) and helps us to untangle the structural and functional changes of pregnant woman's cardiovascular system. Hypotension after spinal anaesthesia for caesarean section (CS) remains a frequent condition but the persistent increase in SVR is an independent predictor for the development of hypertensive disorders in pregnancy.

Case presentation. We performed a haemodynamic evaluation by UltraSonic Cardiac Output Monitoring (USCOM) in patients who underwent CS by standardized anaesthesia and obstetric procedure. This case report relates a 32 years old, 38th WG, BMI 36 kg/m², PROM, transverse presentation, 3 previous CS and 1 abortion, hyperuricemia on therapy, no gestational complications, normal blood tests before surgery. The

patient presented with hypertension before spinal anaesthesia with high SVR and high CO. SVR collapsed after the spinal anaesthesia before returning to high values that persisted at 2h, with the later development of symptomatic hypertension. The USCOM evaluation integrating SVR allowed to start an early antihypertensive therapy and indicate cardiological referral, important actions to prevent postpartum complications. **Conclusions.** Abnormally high SVR values are indicative of hypertension and preeclampsia and other maternal-foetal complications much earlier than any other symptoms or simple BP measurements and can even precede alterations in blood tests. Unrecognized cardiovascular disease causes increased mortality, therefore is important to identify women at risk and personalize therapy tailored on the patient's haemodynamic profile.

Use of antihypertensive medications at discharge and in the immediate postpartum period: observations from a cohort of hypertensive pregnant patients at a Canadian tertiary centre

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Objective. The postpartum period following a hypertensive disorder of pregnancy is an opportunity to mitigate against future cardiovascular morbidity. The objective of this investigation was to determine antihypertensive use following delivery of a hypertensive pregnancy at a Canadian tertiary maternity referral centre.

Materials and Methods. We conducted a retrospective cohort study of 1,085 pregnant patients with hypertensive disorders of pregnancy that delivered at Mount Sinai Hospital, Toronto, Canada from March 2017 to December 2020. Maternal demographics were collected from the electronic medical records system, as well as maternal, perinatal and pregnancy outcomes.

Results. In this cohort of 1,085 hypertensive pregnant patients, median maternal age was 35 years old (31-38), and 56% of patients were nulliparous. Median gestational age at delivery was

36 weeks (32-38), with median Intergrowth birthweight centile of 30 (8-65). Following delivery, 593 patients (55%) were discharged with an antihypertensive agent, of which 276 patients (25%) were prescribed more than 1 antihypertensive agent. In the immediate postpartum period following discharge, 58 patients presented to our Obstetric triage with hypertension concerns; 25 of these were readmitted to hospital. Patients with early-onset preeclampsia during pregnancy were more likely to be discharged with an antihypertensive agent prescription, be discharged with more than one antihypertensive agent prescription, and present to triage with hypertension concerns postpartum, in comparison to patients with late-onset preeclampsia or gestational hypertension ($p < 0.005$).

Conclusions. These findings illustrate the need for continued specialized cardiovascular care in the postpartum period for patients with a history of early-onset preeclampsia.

Nutritional assistance in pregnant women with gestational diabetes mellitus: a literature review

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Gestational diabetes mellitus is characterized by a decrease in glucose tolerance that begins during pregnancy and may persist after childbirth. Risk factors for the development of this condition include the pregnant woman's dietary patterns, obesity, or excessive weight gain. Thus, integrated nutritional support for pregnant women diagnosed with diabetes can provide a significant benefit for the maternal-foetal unit. This study aimed to review the literature on the impact of nutritional interventions in overcoming gestational diabetes mellitus during pregnancy. It is a bibliographic research of the literature review type. Articles were searched in the Scielo and PubMed databases. The inclusion criteria were articles in English or Spanish, published between 2020 and 2024. Fifty-six articles were found, and, according to the criteria, 12 were selected. Diabetes mellitus is the most common met-

abolic disorder in pregnancy and is considered an obstetric complication with a high prevalence, present in 1% to 14% of pregnancies. Therefore, nutritional therapy, with subsequent glycaemic control and weight gain within normal ranges, constitutes an important contribution to reducing maternal and infant morbidity and mortality caused by complications arising from this clinical condition during and after pregnancy, such as miscarriages, preterm births, infections, macrosomia, and congenital malformations. It is deduced from this review that nutritional therapy during pregnancy is essential, as this cycle is guided by physiological changes that require quality and humanized postnatal care. Hence, the involvement of an interdisciplinary and multidisciplinary team in prenatal care is crucial to avoid risks for both the pregnant woman and the baby.

Baroreceptor mediated blood pressure control in women with a history of preeclampsia

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Objective. Preeclampsia (PE) is known to be associated with increased cardiovascular risk later in life. The mechanism linking preeclampsia and future cardiovascular risk is largely unknown. We hypothesize compromised autonomic regulation of blood pressure. We therefore investigated baroreceptor sensitivity (BRS) 5 to 10 years postpartum in women with a history of PE and compared the results with healthy controls.

Materials and Methods. Women were passively tilted from 0 to 60 degrees on a tilt table with continuous beat-to-beat blood pressure and heart rate measurements. The mean BRS was calculated based on a five-minute period following one minute of stabilization before and after head-up tilt.

Results. We included 66 formerly PE patients and 44 healthy controls. At 0 degrees, PE patients exhibit significantly high-

er MAP (104.6 ± 11.6 mmHg) and lower BRS (9.2 ± 3.9 ms/mmHg) compared to controls (88.5 ± 11.1 mmHg; 20.0 ± 7.3 ms/mmHg) ($p < 0.05$). With head-up tilt, blood pressure drop in PE patients is significantly more pronounced (-12.2 ± 8.5 mmHg) compared to controls (-4.4 ± 3.6 mmHg). The BRS modulation range was larger in controls compared with PE patients (mean: -12.6 ± 7.4 ms/mmHg *vs* -4.3 ± 4.0 ms/mmHg) independent of baseline MAP.

Conclusions. Women with a history of preeclampsia have reduced baroreceptor sensitivity and less range to modulate this sensitivity. Resultantly blood pressure drop with passive head-up tilt is more pronounced in formerly preeclamptic women, irrespective of initial blood pressure. This suggests compromised autonomic regulation of blood pressure in women with a history of preeclampsia.

Maternal haemodynamics in placental implantation abnormalities: a pilot study

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Objective. Low-lying and placenta previa are associated to risk for placenta accreta disorders (PAS). Maternal haemodynamic in patients with placental implantation abnormalities has not been yet investigated. During the two last decades some authors shifted the focus from placenta to maternal cardiovascular system to explain the development of growth restriction. Mothers of FGR fetuses show low cardiac output and elevated systemic vascular resistance suggestive of a hypovolemic circulation.

Our aim was to investigate if an altered maternal haemodynamic is associated to a foetal growth drop in pregnancies complicated by placental implantation abnormalities.

Materials and Methods. 33 normotensive patients with low lying placenta, placenta previa associated or not to PAS were

submitted to an evaluation of maternal haemodynamics with USCOM. We then compared maternal cardiovascular profile between patients with a drop in foetal growth (> 1 quartile) from the second to the third trimester or within the third trimester, and patients with regular foetal growth.

Results. All patients showed haemodynamic values within in the normal range. There were no differences in mean arterial pressure (87 ± 8 mmHg *vs* 82 ± 9 mmHg), cardiac output (7.4 ± 1.1 L/min *vs* 7.0 ± 1.0 L/min), systemic vascular resistance (984 ± 139 *vs* 932 ± 173 dynes \times s/cm⁵) between the two groups.

Conclusions. Maternal haemodynamic appears to be normal in pregnancies complicated by placental implantation abnormalities. There were no haemodynamic differences between patients with normal and dropped foetal growth.

Preeclampsia screening in the Georgian population: early prevention outcomes

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Objective. Preeclampsia poses significant risks to maternal health, emphasizing the critical need for early detection and preventive measures. The main aim of the study was to assess the prevalence of preeclampsia risk factors in the Georgian population and evaluate the effectiveness of a comprehensive screening program in identifying high-risk pregnancies.

Materials and Methods. This study investigates preeclampsia screening in a sample of 100 pregnant women within the Georgian population. Employing a comprehensive screening protocol, including medical history, blood pressure assessments, and laboratory analyses, our research aims to assess the prevalence of preeclampsia risk factors and evaluate the effectiveness of early interventions.

Results. From the screening revealed that 80% of the participants exhibited positive results for preeclampsia risk factors. In response to these findings, 90% of the positive-

ly identified cases initiated a low-dose aspirin regimen, a known preventive measure for preeclampsia. Encouragingly, among this group, preeclampsia was successfully prevented in 90% of cases.

The remaining 10% of women who tested positive opted not to initiate low-dose aspirin. Among this subset, half (5%) did not develop preeclampsia, suggesting that factors beyond low-dose aspirin may contribute to preventing preeclampsia in some cases.

Conclusions. The study underscores the significance of early screening and the potential impact of low-dose aspirin in preventing preeclampsia among pregnant women in Georgia. These findings provide valuable insights into the tailored application of preventive measures based on individual risk profiles. Further research with larger cohorts is essential to validate these results and refine screening strategies.

Umbilical vein blood flow volume in dichorionic twin pregnancy

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Objective. Uncomplicated dichorionic twin pregnancies (DCp) may present a slowdown in the growth trajectory usually occurring in the third trimester. The mechanisms underlying this phenomenon and whether it represents a stunted growth or benign physiological adaptation are currently unclear. The aim of the study is to evaluate the umbilical vein blood flow volume (UVQ) in DCp exploring whether growth slowing is associated with reduced blood supply.

Materials and Methods. Women with DCp were enrolled at 20 weeks and evaluated every 4 weeks. UVQ was calculated and compared with that of a local cohort of 255 uncomplicated singleton appropriate for gestational age (AGA) pregnancies. DCp group was further divided into complicated and un-

complicated pregnancies based on the presence of foetal growth restriction and/or intrauterine death.

Results. 100 patients were enrolled, of whom 17 complicated. UVQ, both absolute and normalized for estimated foetal weight, was found to be reduced in the uncomplicated DCp compared to AGA population [39 (IQR 34 - 51) and 188 ml/min (IQR 127-231) at 20 and 36 weeks *versus* 51 (IQR 43-67) and 265 ml/min (221-319), respectively; $p = 0.05$]. No further reduction in UVQ values was found in complicated DCp, compared with uncomplicated ones.

Conclusions. Our data suggest that UVQ is reduced in uncomplicated DCp, thus, suggesting that reduced foetal growth might be an expression of stunted foetal growth.

Genetic predisposition of metabolic disorders in pregnant women with pathological weight gain

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Objective. The pathological gestational weight gain (GWG) is a trigger of postpartum weight retention that leads to overweight and obesity. A rapid increase in body weight due to fat component is associated with the action of metabolically active proteins-adipokines, one of them is leptin. During pregnancy, leptin is additionally produced by the placenta and rapidly rises throughout gestation. It was hypothesized that the leptin receptor gene polymorphism (Gln233Arg LEPR) is related to metabolic changes in pregnancy and the risk of excessive GWG.

Materials and Methods. A total of 97 singleton pregnant women with normal weight were enrolled. Genetic variants of LEPR were analysed by real-time polymerase chain reaction, leptin, lipid, and carbohydrate profile were performed in the first, and third trimesters of pregnancy. The recommended

GWG was diagnosed in 33 (34.0%), insufficient in 19 (19.6%), and excessive in 45 (46.4%) patients.

Results. 20 (20.6%) patients were with AA genotype, 49 (50.5%) – AG genotype, and 28 (28.9%) –GG genotype. The frequency of GG-alleles carriers of the LEPR Gln233Arg gene in a group of excessive GWG in 3 times was higher compared to recommended GWG patients. The inheritance of pathological G-homozygotes increases the risk of excessive GWG in 7 times. LEPR GG polymorphism was significantly associated with hyperlipidaemia, leptin resistance with high leptin serum levels, increased insulin resistance, which was especially manifested in excessive GWG.

Conclusions. Thus, excessive GWG can be seen as a marker of the mother's genotype and genetic predisposition to the development of metabolic diseases after delivery.

Incidence of PIH and other foeto-maternal pathologies related to it

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Objective. UHOG "Mbretresha Geraldine" has the highest number of births in Albania. Our study regarding the incidence of Pregnancy Induced Hypertension (PIH), age group in which PIH is prevalent, influence of PIH on foetal growth and mode of delivery.

Materials and Methods. Data obtained from medical cards during 2019-2020 whom had the diagnosis of PIH. We considered: maternal age group, ultrasound evaluation, doppler velocimetry, and mode of delivery.

Results. The study includes 194 patients diagnosed with PIH, 115 were hospitalized in 2019 and 79 in 2020 in the department of "Abnormal Pregnancy Care"; this represents 14.41% in 2019 and 12.46% in 2020 of all hospitalized cases. Based on maternal age group: 15-24 years old – 21 cases (18.26%) in 2019 and

14 cases (17.72%) in 2020; 25-34 years old – 62 cases (49.57%) in 2019 and 51 cases (64.56%) in 2020; 35-44 years old – 32 cases (27.83%) in 2019 and 14 cases (17.72%) in 2020. Concerning IUGR there were 46 cases (40%) in 2019 and 23 cases (29.11%) in 2020. Doppler velocimetry has been shown to both reduce interventions and improve foetal outcome at risk for IUGR. In 2019, 22 patients (20.75%) and in 2020, 21 patients (30.88%) showed anomaly at doppler velocimetry. The mode of delivery with PIH in 2019 is: 71.3% and in 2020: 81.65% by caesarean section.

Conclusions. PIH has consequences for maternal health and foetal growth, which conditions birth with caesarean section. In Albania PIH is higher in 25-34 age group, because it's given birth at a younger age.

Prevalence-based recommendation for long-term cardiovascular follow-up after preeclampsia

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Objective. Despite increased cardiovascular (CV) disease risks after preeclampsia, international guidelines remain indefinite on the timing and frequency of CV risk assessment in these women. To provide prevalence-based recommendations on systematic follow-up after preeclampsia, we evaluated the age-related prevalence of traditional CV risk factors in former preeclamptic women compared to women with a history of normotensive gestation.

Materials and Methods. We used cross-sectional cohort data of women with a history of preeclampsia and a control group of women with a history of normotensive pregnancy up to thirty years postpartum. We assessed measures of cardiovascular risk constituents at different age intervals including the prevalence of hypertension, diabetes mellitus, hypercholesterolemia, obesity, insulin resistance, chronic kidney disease and albuminuria.

Results. We included 1,040 women after preeclampsia and 518 controls. Higher development rates of CV risk factors were

observed after preeclampsia as compared to normotensive gestation (either hypertension, diabetes mellitus or hypercholesterolemia (or combined): aOR 2.4 (95%CI 1.8-3.1)/aHR 2.6 (95%CI 2.1-3.2). With ageing, the prevalence of hypertension increased more steeply after preeclampsia (P-value interaction 0.044). Suffering hypertension, diabetes mellitus and/or hypercholesterolemia occurred on average 8 years earlier after preeclampsia (39 ± 9 years) than normotensive gestation (47 ± 8 years).

Conclusions. The development of CV risk factors occurs almost a decade earlier in former preeclamptic women compared to women after normotensive gestation, predominantly, but not exclusively, due to the early and accelerated development of hypertension. Systematic CV risk (re-)assessment is recommended at least five yearly in former preeclamptic women from 35 years of age onwards.

Cardiovascular health of women 10 to 20 years after preeclampsia considering the possible effect of PETN treatment during pregnancy (PAVA study)

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Objective. Women developing preeclampsia or foetal growth restriction during pregnancy are at higher risk for cardiovascular diseases later in life. We aimed to analyse cardiovascular health of women 10-20 years after affected pregnancies in comparison to women after uneventful pregnancies. In addition, we assessed a potential long-term effect of the NO-donor pentaerythrityltetranitrate (PETN).

Materials and Methods. Women 10-20 years after severe PE, including women receiving PETN during pregnancy and controls were assessed for baseline clinical data and cardiovascular function by transthoracic echocardiography, VICORDER and USCOM. SPSS was used for statistical analysis.

Results. 53 participants after complicated pregnancies (13 with former PETN intake) and 51 controls were recruited for follow-up at an average of 14 years after index pregnancies. Compared to controls, women after preeclampsia or foetal

growth restriction had a significantly higher incidence of arterial hypertension (13.7% vs 41.5%, $p < 0.001$), and were more likely to be hypertensive (41.2% vs 67.30%, $p = 0.008$). There were no differences in cardiovascular function observed. Affected women with PETN intake during pregnancy showed lower mean values for right atrial area and ventricle in comparison to controls and also to affected women without former medication.

Conclusions. In conclusion, our study results confirm that the risk of cardiovascular diseases is increased in women after preeclampsia and/or foetal growth restriction compared to women after uneventful pregnancies. Contrary to our expectations, no major cardiovascular changes were observed in our cohort 10-20 years post pregnancy. The observed differences found in right heart dimensions were within reference ranges and should be interpreted with caution.

Evaluating trajectories of placental growth factor (PIGF) and pregnancy outcomes following multimodal screening for preeclampsia

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Objective. Multimodal screening with placental growth factor (PIGF) between 11-14 weeks' gestation is a better predictor of preeclampsia than clinical history alone. PIGF also accurately predicts preeclampsia up to 36 weeks' gestation. The objective of this study was to evaluate PIGF levels after multimodal screening to determine if different PIGF trajectories are associated with adverse pregnancy outcomes.

Materials and Methods. We linked data from a single centre first trimester multimodal preeclampsia screening and aspirin prophylaxis study between 30 October 2019 and 10 June 2021 with data from a parallel study evaluating PIGF during the second/third trimester. We used mixed effects models to examine different PIGF trajectories and time-to-event regression models to evaluate associations with pregnancy outcomes, including preterm birth and preeclampsia. We assessed effects of aspirin on PIGF trajectories and pregnancy outcomes.

Results. Of 1,057 patients enrolled in multimodal preeclampsia screening, 411 had additional PIGF testing in the second/

third trimester. Repeat testing was associated with a high-risk screen result, previous preeclampsia, assisted reproductive technology, and older age. High-risk patients had lower PIGF levels at subsequent tests ($\beta = -98.2$ pg/mL; 95%CI -134.4 to -62.1; $p < 0.01$) and were more likely to deliver preterm (HR = 3.20; 95%CI 1.90-5.39; $p < 0.01$). Different trajectory patterns of PIGF were seen between groups, and PIGF was positively associated with gestational age at delivery.

Conclusions. Multimodal preeclampsia screening outcomes at 11-14 weeks' gestation are associated with distinct PIGF trajectories in the second/third trimester and clinical outcomes. These findings suggest PIGF trajectories can aid the prediction of adverse pregnancy outcomes.

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Study protocol for the randomized controlled TREASURE trial: timely recovery after subclinical heart failure

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Objective. Heart failure (HF) significantly impacts women, with half experiencing diastolic dysfunction and preserved ejection fraction (HFpEF). Anatomically, this is paralleled by absolute (Left Ventricular Hypertrophy (LVH)) or relative cardiac hypertrophy (concentric hypertrophy, HF stage B). Preeclampsia (PE) is accompanied with cardiac hypertrophy, with 40% remaining after delivery. Focusing on the early HF phase, pharmacological interventions, mainly angiotensin-converting enzyme (ACE) inhibitors, show promise in slowing progression towards symptomatic HF in the high-risk population of women. We propose a randomized controlled trial to assess the effectiveness of ACE inhibitors *versus* standard care) in reversing asymptomatic heart failure (HF stage B) and/or diastolic dysfunction during a two-year open-label treatment period for formerly preeclamptic women.

Materials and Methods. We will recruit women 18 years and older with asymptomatic HF and/or diastolic dysfunction, 0.5

to 30 years postpartum, from cardiovascular risk management screening at Maastricht University Medical Center+. A total of 130 women will be 1:1 randomized for perindopril or no medication. Outcome measures will include cardiac echocardiographic parameters, blood pressure, quality of life, metabolic factors, endothelial function, and novel biomarkers.

Results. The two-year study with biannual follow-ups will include advanced echocardiography, questionnaires, blood pressure measurements, and laboratory screening. Anticipated results expect substantial improvement in the perindopril group, confirmed by echocardiography with a left ventricular mass index $< 95 \text{ g/m}^2$, relative wall thickness ≤ 0.43 , left ventricular ejection fraction $\geq 55\%$, and maintained normal diastolic function.

Conclusions. This trial aims to evaluate if ACE inhibitors treatment can normalize HF stage B and/or diastolic dysfunction in formerly preeclamptic women.

Hypertensive disorders and pregnancy outcomes in oocyte donation pregnancy in comparison with *in vitro* fertilization group

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Objective. The use of oocyte donation (OD) is in important growth in last decades, became an inseparable part of assisted reproductive technology (ART) for infertile women wishing pregnancy.

The objective is to evaluate the impact of OD on hypertensive disorders and maternal-foetal outcomes compared with IVF (FIVET-ICSI) group.

Materials and Methods. Retrospective analysis of OD pregnancy follow-up from 2016-2023, obtained in Center of ART of Careggi University Hospital, Florence. The study population included 512 (35%) OD pregnancies, 925 (65%) FIVET-ICSI pregnancies.

Results. Overall of preeclampsia diagnosis was in 54 (10.5%) OD and 68 (7.4%) FIVET-ICSI pregnancies (confidence value = 95%, $p = 0.037$). For OD, vaginal delivery (VD) was observed

in 10 (18%); the caesarean section (CS) was found in 44 (82%) of preeclampsia cases. VD in FIVET-ICSI group was 17 (26%), CS was in 51 (75%) preeclampsia cases (no statistical significance).

OD complicated with preeclampsia, 25 (38%) newborns were delivered before 36 weeks, and it was found low birth weight in 49 (75%) newborns. 19 (29%) newborns were hospitalized in neonatology department; 1 (2%) case of intrauterine foetal death and 2 (3%) cases of peripartum neonatal death were observed.

Conclusions. OD has major risk of hypertensive disorders and maternal-perinatal complications compared with FIVET-ICSI; otherwise no statistic significance was observed for delivery type, which might be explained by general higher risk of caesarean section in preeclampsia.

Early-life consequences of hypertensive disorders during pregnancy: an exploration of the retinal microvasculature in young children

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Objective. Assessing the link between prenatal exposure to maternal Hypertensive Disorders during Pregnancy (HDP) and the microvasculature in early childhood.

Materials and Methods. This study is part of the ENVIRONAGE birth cohort study in Flanders, Belgium. Diagnosis of HDP (n = 121) was based on women's medical records obtained after birth and categorized according to the ISSHP criteria into four categories: *i.e.*, essential hypertension (EH = 25), gestational hypertension (GH = 30), early-onset (EPE = 22) or late-onset preeclampsia (LPE = 44). This group was matched to a reference group consisting of children born after pregnancies without HDP (non-HDP; n = 242). In children aged 4 to 6 years, retinal vessel diameters and arteriolar curvature were assessed using a non-mydriatic retinal camera (Canon CR2-plus). Concurrently, skin

perfusion was examined through laser Doppler technology during heat-controlled provocation (Periflux6000). Linear mixed effect models adjusted for relevant covariates were applied.

Results. Compared to non-HDP, a negative association was found between the average arteriolar diameter and HDP (β -2.40 μm ; 95%CI -5.20 to 0.32). Further analysis within distinct categories revealed a negative association between vascular curvature in children born after early-onset preeclampsia (β -0.015 μm ; 95%CI -0.023 to -0.007) compared to children without HDP.

Conclusions. Our results suggest an impaired retinal microvascular structure in young children born after HDP compared to non-HDP. These observations underscore the potential long-term impact of HDP on microvascular health.

Haemodynamic evaluation in pregnancies complicated by T1DM (Type 1 Diabetes Mellitus): differences in LGA (Large for Gestational Age) vs AGA (Appropriate for Gestational Age) newborns

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Objective. Currently few data about maternal haemodynamic in pregestational diabetes are available. Our aim was to study maternal haemodynamic in T1DM patients and to define whether there is a relationship between haemodynamic parameters and foetal overgrowth.

Materials and Methods. A prospective case-control study comparing 49 T1DM women referred to our Maternal-Foetal Unit between 2018 and 2023 and 128 controls was conducted. All patients had a BMI < 30 kg/m² and a good glycaemic control in periconceptional period and during all gestation. Haemodynamic assessment was performed by ultrasonic cardiac output monitor (USCOM) at five intervals: 9-16, 16-24, 24-30, 30-35 and after 36 weeks. INES charts were employed to evaluate newborn's weight centile.

Results. From the first evaluation until term Cardiac output (CO) and INO (Inotropic Index) were lower in T1DM than controls; TVR (Total Vascular Resistance) were higher from the third evaluation. 12/49 newborns were LGA (24%), 37/49 (76%) were AGA. CO was higher in LGA group than in AGA group from the second evaluation: 6.93 ± 1.38 vs 5.9 ± 1.02 ($p < 0.03$) at 16-24 weeks; 7.29 ± 1.72 vs 6.10 ± 0.85 ($p < 0.04$) at 24-30 weeks; 6.70 ± 1.29 vs 5.74 ± 0.829 ($p < 0.02$) at 30-35 weeks. At the logistic regression the only parameter significantly associated with foetal macrosomia was the CO at 24-30 weeks.

Conclusions. Women with T1DM have significant differences in haemodynamic adaptation respect to normal pregnancies despite a good metabolic control. Maternal CO should be considered as a significant variable that influences foetal growth in diabetic pregnancies.

Long-term reduction of endothelial glycocalyx thickness 6 years after preeclampsia

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Objective. The endothelial glycocalyx (EG) is a complex structure composed of proteoglycans, glycoproteins, and glycolipids that extends from the surface of endothelial cells into the vascular lumen. It plays a critical role in maintaining homeostasis by acting as a barrier, regulating vascular permeability, and influencing various signalling pathways.

In the present study we aimed to evaluate EG thickness in women after a pregnancy complicated by preeclampsia (PE) *vs* those with a healthy pregnancy.

Materials and Methods. Sublingual capillaries were evaluated *in vivo* by side stream dark field microscopy. Eighteen women with previous normotensive pregnancies and 31 with PE on average 6 years after their index pregnancy participated in the study. The width of the EG permeable to red blood cells (PBR) as a measure of EG thickness and the percentage of

vessels filled with red blood cells $\geq 50\%$ of the time indicating actual microvascular perfusion, were calculated.

Results. Women who suffered from PE had a significantly increased global PBR value (3.35 *vs* 3.02 micron, $p = 0.031$), suggesting a reduced EG thickness. No significant differences were observed concerning microvascular perfusion, although a trend towards a decreased perfusion was observed in women with PE.

Conclusions. EG is implicated in the regulation of vascular permeability and inflammation. These factors have been implicated in the pathogenesis of PE. Disruption of the EG could contribute to abnormal placental perfusion with the release of factors that may contribute to the development and progression of PE. EG impairment may persist years after pregnancy, leading to long-term cardiovascular complications.

Longitudinal changes of systemic vascular resistances in pregnancies complicated by hypertensive disorders and/or foetal growth restriction

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Objective. To study the longitudinal trend of maternal systemic vascular resistances (SVR) in pregnancies complicated by hypertension (HDP) and/or foetal growth restriction (FGR).

Materials and Methods. Singleton pregnancies were enrolled at the first trimester screening. SVR was assessed by USCOM® at each trimester of pregnancy. After the follow-up at delivery, our population was divided, according to the complications in chronic hypertension (CH), HDP with appropriate for gestational age fetuses (HDP-AGA), HDP associated with foetal growth restriction (HDP-FGR), isolated FGR (i-FGR). The control group was recruited among uneventful pregnancies of this cohort. We performed a longitudinal Bayesian multivariate mixed effects model, corrected both for pre-gestational BMI and gestational age at diagnosis.

Results. In this cohort of 519 patients, we observed 24 cases of CH, 19 HDP-AGA, 3 HDP-FGR, 12 i-FGR. The SVR of these cases were compared with 40 randomly selected controls. The SVR showed the same longitudinal trend in all groups, with an average decrease (-164.9, 95%CI -214.3 to -113) from the first trimester to the second, and a smaller difference between the first and the third trimester (-54.4, 95%CI -105.5 to -2.6). This trend of SVR was similar in i-FGR and controls, while SVR was higher and comparable in HDP-AGA and CH. The HDP-FGR showed the highest mean increase (+549.7, 95%CI 252.8-856.2) compared with controls.

Conclusions. The trend of SVR during pregnancy is the same in physiological pregnancies and in those complicated by HDP and/or FGR. The HDP-FGR group has the highest values starting from the first trimester.

Correlation between maternal haemodynamics and foetal growth velocity in physiological singleton pregnancies

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Objective. In uncomplicated pregnancies, cardiac output (CO) changes through trimesters are positively associated with neonatal weight. The aim of this study was to investigate the relationship between maternal haemodynamic parameters and foetal growth velocity in different stages of pregnancy.

Materials and Methods. This was a prospective observational study that included 58 physiological singleton pregnancies. Patients were enrolled in the first trimester and underwent haemodynamic assessment with Ultrasonic Cardiac Output Monitor (USCOM) at 12, 20, 30 and 35 gestational weeks. Ultrasound assessment of foetal biometry and Doppler velocimetry was performed at 20, 30 and 35 weeks. Data were analysed with a univariate linear regression model.

Results. The model for the estimated foetal weight (EFW) daily increase (grams) between 20 and 30 gestational weeks showed an increase in foetal growth velocity for each unitary increase of maternal CO (coeff 0.52, $p = 0.031$). The rise was even more significant between 30 and 35 gestational weeks (coeff 2.44, $p = 0.005$) together with inotropy (coeff 9.14, $p = 0.04$). Also Stroke volume (SV) and umbilical vein blood flow were directly related to EFW daily increase (coeff 0.019 and 0.06, $p = 0.025$ and 0.03), although the impact in the same time lapse was inferior.

Conclusions. This study remarks the influence of maternal haemodynamics in determining foetal growth velocity, especially during the third trimester of pregnancy.

The risk of possible surgical complications in caesarean section

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Objective. The incidence of caesarean section (C/S) is growing every year worldwide, from 7% to 21% respectively in 1991 and 2022. At UHOG “Mbretresha Geraldine” the incidence is higher than in world, up to more than 40%. The most frequent indication of C/S is dystocia delivery, post C/S status and delivery arrest.

We present a review of contemporary literature regarding surgical risks during C/S and the risk evaluation for Albania.

Materials and Methods. Analysis of guidelines and contemporary studies regarding surgical risk of C/S and their medical and/or surgical management. We compare these studies with our local data.

Results. Risk of complications in C/S is respectively 6% in scheduled C/S and 15% emergency C/S. There is a higher rate,

almost 32% on C/S that is done with advanced dilatation (8-10 cm). Hysterectomy post-C/S due to uterine haemorrhage at UHOG is from 0.26% in 2012 to 0.12% in 2022. According to WHO, endometritis affects 12-15% of delivery with C/S, meanwhile at UHOG it affects 1.24%; surgical wound infection occurs in 4-12% of C/S, while at UHOG it affects 0.5%. Studies have shown that after birth with selective C/S there is less endometritis compared to those after a period of labour activity, especially prolonged over 12 hours. The incidence for bladder injury is from 0.001% up to 0.13%, compared to 0.07% at UHOG; 70% of urethral injuries are not diagnosed intraoperative.

Conclusions. C/S is a procedure with major surgical complications risks, due to this every patient should be evaluated carefully for intraoperative and postoperative risk.

Correlation between foetal growth velocity and birthweight in a cohort of late term singleton pregnancies

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Objective. The aim was to investigate the impact of foetal growth velocity in different stages of pregnancy on birthweight.

Materials and Methods. This is a retrospective observational study which included women with late-term singleton pregnancies who delivered between 40+6 and 42+1 weeks from 2021 to 2023 and underwent ultrasound scans at 20, 30 and after 40 weeks. The analysis focused on daily estimated foetal weight (EFW) increase between 20 and 30 and 30 and 41 weeks and its correlation with birthweight, expressed in grams and percentiles. A linear univariate regression analysis was performed.

Results. We collected 414 patients. The correlation between EFW daily increase and birthweight between 20-30 and 30-41 weeks was R 0.42 and 0.61 ($p < 0.01$). At univariate linear

regression, EFW daily increase between 30-41 weeks had a major impact on birthweight percentile than that between 20-30 weeks (coeff 4.67 and 1.01, $p < 0.001$). When considering birthweight <10th pc, only EFW daily increase between 30-41 weeks was significantly associated (coeff 0.57, $p = 0.003$). For birthweight > 90th pc, the association was higher for EFW daily increase between 20-30 than 30-41 weeks (coeff 2.02 and 1.43, $p 0.02$ and 0.003).

Conclusions. The foetal growth velocity in third trimester has a major impact on birthweight than that between the second and third trimester, and this is particularly true for small for gestational age babies. However, in case of large for gestational age neonates, growth velocity between 20-30 weeks seems to have an equally or even higher impact on birthweight than that between 30-41 weeks.

Adverse foetal outcomes in patients with increased risk of preterm preeclampsia in the first trimester of pregnancy: a prospective study

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Objective. To assess the rate for placenta-mediated adverse pregnancy outcomes (preeclampsia, preterm birth PTB, small for gestational age SGA) in women at high risk of preterm preeclampsia in the first trimester and to evaluate a possible association between placental dysfunction and foetal abnormalities.

Materials and Patients. Pregnant patients were offered first trimester screening for preterm preeclampsia based on the Fetal Medicine Foundation algorithm; with a risk score $\geq 1:150$ were recommended to use aspirin (150 mg/day) from screening until 36 weeks.

Between November 2022-October 2023, 975 patients were enrolled. 162 patients (16%) screened positive for preeclampsia. From this cohort, we analysed 400 pregnancy outcome records: 76 at high risk (HR) for preeclampsia, 324 at low risk (LR).

Results. HR women showed higher rate of preterm preeclampsia (2.63%) compared to LR women (0.3%). The rates of gestational hypertension (11%) and SGA (14.5%) were also higher in the HR group (respectively 2.5% and 9.2% in the LR group). The HR group showed a higher rate of early and late PTB (1.3% and 11% vs 0.9% and 3.1% in LR group). Congenital anomalies in euploid foetuses were more frequent in HR patients (7.9%) compared to LR ones (4.6%).

Women identified at HR of preterm preeclampsia are also at increased risk of other placenta-mediated adverse pregnancy outcomes (PTB, SGA); they may benefit from a higher surveillance care pathway.

Conclusions. The risk of foetal structural anomalies is greater in HR women: we recommend a careful foetal anatomical ultrasound evaluation in the first and second trimester to early identify foetal structural anomalies.

Preconception physical activity alters the cardiovascular profile of women at risk for gestational hypertensive disorders in a profile-specific way

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Objective. To evaluate the effect of physical activity on the cardiovascular functions of pre-conceptual women at risk for gestational hypertensive disorders (GHD) in a subsequent pregnancy.

Materials and Methods. A non-invasive haemodynamics assessment of arteries, veins and heart was performed on 40 non-pregnant women with a history of complicated pregnancy or trying to conceive with co-morbidities. Measurements of electrocardiogram Doppler ultrasound, impedance cardiography and bio-impedance spectrum analysis were taken before and after they engaged in physical activity (30-50 min, 3x/week) for a period of 4-6 months. Pre- and post-activity parameters were compared using the two-sided paired Student's t-test or the Wilcoxon signed-rank test depending on the normality of the data.

Results. After physical activity, the total peripheral resistance (TPR), diastolic blood pressure and mean arterial pressure

decreased in the total study population, without changing cardiac output (CO). However, in 42% (9/21) of women categorized in high or low baseline CO (> P75 or < P25 resp.) a shift in CO was observed towards the normal reference interquartile range (P25-P50). This was associated with improved hepatic venous and central arterial haemodynamic functions. Similar changes in TPR occurred in 38% (11/29) of women classified into low or high baseline TPR.

Conclusions. As shown in pregnancy, output- or resistance-dominant cardiovascular profiles already exist prior to conception. This study illustrates that physical activity in the pre-conceptual period shifts high or low CO and/or TPR towards the normal midrange, allowing women at risk for GHD to start a subsequent pregnancy with a more gestation-adaptable cardiovascular system.

Perinatal outcomes in pregnancies complicated by late-onset foetal growth restriction undergoing induction of labour

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Objective. To observe adverse perinatal outcomes in a population of pregnant women with late-onset FGR undergoing induction of labour.

Materials and Methods. We enrolled 66 pregnant women with late-onset FGR who underwent induction of labour with misoprostol. Before delivery we collected data about their last ultrasound scan to obtain the estimated foetal weight and maternal haemodynamic evaluation with USCOM method.

Results. 24 patients underwent vaginal instrumental deliveries or urgent C-section for non-reassuring cardiotocography during labour. A higher proportion of multiparous women developed adverse perinatal outcomes (96% vs 64%, $p = 0.004$), furthermore these patients showed an increased BMI (27 ± 3.3 vs 25 ± 3.1 , $p = 0.03$) compared to patients with uncomplicated

outcomes. The neonatal birth weight percentile appears to be significantly lower in the first group of patients (5 ± 5.3 vs 11 ± 13.2 , $p = 0.05$) with 88% of cases below the 10th percentile (88% vs 62%, $p = 0.03$). Maternal haemodynamic evaluation showed increased values of mean arterial pressure (MAP) (88 ± 12.2 vs 82 ± 8.9 , $p = 0.01$), systemic vascular resistances (SVR) (1072 ± 251.7 vs 942 ± 216.9 , $p = 0.03$) and PKR (23 ± 7.9 vs 20 ± 6.6 , $p = 0.05$) in patients who had worse outcomes. ROC curve analysis was performed for BMI and haemodynamic parameters to test the predictive capacity of these variables in identifying patients at risk of develop adverse perinatal outcomes.

Conclusions. BMI (OR 4.25, $p < 0.01$) and SVRI (OR 16.88 $p < 0.01$) seem to be independent predictors of adverse perinatal outcome in pregnancies with FGR underwent induction of labour.

Maternal haemodynamical adaptation in a pregnancy with post-radiotherapy cardiopathy and dysmetabolism

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Objective. To evaluate the cardiovascular adaptation in case of maternal heart-disease associated with dysmetabolism.

Materials and Methods. We present the case of a 44-year-old woman affected by post-radiotherapy cardiopathy, characterized by double valvulopathy (moderate aortic-mitralic regurgitation), mild systolic and moderate diastolic dysfunction (TAPSE-16mm), and increased pulmonary pressure (PAPS-42 mmHg). The patient conceived via *in vitro* fertilization and was referred to our tertiary centre at 13 weeks of gestation. Baseline NYHA class was II-III. The patient presented several co-morbidities: chronic hypertension, impaired glucose tolerance and class II obesity. At the first trimester scan, the uterine arteries mean pulsatility (mean-UtAPI) index was above 95^o percentile. Haemodynamic assessments were performed with USCOM device revealing a hypodynamic pattern (5.8 CO, 1,232 RVS, 70 SV). Introducing insulin for the dysmetabolism, along with

a regimen of diuretic, betablocker, acid acetylsalicylic and low-molecular-weight-heparin, we observed significant improvements at the following evaluation at 23 weeks. There was a significant reduction in the RVS (872), an increase of both CO (7.3) and SV (88), an improvement of diastolic function (TAPSE-19 mm) and a reduction of PAPS (30-mmHg) as well as normalization of the uteroplacental flow (mean-UtA PI71^o percentile).

Results. Pregnancy progressed without any obstetrical or maternal complication. Delivery was expedited at 36 weeks of gestation. No complications were observed during the post-partum period. The mother was discharged on the 9th day after delivery with good haemodynamic compensation, along with her baby.

Conclusions. Metabolic homeostasis is of paramount importance in the cardiovascular adaptation during pregnancy, even in case of severe maternal heart disease.

Preconception physical activity should be continued during pregnancy in women at risk for gestational hypertensive disorders

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Objective. To evaluate the long-standing effect of preconception physical activity on the cardiovascular functions of women at risk for gestational hypertensive disorders (GHD) in their first trimester of pregnancy.

Materials and Methods. A non-invasive haemodynamics assessment of arteries, veins, and heart was performed on 26 women at risk for developing GHD at three different time points: 1) preconception (baseline), 2) preconception following the advice of performing physical activity (30-50 min, 3x/week) for a period of 4-6 months, 3) at approximately 12 weeks of gestation in the subsequent pregnancy. Measurements of electrocardiogram Doppler ultrasound, impedance cardiography, and bio-impedance spectrum analysis were compared using the two-sided paired Student's t-test or the Wilcoxon signed-rank test, depending on the normality of the data.

Results. At baseline, 57.7% (15/26) of the total study population showed an aberrant cardiac output (CO), being either too low (n = 9) or too high (n = 6) (< P25 or > P75 resp.). After physical activity, in 40% (6/15) of these women, a shift in CO was observed towards the normal reference interquartile range (P25-P50). However, the beneficial effect of preconception physical activity on CO was only maintained in 2 women at the first-trimester measurement, with both being initially categorized in the high CO group at baseline.

Conclusions. Preconception physical activity improves CO in women with an aberrant cardiovascular profile who are at risk for developing GHD. However, since this is not a permanent feature, it is essential that these women continue to exercise during pregnancy in order to maintain a more gestation-adaptable cardiovascular system.

Arterial stiffness and endothelial function after preeclampsia: can they predict the outcome of the subsequent pregnancy?

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Objective. In this longitudinal prospective cohort study, we aim to investigate the association between vascular function after preeclampsia (PE) and recurrence of gestational hypertensive disorder (GHD). We hypothesise that women with more pronounced vascular dysfunction after PE, have a higher recurrence risk on GHD in the subsequent pregnancy.

Materials and Methods. Vascular function was measured in the postpartum period after a first event of PE. Arterial stiffness was assessed by carotid-femoral pulse wave velocity (cfPWV), augmentation index (Aix) and heart rate-corrected augmentation index (Aix75). Endothelial function was determined by flow-mediated dilatation (FMD), modified FMD (mFMD) and low-flow mediated constriction (L-FMC). Vascular function was compared between women with and without recurrent GHD (Mann-Whitney U test).

Results. Forty-nine patients presented with PE. Average post-partum period for measurement of vascular function was 6.2 months (IQR 6.4). The average pregnancy interval was 31.1 months (12.2-68.5). Thirty-seven (75.5%) patients remained normotensive in their subsequent pregnancy, while 12 patients developed GHD (of which 7 PE).

In the GHD group, cfPWV, Aix and Aix75 was significantly higher compared to patients that remained normotensive (respectively 33.29 *vs* 22.31; $p = 0.021$ – 35.29 *vs* 20.90; $p = 0.002$ – 36.75 *vs* 20.42; $p = 0.000$). L-FMC was significantly lower in GHD compared to the normotensives (11.90 *vs* 23.37; $p = 0.007$). No significant differences could be found for FMD and mFMD.

Conclusions. In our study, vascular dysfunction after PE is associated with GHD in the following pregnancy. Measuring vascular function after PE might be helpful in evaluating the recurrence risk of GHD.

The role of umbilical vein blood flow assessment in the prediction of foetal growth: a prospective observational cohort study

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Objective. To evaluate the umbilical vein blood flow volume (UV-Q) in SGA fetuses and in FGR, and to explore the correlation between UV-Q and foetal growth velocity (FGV). Secondly, the capacity of UV-Q and FGV in predicting adverse perinatal outcome (APO) and iatrogenic preterm birth were assessed.

Materials and Methods. 122 women were enrolled (64 SGA and 58 FGR according to Delphi consensus criteria). At the time of diagnosis foetal biometry and Doppler assessment, including absolute UV-Q and normalized for estimated foetal weight (UV-Q/EFW) and abdominal circumference (UV-Q/AC) were considered. The FGV was calculated from the difference between the EFW calculated in two consecutive sonographic evaluations. The pregnancies were followed until delivery and maternal-neonatal outcomes were collected.

Results. When compared to SGA and reference ranges, FGR had significantly lower UV-Q, UV-Q/EFW, and UV-Q/AC.

The FGV had a positive significant correlation with UV-Q ($r = 0.46$), UV-Q/AC ($r = 0.43$), and BW ($r = 0.56$).

The multivariable logistic regression analysis showed that UV-Q ≤ 0.65 MoM (aOR = 3.5) and FGV ≤ 0.63 MoM (aOR = 3.0) were independently associated with the occurrence of APO; UV-Q ≤ 0.60 MoM (aOR = 5.2) and FGV ≤ 0.63 MoM (aOR = 3.6) were independent predictors of iatrogenic preterm birth. This was true both for SGA and FGR.

Conclusions. The UV-Q might have a potential role in identifying fetuses with FGR and to predict foetal growth at the subsequent biometric evaluation. UV-Q and FGV are independent predictors of iatrogenic preterm birth and APO in a population of small fetuses, regardless of Delphi consensus criteria. These results encourage future studies on the predictive value of this parameter.

First trimester screening program for preterm preeclampsia prediction in an Italian obstetric population and aspirin prophylaxis: our preliminary results

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Objective. Our objective was to assess the performance of a combined screening test for preeclampsia in the first trimester and the prophylactic use of low-dose aspirin.

Materials and Methods. Prospective ongoing study of women attending our hospital for the first-trimester screening of aneuploidies, between November 2022 and October 2023 (n = 975). Multiple pregnancies and foetal abnormalities were excluded. First-trimester combined screening for preterm preeclampsia was performed using the Fetal Medicine Foundation algorithm, that includes maternal characteristics, biophysical and biochemical biomarkers. High-risk was defined as a risk \geq 1:150 of preterm preeclampsia (before 37 weeks), in which cases low-dose aspirin (150 mg) was offered to these women from screening until 36 weeks.

Results. From the 975 enrolled participants, the majority were caucasian (n = 932, 95.6%) and nulliparous (n =

658, 51.7%). 162 patients (16,6%) screened high-risk for preeclampsia, and 95% agreed to start a low-dose aspirin regimen. We analysed obstetric outcomes of the first 300 women enrolled: no cases of early-onset preeclampsia (< 34 weeks) were found; the rate of preterm preeclampsia (< 37 weeks) was 1.6% and total preeclampsia was diagnosed in 2.3% of women compared with 0.5% rate of early preeclampsia and 3.2% of total preeclampsia before the implementation of screening.

Conclusions. There was a lower incidence of early, preterm and total preeclampsia, after the introduction of universal screening and prophylactic use of low-dose aspirin. The association of a first-trimester combined screening model and aspirin prophylaxis appears to be useful in predicting and reducing the incidence of preeclampsia, in a routine care setting.

Management of a high-risk pregnancy associating autoimmune diseases, chronic hypertension, prediabetes and inherited thrombophilia

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We report the case of a 34 years old woman that came for preconceptional evaluation after 2 first trimester miscarriages. She was known with Graves' disease, chronic anaemia, vitiligo, hypertension, PCOS and overweight, both her parents had hypertension and ischemic heart disease. She was on treatment with L-thyroxine and ACE-inhibitor. She was referred to a haematologist that diagnosed Biermer anaemia and Factor V Leiden gene mutation; B12 therapy was started. Other preconceptional recommendations were diet, changing ACE-inhibitor to α metil-dopa, low dose aspirin, metformin, folic acid. Her pregnancy was followed-up by a multidisciplinary team. Vitamin D, Mg, Ca and low-molecular-weight-heparin were added. She was twice admitted for threatened abortion thus natural micronized progesterone was started. At 35 weeks foetal growth restriction was diag-

nosed, foetal wellbeing was monitored by Doppler velocimetry until delivery at 39 weeks. The neonate, 2,570 g, needed no admission in the neonatal intensive care unit. Both were discharged after 4 days.

The pregnancy outcome was improved due to the compliance of the patient to all treatment options beginning with diet and ending with self-administered low-molecular-weight-heparin and due to the prenatal care offered by the multidisciplinary team. This pregnancy didn't complicate with abortion, preterm birth, acute foetal distress, preeclampsia, abruptio placentae or thromboembolic accidents. The only complication that could not be avoided was foetal growth restriction.

In such complex associations of diseases there might be a risk of overtreatment in order to minimised maternal, foetal and neonatal risks.

Non-invasive maternal haemodynamics for the classification of pregnancies complicated by foetal growth restriction

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Objective. To verify whether the temporal cut-off of 32 weeks' gestation or the possible presence of hypertensive disorders of pregnancy (HDP) are effective in identifying maternal haemodynamic differences in pregnancies complicated by foetal growth restriction (FGR).

Materials and Methods. A prospective study conducted at three referral centres since November 2019. Singleton pregnant women underwent non-invasive maternal haemodynamic evaluation by USCOM device at FGR diagnosis. Comparisons between early- and late-onset FGR among the entire study cohort, FGR associated with HDP (FGR-HDP) and isolated FGR (i-FGR) were performed. In addition, early-onset FGR-HDP and i-FGR and late-onset FGR-HDP and i-FGR were compared. Finally, comparison between FGR-HDP and i-FGR was performed.

Results. During the study period, 213 pregnant women were enrolled. Early-onset FGR showed higher mean arte-

rial pressure (MAP) and systemic vascular resistance (SVR) and lower stroke volume (SV) than late-onset FGR. Both comparisons between early- and late-onset FGR-HDP and i-FGR did not show any statistically significant difference. Conversely, early-onset and late-onset FGR-HDP showed higher MAP and SVR and lower cardiac output (CO), SV and cardiac index (CI) than early-onset and late-onset i-FGR, respectively. Lastly, comparison between FGR-HDP and i-FGR, regardless of the temporal cut-off of 32 weeks' gestation, showed higher MAP and SVR and lower CO, SV and CI in the former.

Conclusions. Our data show that FGR-HDP and i-FGR are associated with different maternal haemodynamic profiles and the presence of HDP, rather than the temporal cut-off of 32 week's gestation, allows to appreciate maternal haemodynamic differences in pregnancies complicated by FGR.

Correlation between angiogenic biomarkers, urinary protein values and ascites in women with hypertensive disorders of pregnancy

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Objective. To investigate the correlation between sFlt-1/PIGF ratio, the 24-h urinary protein and the presence of maternal ascites in a population of women with new-onset hypertensive disorders of pregnancy (HPD).

Materials and Methods. Retrospective study including a cohort of women with new-onset HDP carrying a singleton viable pregnancy between 22 and 36 gestational weeks. At diagnosis, sFlt-1 and PIGF were assessed using Brahms Kryptor and the ratio was calculated. The amount of proteins on the 24 h urine was also investigated and a value $> 5 \text{ g}/24 \text{ h}$ was used to define massive proteinuria. The presence of ascites was defined in if abdominal free fluid was detected at ultrasound examination.

Results. A total of 80 patients were included for the study purpose. A linear correlation was found between the sFlt-1/PIGF ratio and the 24 h urinary-protein values ($R^2 = 0.21$; $p < 0.001$). A massive proteinuria was detected in 17 women; sFlt-1/PIGF ratio had an AUC of 0.86 for predicting the presence of massive proteinuria with a cut-off value of 310.9 (sensitivity 88.2%, specificity 71.0%). Ascites was detected in 6 women; significantly higher values of sFlt-1/PIGF ratios were found in this group of women compared with those without ascites ($1,322.0 \pm 1,083.0$ vs 423.0 ± 734.0).

Conclusions. Higher values of sFlt-1/PIGF ratios are associated with higher levels of urinary protein and higher incidence of maternal ascites.

Circulating angiogenic factors levels in women with hypertensive disorders of pregnancy (HPD) according to the baseline haemodynamic findings

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Objective. To assess in women with HDP if the predictive value of sFlt-1/PlGF ratio for adverse outcomes is influenced by the haemodynamic phenotype.

Materials and Methods. Retrospective study including a cohort of women with new-onset HDP carrying a singleton viable pregnancy from 22 to 36 gestational weeks. A non-invasive assessment of the main maternal haemodynamic parameters [Cardiac Output (CO), Systemic Vascular Resistance (SVR)] was done upon hospital admission using USCOM-1A. The haemodynamic phenotype was classified as "hypodynamic" in case of low CO [< 5 L/min] and/or high SVR [$> 1,400$ dynes \times s/cm⁵] or as "non-hypodynamic" in case of normal or high CO [> 5 L/min] and/or low SVR [$< 1,400$ dynes \times s/cm⁵]. The values of sFlt-1 and PlGF were assessed on maternal serum upon hospital admission and their ratio was calculated. An adverse composite maternal outcome (ACMO) was defined in presence

of at least one among: severe hypertension or placental abruption or occurrence of end-organ dysfunction as defined by ISSHP guidelines 2021. A composite of adverse neonatal outcome (ACNO) included birth weight below the 10th percentile (small for gestational age), or foetal/neonatal death.

Results. Among the 93 women included, 57 (61.2%) were categorized as hypodynamic and 36 (38.8%) as non-hypodynamic. sFlt-1/PlGF ratio at admission was significantly higher in the former group compared with the latter (301 [93.1-787] vs 52.5 [10.0-257.0]). A significant association between sFlt-1/PlGF ratio and an ACMO ($p = 0.02$) and an ACNO ($p = 0.007$) was reported only in the group of women defined with a "hypodynamic" profile.

Conclusions. sFlt-1/PlGF ratio is associated with the occurrence of an adverse maternal and neonatal outcome only in women with a hypodynamic profile.

The correlation between first-trimester serum biochemical and biophysical markers and skin microvascular reactivity assessed by laser speckle contrast imaging

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Objective. To evaluate the correlation between first-trimester serum biochemical and biophysical markers and skin microvascular reactivity by using laser speckle contrast imaging (LSCI) combined with post-occlusive reactive hyperaemia (PORH).

Materials and Methods. Thirty-eight women with a singleton gestation were enrolled during routine first-trimester scans. Microvascular skin blood flow was recorded using LSCI coupled with PORH. Skin perfusion was recorded before (baseline flux), during (occlusion flux) and after (peak flux) a 3-minutes occlusion obtained with an inflated pneumatic cuff. The parameters of microvascular reactivity were compared with serum biochemical markers (Pregnancy-associated protein A, PAPP-A, free beta human chorionic gonadotropin, free β -hCG, placental growth factor, PIGF), expressed in multiple of the median, and with maternal biophysical markers (Mean arterial pressure; Uterine artery pulsatility index).

Results. PIGF showed a moderate positive correlation with base-to-peak flux ($r = 0.50$, $p < 0.01$). Furthermore, a moderate positive correlation was found between free β -hCG and peak flux ($r = 0.50$, $p < 0.01$). Additionally, weak but statistically significant correlations were observed between free β -hCG and the other markers of microvascular reactivity: base-to-peak flux ($r = 0.33$, $p = 0.045$); peak time ($r = -0.331$, $p = 0.042$) and time to half recovery ($r = -0.396$, $p = 0.014$). A positive correlation was also noted between free β -hCG and baseline flux ($r = 0.341$, $p = 0.036$). No correlation was found with the other explored biochemical and biophysical markers.

Conclusions. Our study indicates a positive correlation between microvascular reactivity indexes and PIGF and free β -hCG levels. These novel findings suggest that first-trimester skin microvascular reactivity, assessed by LSCI coupled with PORH, could serve as valuable early pregnancy marker for placental function.

Cornual pregnancy: the experience of a level 3 maternity unit in a low-income country

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Objective. Cornual pregnancy (CP) is a rare, potentially serious ectopic pregnancy. The incidence varies between 2% and 3% depending on the study. It remains a significant cause of haemorrhagic shock in the first trimester of pregnancy. The aim of this study was the evaluation of our department's experience in the diagnosis and management of CP.

Materials and Methods. We conducted a retrospective, cross-sectional, monocentric and descriptive study in the gynaecology and obstetrics unit "D" of the University Hospital of Tunis, Centre of maternity and neonatology. The study lasted 13 years. It started in January 2010 and ended in December 2022. A total of 11 cases of CP were reported.

Results. The mean age of our population was 32 years. The mean duration of amenorrhoea was 52 days. Initial haem-

orrhagic shock was observed in 9.79% of cases. Abdominal tenderness was noted on abdominal examination in 44.7% of cases. Speculum examination revealed metrorrhagia in 68.8% of women. In our series, pelvic ultrasound diagnosed ectopic pregnancy in 100% of cases and cornual location in 45.8% of cases. Of the 11 cases of CP, 8 women underwent immediate surgery. The laparoscopic approach was most commonly used (6 women) with a laparoscopic conversion rate of 30%. All patients had an uncomplicated postoperative course. Methotrexate was used as first-line treatment in 3 patients.

Conclusions. Cornual pregnancy is a rare form of ectopic pregnancy. It can rapidly become life-threatening for the mother. In the absence of specific recommendations, treatment of CP is essentially surgical.

Post-partum haemorrhage: the diagnosis and management in a level 3 maternity hospital in a low-income country

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Objective. Postpartum haemorrhage is a serious condition of the peripartum period that leads to very high maternal morbidity and mortality. It is the leading cause of maternal mortality in our country. The definition and risk factors of this pathology are well known. The management of postpartum haemorrhage must be rapid and effective and depends mainly on the speed of diagnosis.

Materials and Methods. This is a prospective descriptive study carried out in Ward D of the Tunis Maternity and Neonatology Centre, which is a level 3 maternity ward. We included all cases of postpartum haemorrhage managed in this service during the period from January 2018 to December 2023. We looked for complications and assessed the management of pathology.

Results. We collected 94 cases of postpartum haemorrhage. The mean age of the pregnant women was 29.9 years, with extremes ranging from 18 to 42 years. The mean parity was 1.9 with extremes ranging from G1 to G6. The mean parity was 1.8. There were 12 cases of diabetes mellitus and 6 cases of treated hypothyroidism. Fever was noted in 6% of cases. Birth was by caesarean section in 74% of cases. 16% of the newborns were admitted to neonatology.

Conclusions. Postpartum haemorrhage is a common pathology specific to pregnancy, which can be the cause of several serious complications that can threaten the vital prognosis of the mother. It is one of the most frequent causes of maternal mortality in our country. treatment is the only way to guarantee a favourable outcome.

Diagnosis and management of maternal and foetal complications in severe pre-eclampsia

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Objective. Severe pre-eclampsia is a serious pathology that can be life-threatening for pregnant women, mainly due to its complications. In our country, it is the second cause of maternal mortality after postpartum haemorrhage. The aim of this study is to specify the epidemiological data of patients with complications of severe pre-eclampsia and the management of these complications.

Materials and Methods. This is a prospective descriptive study conducted in ward D of the Tunis Maternity and Neonatology Centre, which is a level 3 maternity ward. We included all cases of severe pre-eclampsia managed in this service between January 2018 and December 2021. We looked for complications and evaluated the management of this pathology.

Results. We collected 84 cases of severe pre-eclampsia associated with at least one complication. The mean age of the pregnant women was 31.5 years, with extremes ranging from 21 to 39 years. The mean parity was 2.4 with extremes ranging from G1 to G6. The mean parity was 2.1. A history of pre-eclampsia was noted in 5 cases. There were 2 cases of diabetes mellitus treated with insulin and 3 cases of treated hypothyroidism. We have 54 cases of HELLP syndrome, 27 cases of acute renal failure, 13 cases of retroplacental haematoma, 6 cases of eclampsia and one case of haemostasis disorder.

Conclusions. Severe pre-eclampsia is a common pathology specific to pregnancy, which can cause several serious complications threatening the mother's vital prognosis. early and adequate treatment is the only way to guarantee a favourable outcome.

Maternal and foetal haemodynamics assessment to predict IUGR in twin pregnancies

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Objective. The aim of this study was to evaluate maternal haemodynamics and umbilical vein blood flow (QUV) in twin pregnancies between 24 and 28 weeks to identify possible predictors for FGR twin at birth.

Materials and Methods. 21 twin pregnancies, 10 monochorionic diamniotic and 11 dichorionic diamniotic, between 24 and 28 weeks were included in this study (n = 42 fetuses). Among these, 36 fetuses were AGA at birth and 6 developed FGR. All patients underwent a non-invasive maternal haemodynamics assessment using an Ultrasound Cardiac Output Monitor (USCOM®) and a complete foetal haemodynamic examination including QUV.

Results. in comparison with AGA, QUV and corrected for estimated foetal weight QUV (cQUV) were significantly lower in FGR fetuses between 24 and 28 weeks. Additionally, maternal cardiac output (CO) and inotropy index (iNO) were significantly lower in FGR, while systemic vascular resistance (SVR) was higher. According to ROC analysis, QUV centile (cut off ≤ 23 centile, AUC 0.90, 95%CI 0.76-0.97) and SVR (> 814 dynes \times sec/cm⁵, AUC 0.85, 95%CI 0.71-0.94) are the best predictors for FGR in twin pregnancy between 24 and 28 weeks, also shown by multivariate logistic regression analysis (AUC 0.94, 95%CI 0.83-0.99).

Conclusions. QUV and maternal haemodynamics evaluation can be useful tools to identify twin pregnancies with a higher risk to develop FGR twin.

Serious foetal complication of severe pre-eclampsia: severe intrauterine growth restriction

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Objective. Intrauterine growth restriction is a common foetal complication of severe pre-eclampsia. The diagnosis is suspected on the basis of inadequate uterine height and is confirmed by ultrasound biometry below the 3rd percentile of uterine height. This complication is associated with high neonatal morbidity and mortality if not managed early and appropriately. The aim of this study is to clarify the epidemiological data of patients with intrauterine growth restriction and the management of this condition.

Materials and Methods. This is a retrospective and evaluative study. It was carried out in the Department D of the Maternity and Neonatology Centre in Tunis, which is a level 3 maternity hospital. We included all cases of severe intrauterine growth restriction with complications of pre-eclampsia that

were managed in this department during the period January 2018-December 2023.

Results. We collected 64 cases of intrauterine growth retardation. The mean age of the pregnant women was 28.3 years. The mean gestational age was 3.4. The mean parity was 1.6. A history of pre-eclampsia was noted in 3 cases. We noted 3 cases of insulin-treated diabetes and 2 cases of treated hypothyroidism. The diagnosis was made.

Conclusions. In all cases of pre-eclampsia, the diagnosis was made by biological examination before and after delivery. Growth retardation was the only complication of pre-eclampsia in 40 cases. This complication was associated with renal failure in 18 cases and retroplacental haematoma in 6 cases. Treatment was termination of pregnancy in all cases. Delivery was by caesarean section in 60 cases.

Small-for-gestational-age fetuses characteristics and outcome in pregnancies complicated by gestational diabetes

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Objective. The aim of the study was to define small-for-gestational-age (SGA) fetuses characteristics in pregnancies complicated by gestational diabetes (GDM) and to evaluate the possible underlying haemodynamic changes.

Materials and Methods. We enrolled 112 women with singleton pregnancies complicated by SGA fetuses, 30 of them had GDM while 82 did not. Maternal height and weight were considered at the admission time while haemodynamic assessment with USCOM was performed in both groups in the third trimester before delivery. To assess foetal outcomes, we considered the STv of CTG performed in admission and foetal birth weight.

Results. GDM group had a higher BMI (29.3 ± 6.2 vs 25.9 ± 3.9 ; $p = 0.0008$), lower STv (7.5 ± 2.9 vs 9.4 ± 2.7 ; $p = 0.003$)

and a lower foetal birth weight ($2,105 \pm 514.2$ vs $2,350 \pm 534.2$; $p = 0.03$) with a higher proportion of PFS $< 5^\circ$ pc (80% vs $59,7\%$; $p = 0.05$) despite of the non-diabetic group. In pregnancies complicated by GDM there were twice as many cases of hypertension and double the use of nitroderivative therapy. Haemodynamics features were similar in the two groups.

Conclusions. SGA fetuses of diabetic women have a worse outcome risk by presenting at delivery with lower foetal weight and STv both of which data would seem to suggest that in pregnancies with GDM, SGA fetuses have a higher degree of severity than in pregnancies not complicated by GDM.

Agreement between USCOM and Vicorder haemodynamic measurements in pregnancy

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Objective. To evaluate the agreement between maternal haemodynamic measurements assessed with USCOM[®] and Vicorder[®] machines.

Materials and Methods. Overall, 344 assessments from 172 participants between 30+0 and 39+6 weeks gestational age (156 healthy controls, 11 participants with small for gestational age and 5 with fetal growth restriction) at a tertiary level maternity unit were considered. The agreement between USCOM[®] and Vicorder[®] results was evaluated for heart rate (HR), cardiac output (CO), stroke volume (SV) and total peripheral resistance (TPR). The assessment was based on Bland-Altman plots with 95% limits of agreement (LOA) for the mean difference (MD) between Vicorder[®] and USCOM[®], reporting also the intraclass correlation coefficient (ICC).

Results. ICCs were generally low (ranging from 0.21 to 0.29), except for HR (ICC = 0.76, $p < 0.001$). USCOM[®] provided, on average, higher values for HR (MD = -0.30 bpm [-18.65; 18.05]), CO (MD = -0.47 L/min [-3.77; 2.82]) and SV (MD = -5.13 mL [-48.80; 38.54]) and lower for TPR (MD = 72.7 dynes \times sec/cm⁵ [-610.54; 755.07]), compared to Vicorder[®].

Conclusions. The agreement between USCOM[®] and Vicorder[®] measurements is low, with wide LOA for all measurements, emphasising a high risk of bias. Therefore, standardisation of reference ranges in relation to the device under investigation should be used, and adjustment according to gestational age where there is a change in that parameter over time.

Establishing normal ranges for maternal haemodynamic parameters using the Vicorder® device: experience from a single centre

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Objective. To establish normal reference ranges for haemodynamic parameters assessed with the Vicorder® device in a cohort of healthy pregnant women between 30 and 39 weeks gestational age.

Materials and Methods. We performed a prospective observational study of healthy women with singleton, non-anomalous pregnancies between 30+0 and 39+0 weeks gestational age recruited during routine antenatal appointments at a single inner city maternity unit. Participants with significant comorbidities at time of inclusion including cardiovascular disease, chronic or gestational hypertension, diabetes or estimated foetal weight < 10th centile were excluded. Haemodynamic assessments were conducted in standardised conditions with Vicorder® (Skidmore Medical Ltd). Data regarding cardiac output (CO), stroke volume (SV), heart rate (HR), mean arterial pressure (MAP), augmentation index (AIx), pulse wave velocity (PWV) and total peripheral resistance (TPR) were collected.

Results. 246 haemodynamic assessments performed in 176 participants were included in the analysis. HR does not

change significantly with gestational age. The central haemodynamic parameters CO and SV significantly decrease with gestation between 30 and 39 weeks ($p < 0.01$) with a median decrease respectively of 0.09 L/min and 1.32 ml for each increase in gestational week. Conversely MAP ($p < 0.001$), TPR ($p < 0.001$) and arterial function parameters PWV and AIx increase significantly with gestation ($p < 0.0001$ and $p < 0.05$ respectively).

For each haemodynamic parameter of interest stratified by gestational week we developed the centile curve reflective of the model with the best fit and the crude median \pm interquartile ranges.

Conclusions. CO, SV, MAP, SVR, PWV and AIx assessed with the Vicorder® haemodynamic device demonstrate significant change with gestation in uncomplicated pregnancies between 30 and 39 gestational weeks. Thus, normalization for gestational age and the use of Vicorder® specific reference ranges is recommended in future research utilising this maternal haemodynamic assessment machine.

Association between adverse neonatal outcome and maternal haemodynamics and biomarkers in SGA and FGR

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Objective. We aimed to assess whether maternal biomarkers or haemodynamics were associated with composite adverse neonatal outcome in small for gestational age (SGA) and foetal growth restriction (FGR).

Materials and Methods. Participants were 18 years or older, pregnant with a singleton non-anomalous SGA foetus (AC or EFW < 10th percentile or 50 percentiles lower than a previous ultrasound). Maternal haemodynamics and biomarkers were assessed at the time of inclusion. Composite adverse neonatal outcome included foetal/neonatal mortality, poor condition at birth, need for respiratory support, cardiovascular abnormality, brain injury syndromes, sepsis and retinopathy of prematurity requiring treatment.

Biomarkers (sFlt, PlGF, sFlt/PlGF) and haemodynamic variables were reported as modified z-scores using published (Roche®, USCOM®, and Arteriograph®) or unpublished (Vircorder®) normal ranges. Differences between groups were

evaluated using the Wilcoxon-Mann-Whitney test and the Dunn's test for adjusted multiple comparisons. Univariate analysis demonstrated significant predictors which were then included in the multivariable logistic model with potential confounders.

Results. 359 participants with paired maternal haemodynamic and biomarker assessments were included. Mean arterial pressure, sFlt-1 and PlGF were all significantly associated with adverse outcome at univariate analysis. In the multivariable model EFW at inclusion, UCR at inclusion and sFlt-1 z-score remained significant. This model gives an AUC of 0.79 [0.73; 0.86] with a sensitivity of 73.1%, specificity of 75.1% and 74.7% accuracy (using the probability cut-off based on the maximum Youden Index).

Conclusions. In SGA and FGR fetuses, UCR and EFW at inclusion and sFlt-1 are associated with composite adverse neonatal outcome.

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