Clinical significance

The clinical significance of early screening for pre-eclampsia lies in the possibility to:
- initiate close obstetrical monitoring,
- start low-dose aspirin treatment early on in the pregnancy.

Although there is no international consensus, a recent study shows that aspirin reduces the risks of pre-eclampsia, premature birth, and IUGR by more than 50% if the treatment is initiated before 16 weeks of pregnancy i.e. 18 WA (Roberge et al. 2012).

Furthermore, according to a meta-analysis in 2012, 89% of cases of early PE could have been avoided or delayed (or less severe form) if treatment with aspirin is initiated before 16-weeks of pregnancy i.e. 18 WA (Roberge et al. 2012).

These results highlight the clinical significance of early screening for PE.

In France, recommendations from the Collège National des Gynécologues et Obstétriciens (French National College of Gynaecologists and Obstetricians)[2009] are to start aspirin treatment with 75-160 mg/day in patients considered high-risk for PE, before the 20th WA.

In practice

Test request
- Estimation of the risk of pre-eclampsia in the first trimester of pregnancy. The risk can only be calculated during a single-foetus pregnancy.

Sample
- Between 11 WA and 0 days and 13 WA and 6 days
- Serum: In a separate plain tube collect a sample for pre-eclampsia. After removing the coagulated mass, quickly centrifuge the sample to separate the serum.

Storage and transport
- Refrigerated (+2°C à +8°C)

Document(s) to be enclosed with the test request
- Specific request form for pre-eclampsia, which can be downloaded at www.biomnis.com > Test menu > Test guide (group code: PECLA).

The scan date for the 1st trimester with the crown-rump length measurement (CRL) are essential for the pre-eclampsia risk assessment.

The other clinical details, if supplied, enable the risk assessment to be improved.

References


Price

PAPP-A quantification is routine in the T21 risk calculation for the 1st trimester and the pre-eclampsia risk calculations. The PPAP-A assay must be performed alongside a PIGF assay and the reagents used must be adapted to the PE risk calculation software.

Please contact the Biomnis International Division for further information.

To find out more about this subject

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Pre-eclampsia prediction screening during the first trimester

Focus on...

Pre-eclampsia

Screening during the first trimester

DS15 UK - MARCH 2014

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Pre-eclampsia

Pre-eclampsia (PE) is a complication that can occur during pregnancy. It is a major, worldwide cause of maternal and foetal morbidity and mortality. In France, the incidence is estimated at 1-3% of nulliparous pregnancies and 0.5-1.5% of multiparous pregnancies.

Définition

PE is defined by:
- gestational arterial hypertension (systolic blood pressure ≥ 140 mm Hg, diastolic blood pressure ≥ 90 mm Hg).
- associated with proteinuria > 0.3 g/24 hrs and/or an oedematous syndrome.
- Hyperuricemia > 300 μmol/L.
- raised AST levels.
- thrombocytopenia > 150 x 10^9/L.
- intrauterine growth retardation (IUGR).

PE is considered severe when:
- the systolic blood pressure is ≥ 160 mm Hg and the diastolic blood pressure is ≥ 110 mm Hg.
- and/or the presence of severe proteinuria > 3.5 g/24 hrs.
- combined with or without clinical symptoms (e.g., abdominal pain, nausea, vomiting, headaches etc.).
- or with changes in laboratory results (creatininemia > 100 μmol/L, AST > 3 times the normal level, thrombocytopenia < 100 x 10^9/L).

Pre-eclampsia pathophysiology

The origin of PE is attributed to a default in placentaion, and then maternal endothelial dysfunction. In a ‘normal’ pregnancy, the maternal spiral uterine arteries dilate following a trophoblast invasion of the uterine walls. In PE, this restructuring does not happen correctly. Placental hypoxia is the first cause of PE. The maternal organism compensates for this abnormal placentation vascularisation by arterial hypertension and a reduction in the perfusion of the organs, which leads to a risk of failure.

Pre-eclampsia develops at the beginning of the 1st trimester of pregnancy.
- The symptoms occur in the 3rd trimester of pregnancy:
  - before 34 weeks of amenorrhoea: Early pre-eclampsia,
  - after 34 weeks of amenorrhoea: Late pre-eclampsia.
- Cases of early PE are more problematic because they require premature induction to delivery.

The pathogenesis of pre-eclampsia

- Demographics
- Environmental factors
- Genetic factors
- Hypertension
- Immunosuppression

The diagnosis of HELLP syndrome (Haemolysis, Elevated Liver enzymes, Low Platelets) is made when confronted with haemolysis, combined with hepatic cytolysis and thrombocytopenia < 100 x 10^9/L.

Pre-eclampsia risk factors*

- Nulliparity
- Previous history of pre-eclampsia
- Pre-existing arterial hypertension
- Maternal age: < 20 years or > 35 years
- Obesity: BMI greater than 30 kg/m²
- Multiple pregnancy
- Auto immune diseases: diabetes, SLE, RP, etc.
- Family history of pre-eclampsia.

* This list is non-exhaustive.

Short-term complications

- Premature delivery
- Intrauterine growth retardation (IUGR)
- Neonatal morbidity and mortality
- Maternal mortality: 2nd cause in France

Long-term complications

Women who suffer from pre-eclampsia that leads to premature delivery are 8 times more likely to die from a cardiovascular disease than women who did not suffer from pre-eclampsia and who deliver at full term.

The calculation of the risk of pre-eclampsia in the first trimester of pregnancy is performed using:

Definition

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Quantification assays of the following serum markers:

- PlGF (Placental Growth Factor), which is produced by the placenta, is an angiogenic factor that belongs to the vascular endothelial growth factor family (VEGF). It is a marker of endothelial function. The circulating concentrations of circulating asymmetric dimethylarginine (ADMA) decrease before the onset of clinical symptoms of PE.

- La PAPP-A (Pregnancy-Associated Plasma Protein-A) is a vascular marker and is quantified routinely as a serum marker for Down’s syndrome screening during the first trimester of pregnancy. The risk of PE, notably severe PE, rises as the PAPP-A concentration decreases. PAPP-A and PAPP-A values are expressed in multiples of the median (MoM) relative to the gestational age at the date of sampling.

Biophysical measurements:
- Arterial blood pressure
- Doppler scan of uterine arteries

Clinical information:
- The patient: BMI, geographical origin, smoker, etc.
- The patient’s background: parity, previous history of PE, previous history of arterial hypertension

The calculation software Predictor® (Perkin Elmer) used by Biomnis uses a calculation method developed by Professor Cuckle (University of Leeds) with data provided by Professor Nicolaidis (King’s College Hospital). The risk calculation is given using a decisional threshold of 1/20.

Risk calculation performance

During the first trimester of pregnancy (11-13.6 weeks of amenorrhea), the combination of the PAPP-A and PlGF results along with the clinical history and the uterine Doppler scan detect up to 92% of cases of early pre-eclampsia (with approximately 5% of false positives).

The PE detection rate relative to the combination of biological and biophysical markers used in the risk calculation [according to Akolekar, 2012].

The calculation of the risk of pre-eclampsia in the first trimester of pregnancy is performed using: