A (quasi)evidence-based approach to the management of early-onset IUGR

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What is early-onset IUGR
Predictors of poor outcome
Stage-based management
Long term consequences
What is early-onset IUGR

Predictors of poor outcome

Stage-based management

Long term consequences
 EARLY-ONSET \\

PREECLAMPSIA
0.5-1 %

PREECLAMPSIA + IUGR

2 %

IUGR

LATE-ONSET \\

2-8 %

4-8 %

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EARLY IUGR (1/3)  |  LATE IUGR (2/3)
--- | ---
PROBLEM: MANAGEMENT | PROBLEM: DIAGNOSIS
Placental disease: high (UA+, PE high) | Placental disease: low (UA-, PE low)
Hypoxia ++: systemic CV adaptation | Hypoxia +/-: central CV adaptation
Tolerance to hypoxia. Natural history | Low tolerance: no natural history
High mortality and morbidity | Low mortality but poor long outcome.

Savchev 2013
What is early-onset IUGR
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FETAL DETERIORATION IN PLACENTAL INSUFFICIENCY

PLACENTAL DISEASE
- Increment placental impedance
- UTERINE A.
- CPR / UMBILICAL A.
- MIDDLE CEREBRAL A.
- Centralization
- Ao ISTHMUS
- growth

COMPENSATED HYPOXIA
- MIDDLE CEREBRAL A.
- Ao ISTHMUS

DECOMPENSATED HYPOXIA
- DUCTUS VENOSUS
- cardiac ischemia
- Diastolic failure
- cCTG: reduced short-term variability
- CTG ABNORMAL
- Systolic cardiac failure

SERIOUS INJURY DEATH
Early-onset IUGR

PROBLEM #1: MORTALITY

Perinatal Mortality

- <26: >90%
- 26-28: 30-40%
- >28: <10%

Pathological CGT

DVa (rev)

- Yes: 19%
- No: 60%

BPP

IUFD 23% in BPP=6 and 11% in BPP=8
Poor correlation with DVa(rev)
Cochrane: poor contribution to prediction

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Early-onset IUGR

PROBLEM #2: (NEUROLOGICAL) MORBIDITY

Brain US anomalies in 30w IUGR

Neurologic Morbidity

- **<29**: >90%
- **29-32**: 30-40%
- **>32.0**: <10%

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Fouron 2004
Del Rio 2008
Cruz-Martinez 2012
What is early-onset IUGR

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**Protocol IUGR**

**First step:** UtA + CPR + EFW = SGA or IUGR

<table>
<thead>
<tr>
<th>I</th>
<th>low EFW (&lt;p3) or mild placental resistance / redistribution</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>III</th>
<th>Severe placental resistance / redistribution</th>
</tr>
</thead>
</table>

| IV | High suspicion of acidosis - High risk of death |

- CPR <p5
- UtA >p95
- MCA <p5
- AEDV
- AoI >p95
- DV >p95
- REDV
- UVpuls
- CGT decelerations of reduced short-term variability
RATIONALE FOR A STAGE-BASED APPROACH TO THE MANAGEMENT OF FGR

PLACENTAL DISEASE

Diagnostic/chronic markers
Early and Late IUGR

Increment placental impedance

Stage fetal deterioration

Risks of prematurity

Low

Moderate

High

HYPOXIA

ACIDOSIS

SERIOUS INJURY

DEATH

Centralization

Increment placental impedance

Prognostic/Acute markers
Early IUGR

Red Line LATE IUGR

Red Line EARLY IUGR

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## IUGR

Management protocol according to severity stages

<table>
<thead>
<tr>
<th>Stage</th>
<th>Follow-up</th>
<th>Delivery</th>
<th>Mode</th>
<th>Mort.</th>
<th>Morb.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td>1-2 d</td>
<td>CS</td>
<td>DV(a-) cCTG abn. CTG dec.</td>
<td>&gt;90%</td>
<td>50%</td>
</tr>
<tr>
<td>III</td>
<td>2/w</td>
<td>CS</td>
<td>DV&gt;p95 UV puls REDV</td>
<td>&lt;10%</td>
<td>50%</td>
</tr>
<tr>
<td>II</td>
<td>1/w</td>
<td>CS or LI</td>
<td>(a) AEDV (b) AoI&gt;95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td></td>
<td>LI</td>
<td>EFW&lt;p3 CPR&gt;p95 UtA&gt;p95 MCA&lt;p5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Follow-up:
- <26w: Hours/Daily
- 26-28: 1-2 d
- 28-32: 2/w
- 32-34: 34-37
- 34-37: 1/w

Mode:
- CS
- CS or LI
- LI

Mort.:
- >90%

Morb.:
- 50%
- >90%
- <10%
- 50%

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EARLY-ONSET IUGR

Key points for clinical management

1 - <28 w : PROBLEM IS MORTALITY
   First determinant: GA
   Second (most useful) determinant 26-28w: DV

2 - >28 PROBLEM IS NEUROLOGICAL MORBIDITY

3 - NATURAL HISTORY: USE A PROTOCOL

4 - (IF PREECLAMPSIA NATURAL HISTORY ALTERED)

5 - LONG TERM SEQUELAE: EARLY POSTNATAL INTERVENTION
umbilical artery
normal and anormal hemodynamics

Cardiac pump
normal function

Cardiac pump
abnormal function

Placental status
>30%

placenta + cardiac ischemia
middle cerebral artery
normal and abnormal hemodynamics

Normal oxygenation
[normal waveform]
[mild vasodilation]

[hypoxia]
30% venous return

REFLECTS DIASTOLIC PRESSURE IN RIGHT (AND LEFT) HEART

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cardiac compliance: effect on right return

myocardial ischemia

compliance

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MPI, AoI, and DV >95th centile at 26, 12 and 5 days before delivery or fetal death

One week before delivery, proportion of normal MPI, AoI, and DV was 60%, 80%, and 90%, respectively.
Fetal deterioration and monitoring in early-severe IUGR. Placental disease affects a large proportion of the surface, and this is reflected in changes in the UA Doppler in a high proportion of cases. The figure depicts in a schematic and simplified fashion the pathophysiologic progression with the main adaptation/consequence in placental-fetal physiology, and the accompanying cascade of changes in Doppler parameters. The sequence illustrates the average temporal relation among changes in parameters, but the actual duration of deterioration is influenced by severity. Regardless of the velocity of progression, in the absence of accompanying PE this sequence is relatively constant, particularly as regards end-stage signs and the likelihood of serious injury/death. However, severe PE may distort the natural history and fetal deterioration may occur unexpectedly at any time.

Fetal deterioration and monitoring in late-mild IUGR. Placental disease is mild and UA Doppler values are not elevated above the 95th centile. Effects of fetal adaptation are best detected by the CPR, which detects mild changes in the AU and MCA Doppler. A large fraction of cases do not progress to baseline hypoxia so that they remain with abnormal CPR. Once baseline hypoxia is established, placental reserve is minimal and progression to fetal deterioration may occur quickly, as suggested by the high risk of severe deterioration or IUFD after 37 weeks in these cases, possibly due to a combination of a higher susceptibility to hypoxia of the term-mature fetus and the more common presence of contractions at term.

BPP<6
Abnormal CTG
DV with RAV
IP DV>95th centile
REDV-UA
AEDV-UA
UA PI>95th centile
CPR<5th centile
MCA<5th centile
UtA>95th centile
Isolated EFW<p3 centile
Isolated EFW<p10 centile

Gestational age at delivery

Savchev 2013