INTEGRATED MANAGEMENT OF FETAL GROWTH RESTRICTION

Eduard Gratacós

BCNatal – Barcelona Center of Maternal-Fetal and Neonatal Medicine
Hospital Clínic and Hospital Sant Joan de Déu
Universitat de Barcelona

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1. Identify small fetus

2. FGR vs. SGA

3. Early vs. Late

4. Stage-based management protocol
1. Identify small fetus

2. FGR vs. SGA

3. Early vs. Late

4. Stage-based management protocol

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Neonatal and Fetal GA-adjusted “normal” weight in the same population
IMPROVING DETECTION: THE DEFINITION OF “RESTRICTION”

Birthweight inverse relation with perinatal outcome AND brain-cardiac remodelling

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1. Identify small fetus
2. FGR vs. SGA
3. Early vs. Late
4. Stage-based management protocol
ISOLATED FETAL SMALLNESS = POORER PROGNOSIS
Perinatal and Long-term Outcomes

FGR vs. SGA: DIFFERENT MANAGEMENT
FGR = abnormal UA Doppler? not anymore

UA Doppler + (EARLY-ONSET)

UA Doppler N (LATE-ONSET)

N cases

0

N cases

Savchev 2013

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SGA: proportion of perinatal adverse outcomes in 376 consecutive cases

Figueras 2011
Classification of stillbirth by relevant condition at birth (ReCoDe): population-based cohort study
Gardosi et al. BMJ 2005 and 2013

IUGR as relevant condition identified in 43-60%

Overall stillbirth rate (/ 1000 births) 4.2, but only 2.4 in non-SGA pregnancies, increasing to 9.7 with antenatally detected IUGR and 19.8 in not detected IUGR.
Prognostic criteria of “poor outcome”-SGA

*CS for distress and/or neonatal acidosis*

- UtA >p95 (.95)
- CPR <p5 (1.35)
- EFW CENTILE <3

*N=509 SGA + 509 controls*

Figueras 2014
Distribution of cases when IUGR = abnormal UA Doppler

Savchev 2013
Distribution of cases when IUGR = abnormal CPR or UtA or EFW <p3

Savchev 2013

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1. Identify small fetus
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IUGR = low CPR or high UtA or EFW < p3 or low PIGF

EARLY IUGR (1%)  LATE IUGR (5-7%)

<table>
<thead>
<tr>
<th>PROBLEM: MANAGEMENT</th>
<th>PROBLEM: DIAGNOSIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placental disease: high (UA+, PE high)</td>
<td>Placental disease: low (UA-, PE low)</td>
</tr>
<tr>
<td>Hypoxia ++: systemic CV adaptation</td>
<td>Hypoxia +/- : central CV adaptation</td>
</tr>
<tr>
<td>Tolerance to hypoxia. Natural history</td>
<td>Low tolerance: no natural history</td>
</tr>
<tr>
<td>High mortality and morbidity</td>
<td>Low mortality but poor long outcome.</td>
</tr>
</tbody>
</table>

32w @ diagnosis

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FETAL DETERIORATION IN PLACENTAL INSUFFICIENCY

PLACENTAL DISEASE

COMPENSATED HYPOXIA

DECOMPENSATED HYPOXIA

SERIOUS INJURY

DEATH

Increment placental impedance

UTERINE A. >p95

CPR <p5

UMBILICAL A. >p95

Centralization

MIDDLE CEREBRAL A. <p5

Ao ISTHMUS >p95

cCTG: reduced short-term variability

DUCTUS VENOSUS >p95 and a-

Systolic cardiac failure

cardiac ischemia
Diastolic failure

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FETAL DETERIORATION IN PLACENTAL INSUFFICIENCY
EARLY VS LATE IUGR (>34s)

PLACENTAL DISEASE

COMPENSATED HYPOXIA

DECOMPENSATED HYPOXIA

SERIOUS INJURY
DEATH

Increment placental impedance

minimal tolerance to hypoxia

Placental injury <30%

UTERINE A. >p95

CPR <p5

UMBILICAL A. >p95

Centralization

MIDDLE CEREBRAL A. <p5

Ao ISTHMUS >p95

cardiac ischemia
Diastolic failure

DUCTUS VENOSUS >p95 and a-

CTG / BPP ABNORMAL

Systolic cardiac failure

growth

mild hypoxia
no cardiovascular adaptation

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1. Identify small fetus

2. FGR vs. SGA

3. Early vs. Late

4. Stage-based management protocol
IUGR = abnormal CPR or UtA or EFW <p3
RATIONALE FOR A STAGE-BASED APPROACH TO THE MANAGEMENT OF FGR

PLACENTAL DISEASE

Diagnostic/chronic markers
Early and Late IUGR

Increment placental impedance

HYPOXIA

Prognostic/Acute markers
Early IUGR

ACIDOSIS

SERIOUS INJURY

DEATH

Stage fetal deterioration

Risks of prematurity

LOW

MODERATE

HIGH

Red Line LATE IUGR

Red Line EARLY IUGR

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## Protocol IUGR

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

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
<th>CPR</th>
<th>Ut A</th>
<th>MCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Low EFW (&lt;p3) or mild placental resistance / redistribution</td>
<td>&lt;p5</td>
<td>&gt;p95</td>
<td>&lt;p5</td>
</tr>
<tr>
<td>II</td>
<td>Severe placental resistance / redistribution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>Severe hemodynamic adaptation - Low suspicion acidosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>High suspicion of acidosis - High risk of death</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **CPR**
  - CPR <p5

- **Ut A**
  - Ut A >p95

- **MCA**
  - MCA <p5

- **AEDV**
  - AEDV

- **Aol**
  - Aol >p95

- **DV**
  - DV >p95

- **REDV**
  - REDV

- **CGT decelerations of reduced short-term variability**
  - CGT decelerations of reduced short-term variability
# IUGR

Management protocol according to severity stages

<table>
<thead>
<tr>
<th>Stage</th>
<th>Criteria</th>
<th>Delivery</th>
<th>Follow-up</th>
<th>Mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;26w</td>
<td>DV &lt;p95</td>
<td>CS</td>
<td>1/w</td>
<td>LI</td>
</tr>
<tr>
<td>26-28</td>
<td>DV &gt;p95</td>
<td>CS or LI</td>
<td>2/w</td>
<td>LI</td>
</tr>
<tr>
<td>28-30</td>
<td>UtA &lt;p95</td>
<td>CS or LI</td>
<td>2/w</td>
<td>LI</td>
</tr>
<tr>
<td>30-34</td>
<td>CPR &lt;p5</td>
<td>CPR &lt;p5</td>
<td>37</td>
<td>LI</td>
</tr>
<tr>
<td>34-37</td>
<td>MCA &lt;p5</td>
<td>MCA &lt;p5</td>
<td>37</td>
<td>LI</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mort.</th>
<th>Morb.</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;90%</td>
<td>&gt;90%</td>
</tr>
<tr>
<td>50%</td>
<td>&lt;10%</td>
</tr>
<tr>
<td>&lt;10%</td>
<td>50%</td>
</tr>
</tbody>
</table>

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Fetal Growth restriction:

**Stage 1**

Recommended management:
Follow-up in 1 week
Multi-platform calculator for the Integrated Management of Fetal Growth Restriction

Stage 1
Delivery
The main goal in FGR is identification

Small fetus (EFW<\text{p10}) must be divided in:
- FGR (placenta, poor perinatal and long-term outcome)
- SGA (we don’t know, perinatal outcome N, poor long term)

Early and late-onset FGR (GA 32s) represent two distinct phenotypes of the same disease

Clinically, a single stage-based protocol allows optimizing decisions in all cases