Serial Ultrasound Measurements of Fetal Head Circumference and Abdominal Circumference to Predict Fetal Growth Restriction in a Sri Lankan Study Population

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Fetal Growth Restriction (FGR)

Definition

“Failure to achieve growth according to the growth potential”
FGR

- Mostly “Under-diagnosed”

- One of the major causes of Still Births at term

- Placental Insufficiency – “The commonest”
“Fetal Origins hypothesis” suggests increased lifetime risk of coronary artery disease, diabetes mellitus and metabolic syndrome in FGR babies.

If FGR is accurately detected, early lifestyle modifications & close follow up can be applied to this group.
Small for gestational age (SGA)

Definition

“Expected weight according to POA is below 10th Centile”
FGR vs SGA

- May coincide
- But are not synonymous
- FGR without SGA & SGA without FGR
- *Birth weight alone is a poor indicator of FGR*
Diagnosis of FGR

- Clinical – SFH
  - Static Fundus
  - Customized SFH charts

- Ultrasound
  - Abdominal circumference- Centile charts
  - Estimated fetal weight- Centile charts

- Doppler
  - Umbilical Artery
  - Middle cerebral Artery
Confirmation of FGR after birth

- Criteria not well established

- Birth Weight alone is not useful
Confirmation of FGR after birth

- Ponderal Index
- Skin fold thickness
- Mid arm to occipito frontal ratio
Ponderal Index

- Weight (kg) / Length (m)³

\[
PI = \frac{mass \ (kg)}{(height \ (m))^3}
\]

SI units

\[
PI = \frac{mass \ (lb)}{\sqrt[3]{mass \ (lb)}}
\]

Imperial units
Objective

Ascertain the ability of serial ultrasound measurements of fetal head circumference (HC) and abdominal circumference (AC) to predict FGR
Study design

- A prospective cohort study
- Excluded – uncertain dates, Late booking, multiple pregnancy, IUD
- 508 pregnant women
Antenatal diagnosis of FGR

By two serial measurements of fetal AC & HC at 28 and 34 weeks

Diagnosis of FGR is made when second value deviates to the right of the original centile

(Did not achieve original growth potential)
FGR and non FGR (Antenatal)

<table>
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<tr>
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<th>FGR</th>
<th>Non FGR</th>
<th>Total</th>
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<tbody>
<tr>
<td></td>
<td>223 (43.89%)</td>
<td>285 (56.11%)</td>
<td>508</td>
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Total 508
After Delivery…..

- Ponderal index (PI) was used to identify FGR

- PI below 10\textsuperscript{th} centile according to POA confirmed FGR
Detection of FGR – Postnatal

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<th></th>
<th>FGR</th>
<th>Non FGR</th>
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<tr>
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<td>224 (44.1%)</td>
<td>284 (59.9%)</td>
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<tr>
<td>Total</td>
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<td>Total</td>
<td>508</td>
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## Comparison

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<tr>
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<th>Postnatal growth restricted</th>
<th>Postnatal non growth restricted</th>
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<tbody>
<tr>
<td>Antenatal growth restricted</td>
<td>185</td>
<td>38</td>
</tr>
<tr>
<td>Antenatal non growth restricted</td>
<td>39</td>
<td>246</td>
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Results

- Sensitivity - 82.59%,
- Specificity - 86.62%,
- Positive Predictive Value - 82.59%,
- Likelihood ratio - 6.2
Conclusions

- Antenatal diagnosis of FGR by using serial ultrasound measurements of fetal abdominal circumference is accurate.

- FGR accounts for a significant percentage of pregnancies in Sri Lankan population.

- Therefore screening for FGR by two USS at 28 and 32 weeks is justified.
Thank you