Management of infants with intra-uterine growth restriction

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Abstract

Intra-uterine growth restriction (IUGR) and prematurity are the two causes for delivery of low birth weight infants. In India, IUGR contributes to almost two-thirds of infants in this category. Poor nutritional status and frequent pregnancies are common pre-disposing conditions in addition to obstetric and medical problems during pregnancy. Growth restriction may be symmetrical or asymmetrical depending on the time of insult during pregnancy. The pathological insult in an asymmetrical IUGR occurs during the later part of the pregnancy and has a brain-sparing effect. Common morbidities are more frequent in <3rd percentile group as compared to 3rd–10th percentile group. Guidelines for management of IUGR neonates in these two groups have been provided in the protocol.
Management of infants with intra-uterine growth restriction

Introduction

Nearly one third of neonates born in India are low birth weight (LBW) weighing less than 2500 grams at birth. The newborn can be LBW because of two reasons. Firstly the infant may be preterm being delivered before 37 completed weeks. The second situation that leads to LBW is intrauterine growth restriction (IUGR). This condition is akin to malnutrition. This condition may present in both term and preterm infants and the infant is usually undernourished, undersized and therefore, low birth weight. Such an infant is sometimes referred to as a small-for-date or SFD neonate. Two thirds of LBW neonates born in India fall in this category. Since IUGR neonates are more likely to suffer complications including cold stress and hypoglycemia, it is important that these infants are identified and managed appropriately at birth. Even after recovering from neonatal complications, they remain more prone to malnutrition, recurrent infection and poor neuro-developmental outcome.

IUGR and SFD

Although both the terms are used interchangeably and both denote malnutrition, there is a minor difference in the terminology. SFD is a mathematical definition and includes all neonates with birth weight below the 10th percentile for that particular gestation. IUGR is a clinical definition and includes neonates with clinical evidence of malnutrition. This may be in the form of loose skin folds on the face and in the gluteal region, absence of subcutaneous fat and peeling of skin. Although most IUGR infants would also be SFD, it is possible that a small minority of IUGR infants may have birth weights above the 10th percentile. These morphological IUGR infants
would behave like SFD infants and should be managed along the same lines as SFD infants. For purposes of discussion in this paper, the term IUGR would include both the groups of infants

**Etiology**

Poor nutritional status of the mother and frequent pregnancies are the major cause of IUGR. Mothers with a weight of less than 40 kg and a height of less than 145 cm often give birth to small-for-date infants. Insufficient nutritional intake during pregnancy also has an adverse effect on fetal weight. Maternal hypertension, pre-eclampsia, post-maturity, frequent pregnancies, multiple pregnancy, anemia, malaria and tobacco use are other causes of IUGR. Chronic maternal diseases of heart, kidneys, lungs or liver may also lead to IUGR.

**Clinical features**

IUGR or small-for-date infants are often full term or borderline term in gestation. Their birth weight usually falls below the 10th percentile. The neonate has an emaciated look and loose skin because of lack of subcutaneous tissue. These are particularly prominent over the buttocks and the thighs. They look alert and are often plethoric. Comparison of the head circumference with chest circumference is helpful in the identification of a SFD infant. In infants with appropriate growth, the head size is usually bigger than the chest by about 2-cm. In SFD infants, the head circumference usually exceeds the chest circumference by more than 3 cm. A preterm SFD infant would have a combination of clinical features suggestive of both, prematurity and IUGR.
Types of IUGR

Infants with IUGR are often classified as having symmetrical (head circumference, length and weight equally affected) or asymmetrical (with relative head growth sparing) growth restriction. Infants with symmetric IUGR often have an earlier onset and are associated with causes that affect total fetal cell number including chromosomal, genetic, teratogenic, intra-uterine infections and severe hypertensive etiologies. Asymmetric IUGR is often of a later onset, demonstrates preservation of blood flow to brain and is associated with poor maternal nutrition or late onset exacerbation of maternal vascular disease (pre-eclampsia, chronic hypertension)\(^9\).

Problems of SFD infants

Common neonatal morbidities encountered in SFD infants born at AIIMS Hospital over a period of 24 months (Jan 99 to Dec 2000) are given in Table 1. The common morbidities encountered in IUGR neonates include: (a) perinatal asphyxia, (b) hypothermia, (c) hypoglycemia and (d) polycythemia. These morbidities are commoner in the more severely growth restricted babies (<3\(^{rd}\) percentile) as compared to babies in the 3\(^{rd}\) to 10\(^{th}\) percentile category.

Management

Early delivery is indicated if there is arrest of fetal growth and pulmonary maturity is satisfactory. Fetal hypoxia may necessitate emergency cesarean section and one should be prepared to receive an asphyxiated infant. If liquor is meconium stained and the neonate is depressed, endotracheal suctioning is essential\(^10\). Infant should be screened for any congenital malformations. Based on initial assessment, decision is taken to either keep the infant in nursery or with mother.
Birth weight 3rd – 10th percentile

In the absence of complications including perinatal asphyxia and respiratory distress, these neonates may be managed with the mother (Table 2). Skin-to-skin care helps in maintaining temperature and facilitates breast-feeding. Early initiation of breastfeeding and/or assisted feeding helps in averting hypoglycemia. Term SFD infants usually do not pose any serious difficulties because they have no problems in direct breast-feeding. To avoid hypoglycemia, they should be put to breast within one hour of birth. However these infants are at risk of morbidities and should be monitored regularly for hypoglycemia and polycythemia in the first 48-72 hours.

Neonates with asymptomatic hypoglycemia should be supplemented with sugar fortified formula feeds. This may be given with the help of a cup and spoon/paladay. Neonates with normoglycemia on regular feeds should be gradually weaned to exclusive breast-feeding within the next 3-4 days. Failure to maintain normoglycemia despite regular oral feeds should be treated with IV fluids. Neonates with symptomatic hypoglycemia should be shifted to a special care nursery and managed appropriately with a glucose bolus followed by a continuous glucose infusion at 6-8 mg/kg/min.

Neonates with asymptomatic polycythemia and a hematocrit <70 maybe managed conservatively by increasing fluid intake. The infant should receive regular (2-3 hourly) breast feeds with extra supplementation. Infants with symptomatic polycythemia or hematocrit >70 should be managed by partial exchange transfusion in the neonatal intensive care unit11.

Birth weight <3rd percentile, gestation <35 weeks

Neonates with severe growth restriction (<3rd percentile) or with presence of complications should be managed in the intensive care unit (Table 2). This group would include infants with
perinatal asphyxia, symptomatic hypoglycemia, symptomatic polycythemia, prematurity (<35 weeks), respiratory distress and hypothermia. They should be monitored for hypoglycemia, polycythemia and feed intolerance in the initial few days.

Infants with gestation <30 weeks (birth weight <1200 grams) should be started on IV fluids initially and gradually weaned to oral feeds over the next few days. In the absence of other complications, oro-gastric feeds should be started for neonates ≥30 weeks (≥1200 grams) and gradually shifted to katori-spoon/ paladay feeding. An infant on full oral feeds with spoon-feeding may be tried on direct breast-feeding. These high-risk infants need to be observed for a minimum of 72 hours for hypoglycemia. Infants on full katori-spoon feeding and/ or breast-feeding may be shifted to the mother after 72 hours if she is confident of on going-care.

*Paladay/ spoon feeding*

Feeding with a spoon (or a similar device such as ‘paladay’) and katori (or any other receptacle such as cup) has been found to be safe in SFD infants. This mode of feeding is a bridge between gavage feeding and direct breast-feeding. It is based on the premise that neonates with a gestation of 30-32 weeks or more are in a position to swallow the feeds satisfactorily even though they may not be good at sucking or coordinated sucking and swallowing. A medium sized katori and a small (1-2 ml size) spoon should be used. The spoon should be filled just short of the brim with expressed milk, should be placed at the corner of mouth and milk should be allowed to flow into the infant’s mouth slowly, avoiding any spillage. The infant would actively swallow the milk. This process should be repeated till the required amount has been fed. If the infant does not actively accept and swallow the feed, an attempt should be made to wake the
infant with gentle stimulation. If he is still sluggish, do not insist on this method. It is better to switch back to gavage feeds till the infant is ready.
References


Table 1. Common morbidities in SFD infants.

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<tr>
<th></th>
<th>Total (N=156)</th>
<th>Weight &lt;3rd percentile (n=47)</th>
<th>Weight between 3rd – 10th percentile (n=109)</th>
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<tbody>
<tr>
<td><strong>Birth asphyxia</strong></td>
<td></td>
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<tr>
<td>Total</td>
<td>14</td>
<td>4 (8.5%)</td>
<td>10 (9.2%)</td>
</tr>
<tr>
<td>Moderate</td>
<td>10</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Severe</td>
<td>4</td>
<td>2</td>
<td>2</td>
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<tr>
<td><strong>Hypoglycemia</strong></td>
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<td></td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>12 (25.5%)</td>
<td>14 (12.8%)</td>
</tr>
<tr>
<td>Symptomatic</td>
<td>9</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Asymptomatic</td>
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<td>6</td>
<td>11</td>
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<tr>
<td><strong>Polycythemia</strong></td>
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<td></td>
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<tr>
<td>Total</td>
<td>31</td>
<td>14 (29.8%)</td>
<td>17 (15.6%)</td>
</tr>
<tr>
<td>Symptomatic</td>
<td>11</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Asymptomatic</td>
<td>20</td>
<td>11</td>
<td>9</td>
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<tr>
<td><strong>Hypothermia</strong></td>
<td>4</td>
<td>0</td>
<td>4 (3.7%)</td>
</tr>
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</table>
### Table 2. Management of SFD infants

**Criteria for admission to Nursery**
- All SFD infants < 2 SD (3rd percentile)
- Infants with gestational age < 35 wks
- Infants with birth asphyxia, respiratory distress etc.

**Care of SFD infants with mothers (birth weight between 3rd and 10th percentile, gestation >35 wks)**
- Early initiation of breast feeding (within 1 hour)
- Skin-to-skin care to maintain temperature, monitoring of cold stress by mother and health professionals.
- Monitor blood sugar, hematocrit
- Prevent infections

**Care of SFD infants in Nursery (birth weight <3rd percentile or gestation <35 wks)**
- Nurse in thermoneuteral environment
- It stable, early initiation of feeds (EBM).
  - Feed by orogastric tube or katori-spoon/paladay if gestation ≥32 wks
  - Initial intravenous fluids followed by orogastric or katori-spoon/paladay if gestation <32 wks
- Monitor blood sugar, hematocrit
Figure 1. Algorithm for management of SFD infants

SFD*

Term (borderline)

- <3rd percentile
  - Admit nursery
  - Breastfeeding or katori-spoon

- 3rd – 10th percentile
  - Monitor with mother
  - Breastfeeding

<35 wk

- <30 wk – initial on IV
- 30 – 34 wk orogastric or katori-spoon

*Blood sugar, hematocrit, temperature monitoring