Late Preterm Pregnancy and the Newborn

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Presenter Disclosures

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Speaker has nothing to disclose

Late Preterm Pregnancy and the Newborn

Objectives:

1. Define the LPT infant
2. Review obstetric issues impacting increase in LPT births
3. Address GA specific morbidities of LPT
4. Long term effects of being born at this GA.
5. Discharge Guidelines for LPT

History of Late Preterm Infant

1948: WHO recommended infants < 2500g and those < 37 weeks gestation be considered immature.

1950: Revised to preterm infants < 37 completed weeks gestation from LMP.

2005: NICHD and NIH recommended definition of births between 34 and 0/7 and 36 and 6/7 completed weeks gestation.

Definitions of “late preterm” and “early term.” Adapted from Engle W, Kominiarek M. Clin Perinatol. 2008;35:325–341

Late Preterm or “Near Term Birth”

34 to 36 and 6/7 weeks gestation
75% of all preterm births in NA and 9% of births in US.
Rates increasing over past decade

WNY: 69-72% of all preterm births (05-’06) and 8.4% of all births.
"Early Term": born between 37 and 0/7 – 37 and 6/7 weeks GA
Multidisciplinary Guidelines for the Care of Late Preterm Infants

Distribution US Preterm Births 2008

Preterm Births as a Percentage of Live Births in the United States, 1990 to 2004

Fig 1. Incidence of preterm (<37 wk), late preterm (34–36 wk) and early preterm (<34 wk) births (16 of all births) in US

Preterm Births by Gestational Age Category United States, 1990, 2004, 2005

A “Bit Too Early”
Changes in Preterm Birth

- Maternal age/race/ethnicity between 92 – 2003 did not account for these changes.
- ?? Association with an increase in obstetrical interventions.
- Increase in inductions due to changing demographics of pregnant women and increase in C/S on demand.

Total and Primary Cesarean and VBAC
United States, 1993 - 2004

Percent of Term and Preterm Births with Induced Labor, US, 1990-2002

Gestational Age-Specific Distribution
Singleton Live Births, Spontaneous

Higher rates of c-sections and inductions among singleton live births: 1992 and 2002

Demographics affecting Preterm Births

- Increased risk factors in pregnant women: obesity, hypertension, diabetes, smoking and chronic medical conditions
- Increase in multiple gestations
- Maternal age < 20 and > 40.
- Previous PT birth

Source: National Center for Health Statistics
Prepared by March of Dimes Perinatal Data Center, 2005

Prepared by March of Dimes Perinatal Data Center, 2005
LPT rates by Maternal Age

Multiple Gestation

Twins have increased by 42% and triplets by 122% (Between 1990-2005).

Higher-Order Multiple Birth Ratios By Maternal Race, United States, 1980-2002

Results
Proportion of infants with neonatal morbidity

<table>
<thead>
<tr>
<th>Neonatal Outcome</th>
<th>Late preterm (N=1,004) %</th>
<th>Term (N=24,320) %</th>
</tr>
</thead>
<tbody>
<tr>
<td>All morbidity</td>
<td>4.3</td>
<td>2.7</td>
</tr>
<tr>
<td>Hospital readmission</td>
<td>3.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Observational stay</td>
<td>0.9</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Morbidity of Late Preterm

Heat Loss
Respiratory immaturity
Poor feeding
Risks for the Late Preterm Infant

- 2 – 3 X risks for hypothermia, hypoglycemia, respiratory distress, poor feeding, jaundice, infection and readmission rates after hospital discharge.

- * 80% of deliveries in US occur in community hospitals.

<table>
<thead>
<tr>
<th>Morbidity</th>
<th>Late Preterm</th>
<th>Full Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Instability</td>
<td>10%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Hypoglycemia</td>
<td>15%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Respiratory Distress</td>
<td>28%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Jaundice</td>
<td>54%</td>
<td>37%</td>
</tr>
<tr>
<td>Poor feeding</td>
<td>70%</td>
<td>28%</td>
</tr>
<tr>
<td>Apnea/bradycardia</td>
<td>4.4%</td>
<td>0%</td>
</tr>
<tr>
<td>Sepsis evaluation</td>
<td>36%</td>
<td>12%</td>
</tr>
<tr>
<td>IV infusions</td>
<td>20%</td>
<td>5.3%</td>
</tr>
</tbody>
</table>

*Wang Pediatrics, 2004:114:372

Clinical Outcomes: Full term vs. Near term

- Most common condition requiring evaluation and treatment in newborns.
- Most common cause of hospital readmission in week 1 of postnatal life.
- LPT GA risk factor for severe hyperbilirubinemia and kernicterus.
Near-term Infants: Hyperbilirubinemia (Jaundice) - 2 reports

4/11 (36%) of infants in an HMO with serum bilirubin of 30+ were born at 35-36 weeks
Newman, Pediatrics 2003

Hyperbilirubinemia in LPT

- 8X risk of TSB > 20mg/dL
- LPT over represented in US Pilot Kernicterus Registry.
- Slower postnatal maturation of bilirubin uptake and conjugation.

Kernicterus

- Over past 2 decades almost all kernicterus cases have been in breast fed infants… and suboptimal lactation was most frequent in those who developed bilirubin encephalopathy.
- > 30% of kernicteric LPT infants were LGA.

Kernicterus

Choreoathetoid cerebral palsy
High-frequency central neural hearing loss
Palsy or vertical gaze
Dental enamel hypoplasia

Late Preterm and Respiratory Distress

Frequency of RDS, sepsis and apnea: 34, 35, 36 weeks of gestation

Late Preterm and Respiratory Issues:

- Higher incidence of transient tachypnea of newborn (TTNB), respiratory distress syndrome (RDS), persistent pulmonary hypertension of newborn (PPHN) and respiratory failure than term infants.
- 50% - 34 weeks GA require NICU care
- 15% - 35 weeks GA require NICU care
- 8% - 36 weeks GA require NICU care

> Delayed respiratory transition

- More respiratory distress than term (28.9% vs. 4.25%)
- Hypothesis: High PUFA $\rightarrow$ thromboxane production $\rightarrow$ prostaglandins change vasomotor tone $\rightarrow$ hypoxemia.

Clinics in Perinatology: Dec 2006

Pulmonary Transition at Birth

Late Preterm: Severe Hypoxic Failure

- ECMO 14.5% late preterm: ↑ IVH and ↓ survival
- ↓ survival 74% LPT vs. 87% in term
- ↓ RV function
- ↓ LV function $\rightarrow$ cardiovascular collapse.

GI/Metabolic Concerns of LPT

- Feeding difficulties – Less mature swallow, poor coordination of suck swallow, decreased peristaltic function.

Moderately Premature Infant Project: LPT infants admitted to NICU – 17% on TPN (range of 5% - 66%) 46% discharged on high caloric formula (range of 4% - 72%)

Discharge Nutrition for LPT

- Higher caloric feeding $\Rightarrow$ higher net growth velocity.
- Consider 22 cal/oz feeds at discharge if < 1800g BWT up to 9 months CGA, (AAP). Uncomplicated course $\Rightarrow$ 20cal/oz.
- Vitamin D for BF infants: 400IU/day for preterm.
- Iron: 2-4mg/kg/day thru year 1. (max 40mg/day)
Cerebral Development in LPT

- Significant increase in gray and white matter at term
- LPT has not yet progressed to myelination of white matter
- Cortex volume: weight – 65% term
  surface area – 50% term

Cerebellar Volume/Development

- Last Trimester: Cerebellum rapid growth
- Late Preterm:
  - 34 weeks GA
  - Cerebellar volume ~ 55% term
- Brainstem: Not fully mature, incomplete myelination

Cause for future concerns…
Developmental Concerns

- Fine Motor Control
- Coordination
- Motor sequencing
- Cognition/Language
- Social Function

LPT Early School Age outcomes Compared to Term

- Increased risk of developmental delays
- 10 – 13% increased risk for retention in kindergarten.
- Behavioral problems, lower IQ at age 6
- Norwegian study: LPT at ages 20 - 26 yrs had increased disabilities and less employment.

What Impact to Infant Health from Rising Late PTB?
Need to separate causes and effects

- Increased morbidities - Higher Neonatal and Infant mortality:
  - U.S. neonatal deaths/1000 live births (2002)
    - 34-36 weeks = 4.1
    - 37-41 weeks = 0.9
  - U.S. infant deaths/1000 live births (2002)
    - 34-36 weeks = 7.7
    - 37-41 weeks = 2.5

Neonatal Re-admission Diagnoses Among Infants Discharged Early

All is not lost.....
AAP Policy: 2004

- Level 1 Nursery: Stabilize and care for 35 to 37 weeks GA.
- Transfer ill LPT and those < 34 weeks to appropriate facility.
- 34 week GA: NICU for "observational period" of 24 hrs.
- 35 weeks and > 2150g to NBN. (? >2300g).

Solutions??

Prenatal education
Limit inductions at < 39 weeks GA
Guidelines/Peer review for use of IVF
In Conclusion…

- Recognize the late preterm as a separate entity.
- LPT are physiologically immature yet exposed to same stressors as term infant with higher morbidities and mortality.
- Higher costs and NICU stays and readmissions.

"Not just another pretty face."

LPT require close neuro developmental follow-up and close monitoring of bilirubin, glucose and nutritional intake.

Practice Guidelines need to be developed and consistent with regard to:
- Hypoglycemia
- Jaundice
- Feeding practices in hospital and at discharge
- Thermoregulation
- Respiratory distress

Discharge Criteria for LPT

- Stable VS for 24 hrs
- RR < 60
- Voided and stool passed
- Successful feeding for 24 hrs (lactation consult particularly if primigravida)
- Evaluation for jaundice/bilirubin PTD
- Back to sleep instruction
- Car seat instruction
- F/U by PMD in 24 – 48 hrs.

Mothers of LPT showed greater stress levels postpartum