Neonatal Outcomes of Multiple Gestation

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UT Health Science Center
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Objectives

- Describe the various neonatal outcomes in multiple gestation pregnancies delivered preterm and term
- List the rates of morbidity and mortality for multiples delivered at varying gestational age
Objectives

- Discuss the benefits of prenatal counseling and patient education on the associated neonatal risk from prematurity
Live Births and Fertility Rates

Figure 2. Live births and fertility rates: United States, final 1920–2009 and preliminary 2010
Figure 1. Late preterm birth rates: United States, selected years final 1990–2009 and preliminary 2010

NOTE: Late preterm is 34–36 completed weeks of gestation.
Temporal trends in the rate of twinning (per 1000 births), and the change in twinning rates since 1980: United States, 1980-2009.

Ananth C, Chauhan S. Seminars in Perinatology Volume 36, Issue 3 2012 156 - 161
Infant Mortality Singleton vs. Multiple Births in the United States

Infant mortality rates by birth weight among singletons (lighter bars) and multiples (darker bars) in the United States, 1989 and 1999. Graph is shown using a log scale. Source: National Center for Health Statistics

Changes in rates of neonatal mortality (first 28 days) among twin live births delivered at preterm gestations based on the underlying clinical subtypes. The mortality rates are plotted on a logarithmic scale (Adapted from Lisonkova et...)

Ananth C, Chauhan S, Seminars in Perinatology Volume 36, Issue 3 2012 156 - 161
Changes in the risk of serious neonatal morbidity or mortality (neonatal mortality or one or more of 5-minute Apgar score <4, neonatal seizures, or assisted ventilation for >30 minutes) among twins delivered at preterm gestational ages (24-36 w...
Twin birth ratios among infants of all races (shaded bars), white infants (solid line), and black infants (broken line) in the United States, 1980-1999.

Higher order birth ratios among infants of all races (shaded bars), white infants (solid line), and black infants (broken line) in the United States, 1980-1999

Morbidity during birth hospitalization among late preterm and term infants

Length of Stay

Gestational Age (weeks)

Length of Stay (days)

near term • full term

Neonatal Outcomes

- Most studies are retrospective evaluations of neonatal outcomes mostly related to morbidity (gestational age at delivery, birth weight) and mortality.
OBSTETRICS

Gestational age at delivery and perinatal outcomes of twin gestations

Amy E. Doss, MD; Melissa S. Mancuso, MD; Suzanne P. Cliver, BA; Victoria C. Jauk, MPH, BSN; Sheri M. Jenkins, MD

OBJECTIVE: The optimal gestational duration for twin gestations is unknown. Epidemiologic studies show that the lowest perinatal mortality rate for twins is at 37-38 weeks, but these studies lack information on pregnancy complications and neonatal morbidities. This study evaluates pregnancy characteristics and perinatal outcomes of twins in order to assess the optimal gestational age for delivery.

STUDY DESIGN: This is a retrospective study of twins delivered at 36 weeks at our institution from 1991-2009. The composite rate of perinatal morbidity and mortality (including perinatal death, respiratory distress, suspected sepsis, and need for neonatal intensive care) was determined for weekly intervals from 36-39 weeks.

RESULTS: There were 377 twin gestations included. Of those 83% were dichorionic. Fifty-three percent had spontaneous labor and 48% were delivered by cesarean section. Perinatal outcomes improved as gestational age advanced to 38 weeks.

CONCLUSION: Perinatal morbidity and mortality rates suggest that the optimal time for delivery of twins is at 38 weeks or greater.

OBJECTIVE: We sought to assess neonatal morbidity and mortality of elective cesarean section (CS) of uncomplicated twin pregnancies per week of gestation 35.

STUDY DESIGN: We performed a retrospective cohort study in our nationwide database including all elective CS of twin pregnancies. Two main composite outcome measures were defined, ie, severe adverse neonatal outcome and mild neonatal morbidity.

RESULTS: We report on 2228 neonates. More than 17% were born 37 weeks of gestation. Adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for severe adverse neonatal outcome at 35 +0-6, 36+0-6, and 37+0-6 weeks were, OR, 9.4; 95% CI, 3.2–27.6; OR, 1.7; 95% CI, 0.5–5.3; and OR, 0.7; 95% CI, 0.2–2.0, respectively; and for mild neonatal morbidity, OR, 4.7; 95% CI, 2.6–8.7; OR, 4.9; 95% CI, 3.1–7.9; and 1.4; 95% CI, 0.9–2.1, respectively, compared to neonates Born 38 weeks of gestation.

CONCLUSION: In uncomplicated twin pregnancies elective CS can best be performed between 370 and 396 weeks of gestation.
55% of twin pregnancies deliver prematurely with a mean gestational age of 35 weeks compared to singleton of 39 weeks.

Rates of deliveries < 32 weeks are 1-2% in singletons, 5.5% in dichorionic and 9.2% in monochorionic twin pregnancies.
Neurodevelopmental Outcome

Retrospective cohort study of ELBW (401-1000g) of NICHD NRN 1996-2005 (n=17429) evaluating neurodevelopmental outcome between three groups: singletons; twins and triplets or higher-order multiple births.

Exclusion criteria for study subjects included: outborn infants, death within 12 hours of birth, missing or incomplete survival or follow-up information.
Study Population

## Infant Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Singletons, $n = 8296$</th>
<th>Twins, $n = 2164$</th>
<th>Triplets or Higher-Order Births, $n = 521$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestational age, means ± SD, wk</td>
<td>26.0 ± 2.1</td>
<td>25.8 ± 2.1</td>
<td>25.9 ± 2.0</td>
</tr>
<tr>
<td>Birth weight, means ± SD, g</td>
<td>757 ± 147</td>
<td>748 ± 151</td>
<td>759 ± 154</td>
</tr>
<tr>
<td>Male, $n$ (%):</td>
<td>4045 (48.8)</td>
<td>1135 (52.5)$^a$</td>
<td>254 (48.8)</td>
</tr>
<tr>
<td>1-minute Apgar score &lt;3, $n$ (%)</td>
<td>2368 (28.6)</td>
<td>550 (25.5)$^a$</td>
<td>92 (17.7)$^a$</td>
</tr>
<tr>
<td>5-minute Apgar score &lt;3, $n$ (%)</td>
<td>447 (5.4)</td>
<td>93 (4.3)$^a$</td>
<td>15 (2.9%)$^a$</td>
</tr>
<tr>
<td>Days on ventilator, means ± SD</td>
<td>24.4 ± 26.0</td>
<td>23.7 ± 25.2</td>
<td>21.5 ± 25.1$^a$</td>
</tr>
<tr>
<td>Surfactant, $n$ (%)</td>
<td>6695 (80.9)</td>
<td>1861 (86.2)$^a$</td>
<td>458 (88.3)$^a$</td>
</tr>
<tr>
<td>Patent ductus arteriosus, $n$ (%)</td>
<td>3678 (44.4)</td>
<td>1070 (49.5)$^a$</td>
<td>259 (49.7)</td>
</tr>
<tr>
<td>Patent ductus arteriosus, surgery, $n$ (%)</td>
<td>986 (26.8)</td>
<td>289 (27.0)</td>
<td>90 (34.8)$^a$</td>
</tr>
<tr>
<td>Days on total parenteral nutrition, $n$ (%)</td>
<td>30.1 ± 23.2</td>
<td>29.7 ± 23.9</td>
<td>29.1 ± 23.5</td>
</tr>
<tr>
<td>Postnatal steroids, $n$ (%)</td>
<td>2255 (27.3)</td>
<td>548 (25.3)</td>
<td>150 (28.8)</td>
</tr>
</tbody>
</table>

$^aP < .05$ vs. singletons.
## Short-Term and 18-22 Months Outcomes by Univariate Analysis

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Singletons, $n = 8296$</th>
<th>Twins, $n = 2164$</th>
<th>Triplets or Higher-Order Births, $n = 521$</th>
<th>$P$, Twins vs Singletons</th>
<th>$P$, Triplets or Higher-Order Births vs Singletons</th>
<th>$P$, Triplets or Higher-Order Births vs Twins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe intraventricular hemorrhage, $n$ (%)</td>
<td>1361 (17.0)</td>
<td>415 (20.4)</td>
<td>79 (16.0)</td>
<td>.0016</td>
<td>.61</td>
<td>.048</td>
</tr>
<tr>
<td>Bronchopulmonary dysplasia, $n$ (%)</td>
<td>3002 (47.9)</td>
<td>756 (50.9)</td>
<td>165 (44.0)</td>
<td>.05</td>
<td>.21</td>
<td>.038</td>
</tr>
<tr>
<td>Late-onset sepsis, $n$ (%)</td>
<td>3042 (38.8)</td>
<td>782 (40.2)</td>
<td>183 (39.5)</td>
<td>.27</td>
<td>.77</td>
<td>.80</td>
</tr>
<tr>
<td>Necrotizing enterocolitis, $n$ (%)</td>
<td>933 (11.3)</td>
<td>252 (11.7)</td>
<td>35 (6.7)</td>
<td>.61</td>
<td>.0002</td>
<td>.0003</td>
</tr>
<tr>
<td>Death before discharge, $n$ (%)</td>
<td>2080 (25.1)</td>
<td>694 (32.1)</td>
<td>137 (26.3)</td>
<td>&lt;.0001</td>
<td>.64</td>
<td>.043</td>
</tr>
<tr>
<td>Death or NDI, $n$ (%)</td>
<td>4418 (53.3)</td>
<td>1324 (61.2)</td>
<td>289 (55.5)</td>
<td>&lt;.0001</td>
<td>.44</td>
<td>.064</td>
</tr>
<tr>
<td>NDI, $n$ (%)</td>
<td>2190 (36.1)</td>
<td>585 (41.1)</td>
<td>149 (39.1)</td>
<td>.0018</td>
<td>.3341</td>
<td>.57</td>
</tr>
</tbody>
</table>

\[^{a}\text{Survivors on supplementary oxygen at 36 weeks}\]
\[^{b}\text{Denominator: surviving infants with complete follow-up data}\]

### Neurodevelopment Index (NDI) Components

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Singletons, $n = 6068$</th>
<th>Twins, $n = 1425$</th>
<th>Triplets or Higher-Order Births, $n = 381$</th>
<th>$P$, Twins vs Singletons</th>
<th>$P$, Triplets or Higher-Order Births vs Singletons</th>
<th>$P$, Triplets or Higher-Order Births vs Twins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental developmental index &lt;70, $n$ (%)</td>
<td>1816 (30.3)</td>
<td>496 (35.2)</td>
<td>118 (31.6)</td>
<td>.0015$^a$</td>
<td>.64</td>
<td>.28</td>
</tr>
<tr>
<td>Psychomotor developmental index &lt;70, $n$ (%)</td>
<td>1226 (20.5)</td>
<td>336 (24.0)</td>
<td>83 (22.6)</td>
<td>.0090$^a$</td>
<td>.38</td>
<td>.61</td>
</tr>
<tr>
<td>Cerebral palsy, $n$ (%)</td>
<td>298 (5.0)</td>
<td>97 (6.9)</td>
<td>21 (5.6)</td>
<td>.0143$^a$</td>
<td>.61</td>
<td>.34</td>
</tr>
<tr>
<td>Blindness, $n$ (%)</td>
<td>100 (1.7)</td>
<td>31 (2.2)</td>
<td>10 (2.6)</td>
<td>.25</td>
<td>.29</td>
<td>.65</td>
</tr>
<tr>
<td>Deafness, $n$ (%)</td>
<td>106 (1.8)</td>
<td>31 (2.2)</td>
<td>9 (2.4)</td>
<td>.34</td>
<td>.44</td>
<td>.83</td>
</tr>
</tbody>
</table>

$^a P <.05.$

Results of logistic regression:
Death or NDI

NDI among survivors with follow-up

Prenatal Counseling and Patient Education

- At risk population in this maternal and infant dyad.
- Maternal risk for pregnancy complications of preterm labor, preeclampsia, fetal loss
- Infant risk of prematurity birth, prolonged hospitalization, morbidities associated with premature delivery
Prenatal Counseling Benefits

- Mental preparation period for parents of potential extended hospitalization even if “just a little premature”.
- Opportunity to address questions of outcome including neurodevelopmental outcome.
- Recognize the associated stress for many of these parents especially if infertility history.
- Identify at risk mothers for referral of support and professional interventions.
Summary

- Birth rates have not changed much but rise in multiple order births.
- Multiple order births are greater risk to deliver prematurely with associated risks including morbidity and mortality.
- Prenatal counseling of parent(s) with neonatology colleagues may alleviate and address concerns prior to delivery of a probable stressful situation.
Length of Stay

Gestational Age (weeks)

Length of Stay (days)

Near term • Full term

Percent of all live births born late preterm by race and ethnicity, United States, 2006.

Shapiro-Mendoza C K Neoreviews 2009;10:e287-e294
Thank You!