Prolonged Pregnancy

- The problem of the post mature infant
  
  Ballantyne (1902)
  
  “….the fetus that has remained so long in utero that his difficulty is to be born with safety to himself and his mother”

- Postmaturity with placental dysfunction, clinical syndrome and pathologic findings
  
  Clifford (1954)
  
  “….recent weight loss… malnourished… lose peeling skin… meconium staining… birth asphyxia… meconium aspiration… perinatal death”
Pregnancy Dating

Boyd et al. AJOG; 1988:158

- G.A. by LMP > 293 days – 7.5%
- G.A by Sono > 293 days – 1.1%
Gestational Dating

“75% of post-term (>294 days) inductions were done before the pregnancy was actually post-term by scan dates.”

Jason Gardosi, Ultrasound Obstet Gynecol 1997;9:367
Etiology

- Wrong dates !!
- Fetal abnormalities (hypothalamic-pituitary-adrenal axis)
- Placental sulphatase deficiency (x-linked recessive)
- Prostaglandin inhibitors
- Maternal factors: primiparity & previous prolonged delivery
TABLE 28-1. Adjusted\(^a\) Odds Ratios for Perinatal Mortality As a Function of Gestational Age for 181,524 Births in Sweden (1987–1992)

<table>
<thead>
<tr>
<th>Gestational Age (wk)</th>
<th>Fetal Death Odds Ratio (95% CI)</th>
<th>Neonatal Mortality Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>1.0 (ref)</td>
<td>1.0 (ref)</td>
</tr>
<tr>
<td>41</td>
<td>1.48 (1.13–1.95)(^b)</td>
<td>1.24 (0.90–1.70)</td>
</tr>
<tr>
<td>42</td>
<td>1.77 (1.22–2.56)(^b)</td>
<td>1.44 (0.92–2.24)</td>
</tr>
<tr>
<td>≥43</td>
<td>2.90 (1.27–6.61)(^b)</td>
<td>1.89 (0.60–5.99)</td>
</tr>
</tbody>
</table>

CI = Confidence interval.

\(^a\)Adjusted for maternal age, parity, smoking, and fetal sex.

\(^b\)P < .05 (over referent group).

From Divon and co-authors (1998).
Post-Term Birth: Risk Factors and Outcomes in a 10-Year cohort of Norwegian Births

Complication Rates in Term (n= 379,445) and Post Term (n= 65796)

<table>
<thead>
<tr>
<th>Complications</th>
<th>Prevalence (%)</th>
<th>Relative risk (95% CI) post-term vs. term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In term births</td>
<td>In post-term births</td>
</tr>
<tr>
<td>Fetal distress</td>
<td>5.02</td>
<td>8.42</td>
</tr>
<tr>
<td>Shoulder dystocia</td>
<td>0.53</td>
<td>0.73</td>
</tr>
<tr>
<td>Labor Dysfunction</td>
<td>9.45</td>
<td>11.9</td>
</tr>
<tr>
<td>Obstetric trauma</td>
<td>2.62</td>
<td>3.28</td>
</tr>
<tr>
<td>Hemorrhage</td>
<td>9.14</td>
<td>9.96</td>
</tr>
</tbody>
</table>

Campbell et al. Obstet Gynecol; 1997
Birthweight

The **post-term** fetus may outgrow the ability of its **placenta** to supply nutrients and provide adequate gas exchange and is, therefore, at risk for adverse outcome resulting from either **malnutrition** or **asphyxia**.
Fetal and Neonatal Mortality in the Post Term Pregnancy: The Impact of Gestational Age and Fetal Growth Restriction

<table>
<thead>
<tr>
<th>Gestational age</th>
<th>Intrauterine fetal death: Odds ratio and 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>40 wk</strong></td>
<td></td>
</tr>
<tr>
<td>Non-IUGR</td>
<td>1.0 (ref)</td>
</tr>
<tr>
<td>IUGR</td>
<td>7.17 (4.06-12.66)*</td>
</tr>
<tr>
<td><strong>41 wk</strong></td>
<td></td>
</tr>
<tr>
<td>Non-IUGR</td>
<td>1.47 (1.10-1.98)*</td>
</tr>
<tr>
<td>IUGR</td>
<td>10.03 (5.56-18.07)*</td>
</tr>
<tr>
<td><strong>&gt;42 wk</strong></td>
<td></td>
</tr>
<tr>
<td>Non-IUGR</td>
<td>1.94 (1.33-2.82)*</td>
</tr>
<tr>
<td>IUGR</td>
<td>7.11 (2.87-17.63)*</td>
</tr>
</tbody>
</table>
Multivariate Analysis of Variables Associated with Perinatal Death Among Post-Term Births (n=65,796)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Relative Risk</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>SGA</td>
<td>5.68</td>
<td>4.37, 7.38</td>
</tr>
<tr>
<td>Maternal Age ≥35y</td>
<td>1.88</td>
<td>1.22, 2.89</td>
</tr>
<tr>
<td>LGA</td>
<td>0.51</td>
<td>0.26, 1.00</td>
</tr>
</tbody>
</table>

Campbell et al. Obstet Gynecol 1997
Fetal Macrosomia

- Prolonged Pregnancy
- Constitutional
- Diabetes
- Syndromes (i.e., Beckwith-Wiedman)
- Fetal tumors
Incidence of Persistent Birth Injury in Macrosomic Infants: Association with Mode of Delivery

Kolderup et al.; AJOG 1997

- 2924 Macrosomic (>4000g) infants; 16,711 controls
- Overall incidence of persistent injury - 0.3%
- Persistent injury in macrosomia - 1.6% (injuries with birthweight >4500g - 2.9%)
AC 31.99cm
GA 35w6d 57.9%
EFW 2588g (5lb11oz) 29.6%
# Accuracy of Sono Estimates of Fetal Weight

## Birth weight

<table>
<thead>
<tr>
<th>EFW</th>
<th>≥ 4000g</th>
<th>&lt; 4000g</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 4000g</td>
<td>49</td>
<td>22</td>
</tr>
<tr>
<td>&lt; 4000g</td>
<td>32</td>
<td>214</td>
</tr>
</tbody>
</table>

- Sensitivity = 61%
- Specificity = 91%
- + PV = 70%
- - PV = 87%
Macrosomia in Post-Dates Pregnancies: The Accuracy of Routine Ultrasonographic Screening
Receiver Operating Characteristic Curves of Sonographic Estimated Fetal Weight for Prediction of Macrosomia in Prolonged Pregnancies

Predicting Birthweight >4000 grams

Area under curve = 0.85, SE = 0.02, $p < 0.000001$

3711g cut-off (0.85, 0.28)
Labor Induction with a Prenatal Diagnosis of Fetal Macrosomia


<table>
<thead>
<tr>
<th></th>
<th>Induction (n=53)</th>
<th>Control (n=53)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>C/S</td>
<td>36%</td>
<td>17%</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Shoulder Dystocia</td>
<td>5.9%</td>
<td>11%</td>
<td>NS</td>
</tr>
</tbody>
</table>

“In conclusion, our study does not support the practice of induction of labor for fetal macrosomia.”
**Induction of Labor Versus Expectant Management in Macrosomia: A Randomized Study**


273 patients with EFW >4000g

<table>
<thead>
<tr>
<th></th>
<th>Expectant</th>
<th>Induction</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>C/sect</td>
<td>21.6</td>
<td>19.4</td>
<td>NS</td>
</tr>
<tr>
<td>Shoulder Dystocia</td>
<td>5/139</td>
<td>6/134</td>
<td>NS</td>
</tr>
</tbody>
</table>

“Induction of labor for suspected macrosomia did not decrease the incidence of c/s or neonatal morbidity.”
The Effectiveness and Costs of Elective Cesarean Delivery for Fetal Macrosomia Diagnosed by Ultrasound

Rouse et al. JAMA; 1996

2345 unnecessary cesarean deliveries need to be performed to prevent one case of permanent brachial plexus injury.
The Effectiveness and Costs of Elective Cesarean Delivery for Fetal Macrosomia Diagnosed by Ultrasound

Rouse et al. JAMA; 1996

“For every 3.2 permanent brachial plexus injuries prevented, one maternal death would result”
Fetal Surveillance in prolonged pregnancy

- Commonly used
- No testing protocol completely eliminates the risk of stillbirth.
- High false positive rate leading to unnecessary intervention.
Quantifying Amniotic Fluid Volume and Defining Oligohydramnios

- Supported by a prospective study of 1584 patients where AFI <5 cm was associated with an increase in birth asphyxia and meconium aspiration (with a PPV of ≤28.6% for various adverse outcomes).
- Most patients with AFI <5 cm tolerate labor well.
Amniotic Fluid Volume at 41 weeks and Infant Outcome

*Lam J Reprod Med 2006:*

“Although AFI may be used to predict thick meconium-stained liquor and the need for intervention for fetal distress in postdate pregnancies, its role on its own is limited”
Intervention for Preventing or Improving the Outcome of Delivery at or Beyond Term

Cochrane Database Systemic Reviews (2007):

Review of 26 trial concluded that:

- Early ultrasound dating reduces the incidence of post-term pregnancy.
- Routine induction at 41 weeks appears to reduce perinatal mortality.
- There is not enough evidence to evaluate the effects of tests of fetal well being.
Good and consistent scientific evidence:

- Women with unfavorable cervix can either undergo induction of labor or be managed expectantly.
- Prostaglandins can be used to promote cervical ripening and induce labor.
- Delivery should be effected if there is evidence of fetal compromise or oligohydramnios.
Management of Post Term Pregnancy

ACOG PRACTICE BULLETIN #55, SEPT 2004

Recommendations based on consensus/expert opinion:

- It is reasonable to initiate fetal testing between 41 and 42 weeks’ gestation
- Semi weekly fetal testing is superior to weekly fetal testing (BPP or NST & AFI)
- Delivery if cervix is favorable
Post-Dates in 2012:
Maternal Consequences of Delivery for Prolonged Pregnancy
How Do You Calculate Perinatal Mortality?

- Fetal, Neonatal (<28 days) or perinatal mortality rates
- Per 1000 births
Calculating Perinatal Mortality

“Estimating the probability of an event requires that the number of events (numerator) be divided by the number of events at risk for that event (denominator”).

Smith, AJOG 2001; 184:489
A functional definition of prolonged pregnancy based on daily fetal and neonatal mortality

- Risk increases from 0.5/1000 at 37 weeks to 11/1000 at 43 weeks

Divon et al.  
Ultrasound Obstet Gynecol 2004
When Does the Risk of Fetal Death Exceed the Risk of Neonatal Death?

- Neonatal death per 1000 live births
- Fetal death, cumulative, per 1000 ongoing pregnancies
- Risk of fetal death exceeds that of neonatal death at $> 283$ days gestation (daily R.R. ranging from 1.77 to 6.28)
## Undelivered Patients and Potentially Saved Fetuses at a Specific Gestational Age

<table>
<thead>
<tr>
<th>Gestational Age at Delivery (weeks)</th>
<th># of Undelivered Pregnancies</th>
<th># of Potentially Saved Fetuses</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 3/7</td>
<td>268,068</td>
<td>378</td>
</tr>
<tr>
<td>41</td>
<td>160,394</td>
<td>250</td>
</tr>
<tr>
<td>42</td>
<td>42,818</td>
<td>78</td>
</tr>
</tbody>
</table>
In Conclusion....