Case Study Two
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**Gestational Age**

This female infant was born to a mother with limited prenatal care. Estimated gestational age was 34 weeks based on the mother’s last menstrual period. The mother did not keep her ultrasound appointment. The scan performed prior to the caesarian section (c-section) indicated the infant was small for 34 weeks. Due to lack of prenatal care, gestational age could not be determined by ultrasound parameters or maternal physical assessment. The New Ballard Scale (NBS) Tool was utilized to estimate gestational age. A physical maturity score of 8 was obtained by adding the following:

**Physical Maturity**

- Skin (2) - Few visible abdominal veins
- Lanugo (1) – The presence of thick vernix indicates there is abundant lanugo as lanugo retains vernix to the surface of the skin (Trotter, 2009).
- Plantar Surface (2) - Feet with anterior transverse creases.
- Breast (1) - Breast tissue, flat areola, no buds
- Eye/Ear (1) - Ear is soft with slow recoil
- Genitals (female) (1) - Prominent clitoris, small labia majora

**Neuromuscular Maturity**

The infant is lethargic, in a semi-flexed position, and has a weak cry. The mother was being treated with magnesium sulfate, and the infant was exposed to it during labor. Neuromuscular function is likely diminished due to the influence of the magnesium. Since the infant is only 30 minutes old, the magnesium has not cleared her system, making the neuromuscular exam unreliable at this time. For this reason, gestational age was estimated by multiplying the physical exam score of 8 by two, resulting in a total score of 16. A score of 16 falls in-between the scores of 15 and 20, or 30 and 32 weeks.

The NBS authors do not provide recommendations on how to assign gestation if the score falls between 2 parameters (Trotter, 2009). For this reason, assessment of the anterior vascular capsule of the lens (AVCL) was utilized as another method for determining gestational age. In this case, the anterior vessels are given a grade of 2, suggesting 31-32 weeks (Trotter, 2009). Based on the information from the AVCL and NBS, the infant is assigned a gestational age of 31 weeks. This does not match the original dates of 34 weeks that were provided.
Standard Growth Curve

The infant’s weight (1900 grams), head circumference (29 cm), and length (40cm) are plotted on the growth chart for her assigned gestational age of 31 weeks. All three parameters fall between the 10th and 90th percentiles on the chart, concluding that this infant is appropriate for gestational age (AGA) (Tappero, 2009). These findings contradict the original belief that she was 34 weeks and small for a gestational age.

Maternal History

Due to limited prenatal care, important maternal information is absent. The mother is 36 years old which is considered advanced maternal age. She is now G2 P2 LC 1 and FD 1 indicating that she has been pregnant twice, has delivered 2 infants older than 20 weeks, now has one living child, and previously experienced a fetal demise. It is important to attempt to obtain information on the fetal demise, including gestational age and suspected causes, so that this newly born infant can be monitored for those suspected causes. The mother’s blood type is O-, and although not abnormal, this blood type can lead to both ABO and Rh incompatibilities. The mother is Hepatitis B positive, and infant transmission is possible; therefore the infant must receive treatment. Maternal GBS status is unknown, but the fact that delivery was by c-section and membranes were intact until delivery is reassuring because the infant did not pass through the birth canal, and the intact membranes deterred ascending GBS infection. Nevertheless, the maternal GBS results will be followed up. The other labs are unremarkable. At the mother’s last prenatal visit her urine was positive for protein. This abnormal finding is consistent with preeclampsia and possibly HELLP Syndrome, which increase the infant’s risk of thrombocytopenia and hyperbilirubinemia (Juretschke, 2011). The mother’s urine was positive for THC, or marijuana, which could cause congenital anomalies and withdrawal in the neonate (Pitts, 2011).

Birth History

This infant was delivered via repeat c-section due to maternal pregnancy induced hypertension (PIH). The mother was treated with magnesium. The infant must be closely monitored as magnesium exposure may lead to neuromuscular depression, weakness, lethargy, and respiratory depression (Broussard & Hurst, 2010). Upon artificial rupture of membranes, minimal clear amniotic fluid was noted. Although clear fluid is normal, oligohydramnios could be indicative of neonatal complications requiring close monitoring for positional deformities as
well as renal and respiratory function. With a scheduled c-section and no labor, the infant may not adequately reabsorb fetal lung fluid prior to delivery (Askin, 2010). Following delivery via c-section, the infant presented with retractions, required suctioning, and facemask 02 indicating respiratory difficulty and requiring additional monitoring. Apgars were acceptable at 7 and 8.

**Physical Exam**

**Head, Eyes, Ears, Neck, and Throat**

An anterior fontanel that is soft and flat without bulging or depression is normal. Mobile sutures are normal in neonates. The head is without molding or caput, which is normal after c-section delivery. A positive bilateral red reflex, lack of eye discharge, anterior vessels grade 2, and soft ears with slow recoil are normal and expected findings for this gestational age. Cleft palate and palpable nodes on the neck are abnormal, and may lead to airway compromise and feeding difficulties. Palpable nodes to the neck or spine warrant additional follow up and may indicate a neural tube defect (Sterk, 2010).

**Respiratory**

Symmetrical chest wall movement is normal for a neonate. Decreased bilateral air entry, grunting, nasal flaring, retractions, and respirations in the 60s are abnormal and indicate respiratory distress or obstruction. The infant is tachypneic with a respiratory rate above the normal range of 30-60 (Askin, 2010). Since the infant’s gestation is 31 weeks, Respiratory Distress Syndrome (RDS), resulting from inadequate surfactant production, is suspected over Transient Tachypnea of the Newborn (TTN). X-ray of the lungs shows a reticulo-granular pattern, air bronchograms, and lungs with reduced volumes that have a white appearance congruent with RDS (Juretschke, 2011). The infant is cold with an abnormally low temperature of 96.5F. The cold stress may have further aggravated the respiratory distress (Askin, 2009).

**Cardiovascular**

Regular rate and rhythm with a point of maximal impulse (PMI) at the left midclavicular line (LML) is normal. A 1-2/6 murmur is present. This is common in the first 48 hours of life, and is associated with decreasing pulmonary vascular resistance after birth. Although common in preterm infants, murmurs indicate turbulent blood flow, and even innocent flow murmurs should be followed. If the murmur continues over time, or if the infant becomes symptomatic, additional cardiac evaluation may be necessary. The heart rate is 110, which is slower than the normal rate of 120-160 for preterm infants. The peripheral pulses on the right are stronger than those on the
left. This is concerning because differences in strength of pulses from right to left side, or from upper to lower extremities, may indicate decreased aortic blood flow due to congenital heart disease (Sadowski, 2010).

Gastrointestinal

The infant exhibits a soft and flat abdomen, 3 vessel cord, liver palpable 1cm below the right costal margin, and bilaterally palpable kidneys. These are all normal findings.

Genitourinary

A prominent clitoris and small labia major are expected findings for this gestational age. A hymenal tag is common and usually disappears in a few weeks (Cavaliere, 2009).

Trunk, Spine, and Anus

An intact and straight spine with no dimple, hair tuft, or pit and well placed anus with rugae are normal findings. The inability to pass a thermometer is abnormal and is indicative of an imperforate anus (Bradshaw, 2010).

Extremities

Bilaterally intact clavicles and hips that are in bilaterally are normal findings. Feet with only an anterior transverse crease are expected for this gestational age.

Reflexes

A semi-flexed position, positive grasp reflex, weak cry, and a weak suck are expected findings in a preterm infant. Newborns demonstrate increased flexion and reflexes with advancing gestational age (Haeberline, 2009).

Skin

Visible abdominal veins and thick vernix are expected for this gestational age. Pale and slightly dusky skin with a temperature of 96.5°F is abnormal. An infant should be centrally pink with a temperature between 97.3°F to 98.6°F (Brand & Boyd, 2010). A "dusky" or cyanotic infant could indicate lung disease, sepsis, neurological disease or heart disease (Witt, 2009).

Differential diagnosis

Gestation - 31 week AGA hypothermic female infant
HEENT - Suspected neural tube defect, cleft palate
Neurology – Suspected hypermagnesium
Respiratory – Respiratory distress syndrome
Cardiovascular – Suspected congenital heart disease
Trunk, Spine, Anus -- Imperforate anus
Infectious Disease – Suspected sepsis, Suspected hepatitis B
Hematology – Suspected ABO/RH incompatibility, Suspected thrombocytopenia
Other – Maternal substance abuse, Suspected chromosomal abnormalities

Plan of Care

31 Week AGA Female Infant
- Admit infant to the Neonatal Intensive Care Unit in an incubator and on continuous cardio-respiratory and pulse oximetry monitoring.
- NPO, Start D10 at 100ml/kg/day via PIV, with Strict I&O monitoring
- Blood sugars at admission and every 6 hours
- Head ultrasound at seven days of age
- Eye exam in four weeks by ophthalmologist
- Developmental therapy consult by Occupational Therapist(OT) or Physical Therapist(PT)
- Car seat exam prior to discharge
- Measurements: Daily weights, weekly lengths and FOC to follow growth trends

Cardio-respiratory and pulse oximetry monitoring are indicated in this infant because of RDS and the risk for apnea of prematurity. An isolette on servo control will provide thermal support and decrease stimulation. Intravenous dextrose will be started and transitioned to total parental nutrition (TPN) on day two of life. Due to prematurity, delayed oral feedings, and respiratory stress the infant is at risk for developing hypoglycemia, and blood sugar levels should be monitored (Armentrout, 2010). With prematurity, there is an increased risk of intraventricular hemorrhage. A head ultrasound should be performed at seven days since more than 90% of bleeds occur within the first week of life (Lynn & Verklan, 2010). Cautious use of oxygen therapy should be used, and FiO2 should be titrated to keep SpO2 between 90-95% (Askin & Diehl-Jones, 2010). An eye exam should be done four weeks after birth to evaluate for Retinopathy of Prematurity (ROP). OT or PT should be consulted for individualized care, proper positioning, and developmental support in the NICU. The infant is less than 37 weeks and is at risk for apnea, bradycardia, and oxygen desaturation therefore she should have a car seat test prior to discharge (Hummel, 2010).

Hypothermia
- Place infant on servo control in prewarmed incubator for thermoregulation
Monitor temperature Q 30 min X 4 then every 3 hours with vital signs
Infant is at risk for thermoinstability due to prematurity, decreased subcutaneous fat, and electrolyte imbalance.

**Suspected Neural Tube Defect**
- Cranial Ultrasound (US) and CT for diagnosis and management
- Proper positioning-keep infant off of defect
- Daily FOC to monitor for developing hydrocephalus
- Consult neurosurgery. Clinical management will depend on type of defect and severity. Neurology should be consulted and a cranial US and CT should be obtained for definitive diagnosis. With any CNS disturbance, hydrocephalus development is a risk (Juretschke, 2011).

**Cleft Palate**
- Plastic surgery consult
- Speech therapy (ST) consult to evaluate and work on feedings with infant. Speech therapy should also follow up after discharge for speech and language development.
- Monitor feeding tolerance, intake and output, weight gain
ST should be involved to help with feedings and nipple selection. When the infant’s respiratory status has stabilized, she should be left on a pulse oximeter since airway management and aspiration is a concern. Plastic surgery should follow for surgical repair (Sterk, 2010).

**Suspected Hypermagnesium**
- Obtain serum magnesium level on admission and every 12 hours until WNL
Monitor infant’s neurological, gastrointestinal, and respiratory status which can be depressed due to hypermagnesium. If infant has severe respiratory depression, intubation and mechanical ventilation may be required until magnesium levels have normalized. Enteral feeding should not begin until magnesium levels are acceptable and the suspected imperforate anus is investigated.

**Respiratory Distress**
- Chest X-ray now and in the AM
- Start CPAP peep of 5 with humidified oxygen. Titrate oxygen to keep Spo2 90-95%
- Surfactant administration if warranted
- Blood gas on admission and while on oxygen support
Due to grunting and tachypnea, the infant should be placed on nasal CPAP with humidified oxygen. If work of breathing worsens, infant is requiring more than 30% FiO2, and X-ray is
indicative of respiratory distress syndrome, then rescue surfactant should be administered (Askin, 2010). A baseline blood gas should be obtained on admission to evaluate acid/base status, then one hour after surfactant administration, and every six hours until stabilized.

**Suspected Sepsis**

- Follow up on maternal GBS labs
- Blood Culture and CBC on admission
- Serial CBC labs QAM for at least three days
- Ampicillin 150mg/kg/dose Q12hours
- Gentamicin 4mg/kg/dose Q24hour

The lack of prenatal care, maternal Hepatitis, and unknown maternal GBS status raises concern for neonatal infection. We can discontinue prophylactic antibiotics at 48-72 hours if cultures are negative and infant shows no signs of infection (Juretschke, 2011).

**Suspected Hepatitis B**

- Bathe infant as soon as temperature is stable
- Give Hepatitis B vaccine and HBIG 0.5ml before 12 hours of age
- Infectious Disease Consult

Bathe the infant and administering Hepatitis B vaccine and HBIG will decrease the infant’s risk of contracting Hepatitis B (Verklan, 2010). Infectious disease should be consulted for follow up.

**Congenital Heart Disease (CHD)**

- Cardio-respiratory monitoring with pre and post ductal saturation monitoring
- 4 Point blood pressures
- Chest X-ray and Echocardiogram
- Cardiology consult, if indicated

Pre and post ductal saturation monitoring should be done to evaluate for shunting. An Echocardiogram is the gold standard for CHD diagnosis (Juretschke, 2011).

**Maternal Substance Abuse**

- Urine and Meconium drug screen on admission
- Social services consult
- Monitor for symptoms of withdrawal (tremors, high pitched cry, altered sleep, etc.)
Since mom tested positive for THC during pregnancy, newborn toxicology screens should be sent to identify the presence of THC and/or other substances in infant. If the infant begins to show signs of withdrawal, a Neonatal Abstinence Scoring System should be used every four hours. If necessary, pharmacologic treatment should be initiated (Pitts, 2011).

**Imperforate anus**
- NPO with replogle to low intermittent suction (LIS)
- Abdominal X-ray
- Surgery consult

The infant should not be fed until after surgery and return of bowel function. Infant should be placed NPO with a replogle to low intermittent suction for decompression (Bradshaw, 2010).

**Suspected ABO or RH incompatibility**
- Obtain infant’s blood type & direct coombs test
- Hct, PLT, retic, glucose, and TBili levels QAM
- Follow up if mother ever received RhoGam

We do not yet know the infant’s blood type or if the mother ever received RhoGam. The baby is at risk for Rh incompatibility if she is O+, and ABO incompatibility if she has A or B blood. These conditions could lead to severe anemia, acidosis, thrombocytopenia, hypoglycemia, and hyperbilirubinemia (Diehl-Jones & Askin, 2010).

**Suspected Thrombocytopenia**
- Monitor platelet trends with CBCs and observe for signs of thrombocytopenia

Mother was preeclamptic, and due to limited prenatal care, may have had undiagnosed HELLP syndrome. The infant is at risk for thrombocytopenia and should be closely monitored for petechiae, bruising, excessive bleeding, and hyperbilirubinemia (Juretschke, 2011).

**Suspected Chromosomal Abnormalities**
- Send chromosome studies
- Genetics consult

The mother had limited prenatal care, oligohydramnios, had a previous fetal demise, and prenatal drug use. The infant has multiple physical anomalies including imperforate anus, suspected neural tube defect, cleft palate, and suspected CHD possibly indicating an associated syndrome. Chromosome studies should be sent for further evaluation.
References


