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Pathological Jaundice

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Neonatal jaundice is a common condition present in infants after birth. It is the result of elevated bilirubin in the blood. It can affect up to 84% of term infants and is one of the most common causes for hospital readmission for the neonatal population (Mochwukwu, 2014). A typical appearance within 24 hours of life and is normally present in otherwise healthy newborns. Physiologic jaundice, also known as un conjugated bilirubin, is a normal process that happens in neonates because the hepatic system is not matured yet (Kirk, 2008). A majority of the time physiologic jaundice resolves on its own. Pathologic jaundice, also known as conjugated jaundice, is found in newborns in other reasons other than the normal physiologic process the newborn hepatic system goes through. It may be a result of maturation or genetic disorders, which are considered to be rare (Kirk, 2008). A more common cause is due to ABO incompatibility.

For the purpose of this paper the focus is going to be on pathologic jaundice specifically related to ABO incompatibility between mother and baby.

**Introduction**

A mother who was O blood type and had a term baby with A blood type was admitted to the NICU for elevated bilirubin levels of 20mg/dl. The mother was wanting to understand why her baby had yellowed skin color. It was explained to the mother that she makes antibodies against blood type A and blood type B and antibodies are able to cross the placenta destroying the baby’s RBCs. When RBC’s are destructed there is an increase in bilirubin levels. The newborn also has a protein in their bloodstream which binds to the bilirubin and helps to transport it out of the body (Dennery, et al., 2001). Visual inspection may be the first noticeable sign that an infant may have jaundice. It is not the most accurate method to determine elevated bilirubin levels. Trying to estimate serum bilirubin by using clinical examination is not reliable and not recommended (Dennery, Seidman, & Stevenson, 2001). Jaundice is defined as the yellow-orange disso lution found in the icura, skin, and other tissues of infants (Schwartz, Haberman, & Ruddy, 2011). Jaundice is hard to observe in dark skin babies. Even though jaundice may indicate an imbalance of production and elimination of bilirubin it does not imply any specific cause (Cohen, & Wong, 2010). It is important to properly educate the parents of the babies if they have jaundice or if the babies risk factors may possibly influence jaundice at the different stages.

**Case Study**

- **Father’s Blood Type**: O
- **Mother’s Blood Type**: A
- **Genotypes of Parents**:
  - Father: AO
  - Mother: AO

A mother who was O blood type and had a term baby with A blood type was admitted to the NICU for elevated bilirubin levels of 20mg/dl. The mother was wanting to understand why her baby had yellowed skin color. It was explained to the mother that she makes antibodies against blood type A and blood type B. The antibodies cross the placenta and go into the fetal circulation. The antibodies then attack the infant’s red blood cells (RBCs) causing hemolysis of the RBCs. This attacking and attaching by the antibodies starts while the baby is still in utero. Hemolysis of RBCs cause an increase in bilirubin levels. In order for hemolysis to occur the antibodies have to attach to the RBC’s (Bubul, 2013).

**Pathophysiology**

ABO incompatibility can happen between a mother and baby primarily when the mother has blood type O and the developing fetus has blood type A, B, or AB. This happens because mothers with type O blood have anti-A and anti-B antibodies because the baby has A, B, or AB blood type. These antibodies cross the placenta and go into the fetal circulation. The antibodies then attack the fetus’s red blood cells (RBCs) causing hemolysis of the RBCs. The hemolysis and attaching by the antibodies starts while the baby is still in utero. Hemolysis of RBCs cause an increase in bilirubin levels. In order for hemolysis to occur the antibodies have to attach to the RBC’s (Bubul, 2013).

**Implications to Nursing**

Nurses are the front line to caring for mothers and infants that might have conjugated elevated bilirubin. Nurses play an important role in promoting follow-up, assessing infants for risk factors, assessing jaundice levels using the TSB or Td (Wells, Ahmed, & Mason, 2013). Many hospitals do not allow nurses to independently check bilirubin levels without a physician order. Therefore this can create a barrier to diagnosing hyperbilirubinemia. If there is a system in place to allow the nurses to check the bilirubin levels of infants based on certain risk factors or clinical suspicion might help diagnose hyperbilirubinemia before a baby becomes jaundice. Following-up is important because infants are being discharged sooner making them not available to healthcare workers when the bilirubin levels peak. Having a protocol in place for when infants are discharged may help to ensure follow-up bilirubin testing. The parents must understand the potential risk with hyperbilirubinemia and that is where the nurse can play a strong role. (Bhutani, Scheibab, & Ganem, 2006). It is important that nurses stay up to date on completing ongoing education and passing required competencies in order to provide the best possible care to the patients. Nurses should be well educated about conjugated hyperbilirubinemia in order to properly educate the parents of the babies diagnosed with hyperbilirubinemia and answer any questions they might have.

**Significance of Pathophysiology**

The primary reason that healthcare workers assess for hyperbilirubinemia is because of the chance of neurotoxic effects (Dennery, et al., 2001). This can happen by the bilirubin crossing the blood-brain barrier and entering the brain tissue (Lauer & Speter, 2011). When this happens it causes a risk of developing neurological dysfunction (Stevenson, Vreman, & Wong, 2011). Jaundice is the term used to describe the permanent development of bilirubin toxicity (Schwartz, et al., 2011). Bilirubin can only enter the brain if it is not bound to albumin or is unconjugated bilirubin (Dennery, et al., 2001). If the bilirubin unconjugated level is too high causes the binding of bilirubin to be compromised leading to an increase chance of all kernicterus (Dennery, et al., 2001). Even though kernicterus is not seen very much anymore it is still important to continue to prevent it by being meticulous in assessing and treating elevated levels of bilirubin (Dennery, et al., 2001).

**Table 1. Three possible genotypes for the father in the case study (Rubarth, 2011)**

<table>
<thead>
<tr>
<th>Genotypes of Parents</th>
<th>Mother’s Blood Type</th>
<th>Father’s Blood Type</th>
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<tbody>
<tr>
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<td></td>
<td>AO</td>
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**Table 2. Bilirubin Levels & Risk of Significant Hyperbilirubinemia**

<table>
<thead>
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<th>Age In Hours</th>
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<th>Risk of Significant Hyperbilirubinemia</th>
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<tbody>
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**References**


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**Additional Sources**


**Conclusion**

Even though jaundice can be a normal physiological process that newborns go through it is important to determine whether it has a pathologic component to it in order to properly monitor and treat it. If not properly diagnosed and treated than the risk of developing long term neurological damage is increased. It is important to know how to be able to look for and know the risks associated with hyperbilirubinemia no matter if working in an inpatient or outpatient setting. Early evaluation of infants is important to help determine of pathologic hyperbilirubinemia before the baby is discharged home. Once discharge is important to have a follow-up appointment scheduled within two to three days after so the infant can be professionally examined for jaundice (Dennery, et al., 2001).

**Figure 1. Infant with pathologic jaundice**

**Figure 2. Blood levels & risk of significant hyperbilirubinemia**