

PedsCases Podcast Scripts

This is a text version of a podcast from PedsCases.com on “**Vitamin K Prophylaxis in Newborns – CPS Podcast.**” These podcasts are designed to give medical students an overview of key topics in pediatrics. The audio versions are accessible on iTunes or at www.pedcases.com/podcasts.

Vitamin K Prophylaxis in Newborns – CPS Podcast

Developed by Carina Lauzon, Dr. Marc-Antoine Landry and Dr. Eugene Ng for PedsCases.com.
May 27, 2019

Introduction:

Hi everyone, my name is Carina Lauzon and I am a third-year medical student at the University of Alberta. This podcast will discuss the prevention of vitamin K deficiency bleeding and is based on the 2018 Canadian Pediatric Society statement, Guidelines for Vitamin K Prophylaxis in Newborns. This podcast was created with Dr. Marc-Antoine Landry, a neonatologist at the Royal Alexandra Hospital in Edmonton, Alberta, and Dr. Eugene Ng, assistant professor of pediatrics at the University of Toronto, and author of the CPS statement.

Clinical Case:

Let’s start with a clinical case: you are working in labor and delivery. A couple hours after the delivery of a healthy, term baby girl named Ruby, you are called to the postpartum unit to talk to her parents about vitamin K prophylaxis for the baby. As you begin to talk to the parents, you find that they are hesitant to give their baby the vitamin K injection. They say, “That sounds painful, and she’s so little, do you really need to give her the shot?” How do you respond? We will return to this case at the end of the podcast.

Objectives:

After listening to this podcast, the learner will be able to:

1. Discuss why babies are at risk for vitamin K deficiency bleeding
2. Know the three types of vitamin K deficiency bleeding
3. Recognize the signs, symptoms and consequences of vitamin K deficiency bleeding
4. Know the current recommendations for vitamin K prophylaxis in newborns

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What is vitamin K deficiency bleeding and why does it happen?

Vitamin K deficiency bleeding, sometimes referred to as hemorrhagic disease of the newborn, is a bleeding disorder that can occur in babies due to deficiency in vitamin K. It presents as unexpected bleeding, including bruising, bleeding from mucous membranes, gastrointestinal hemorrhage and in many cases, intracranial hemorrhage. Vitamin K plays a major role in coagulation, as it is a cofactor required for the function of several proteins including factors II, VII, IX, and X, protein C and protein S. Therefore, a deficiency in vitamin K inhibits coagulation and predisposes patients to bleeding.

Babies are at risk for vitamin K deficiency for three main reasons. Firstly, babies have very low levels of vitamin K stored in their bodies at birth, because only small amounts of vitamin K cross the placenta during pregnancy. Secondly, new babies have an immature intestinal microbiota. Beneficial bacteria that produce vitamin K, for example *Bacteroides*, have not yet colonized a newborn's intestines. Finally, breastmilk is very low in vitamin K, so babies cannot consume sufficient vitamin K from breastmilk alone.

Vitamin K deficiency bleeding is classified according to time of presentation after birth. Early Vitamin K Deficiency Bleeding occurs 0-24 hours after birth, classic vitamin K deficiency bleeding occurs 1-7 days after birth, and late Vitamin K Deficiency Bleeding typically occurs 2-12 weeks after birth but can happen as late as 6 months of age.

Early vitamin K deficiency bleeding is most often seen in infants of mothers who took medications that alter vitamin K metabolism during their pregnancy. These medications include anticonvulsants, anti-tuberculosis drugs, cephalosporin antibiotics, and vitamin K antagonists. Early vitamin K deficiency bleeding is often severe, presenting as cephalohematoma plus intracranial and intra-abdominal hemorrhage.

Classic vitamin K deficiency bleeding usually presents as bleeding from the umbilical cord and bruising. Intracranial hemorrhage is rare in classic vitamin K deficiency bleeding, but can occur.

Late vitamin K deficiency bleeding is a serious condition. Unlike the classic presentation, late bleeding presents predominantly as intracranial hemorrhage. Warning bleeds, such as bruising, or bleeding from mucous membranes, are uncommon. Late vitamin K deficiency bleeding occurs almost exclusively in breastfed infants, and babies are at risk for it until approximately the time they start eating solid foods, around 6 months of age. It can also happen as a result of chronic malabsorption.

Risk factors for vitamin K deficiency bleeding

As discussed previously, certain medications taken during pregnancy can put the baby at risk for vitamin K deficiency bleeding. Medications that inhibit vitamin K include anticonvulsants such as carbamazepine, phenytoin, and barbiturates, anti-tuberculosis drugs such as isoniazid and rifampicin, cephalosporin antibiotics, and vitamin K

antagonists such as Warfarin. Additionally, babies who are exclusively breastfed are at higher risk of vitamin K deficiency bleeding than babies who are formula fed because breastmilk contains only small amounts of vitamin K. Finally, malabsorptive diseases such as celiac disease, cystic fibrosis and cholestatic liver disease increase the risk of vitamin K deficiency bleeding, as the body is unable to effectively absorb vitamin K from the diet.

Signs and Symptoms

Signs and symptoms of vitamin K deficiency include bleeding from the nose and umbilical cord, and bruising. The baby may also appear pale or jaundiced. Intra-abdominal bleeding may present as blood in the stool. Finally, the most serious type of vitamin K deficiency bleeding, intracranial hemorrhage, can present as irritability, seizures, lethargy, or vomiting. This can lead to death or permanent neurologic disability.

Prevention of vitamin K deficiency bleeding

In the next section of this podcast, the prevention of vitamin K deficiency bleeding, I am joined by Dr. Eugene Ng, assistant professor of pediatrics at the University of Toronto, and author of the CPS statement, Guidelines for Vitamin K Prophylaxis in Newborns.

Q: Dr. Ng, what are the recommendations for prevention of vitamin K deficiency bleeding by the Canadian Paediatric Society?

For the prevention of vitamin K deficiency bleeding, the Canadian Pediatric Society recommends the routine administration of vitamin K to newborns, preferably by intramuscular injection. It has been shown that infants who do not receive the vitamin K prophylaxis at birth are 81 times more likely to develop late vitamin K deficiency bleeding than those who receive prophylaxis. The recommended best practice in Canada is to administer a single intramuscular dose of vitamin K to all newborns during the first 6 hours of life. The recommended dose for infants who weigh over 1500g is 1.0 mg and half the dose, 0.5mg, for infants who weigh less than or equal to 1500g. Vitamin K injection should be given after initial stabilization and appropriate maternal/newborn interaction within 6 hours of birth.

Q: How would you address concerns from parents, as in our case presentation, about pain associated with the intramuscular injection?

Strategies to minimize procedural pain associated with intramuscular injections should be implemented for all babies. These strategies include breastfeeding or suckling of oral sucrose solutions during the procedure, skin to skin contact with parent, and talking calmly to the baby.

Q: Some parents ask about alternative routes of administering vitamin K to avoid pain in their newborns. Is that a reasonable request?

Intramuscular vitamin K is the recommended route of administration, however some patients and families will ask about intravenous or oral formulations of vitamin K. While both are likely better than nothing, there is evidence that IV and oral vitamin K is less effective than the intramuscular route.

For preterm infants undergoing intensive care, some centres use IV vitamin K prophylaxis in order to avoid procedural pain from intramuscular injection. However, there is limited data that suggests IV administration of vitamin K is not as effective as intramuscular administration, and for this reason, the routine use of IV vitamin K is not recommended in this population.

Oral vitamin K should be reserved for patients whose parents refuse intramuscular injection, as it has been shown to be less effective at preventing vitamin K deficiency bleeding than intramuscular vitamin K.

Q: What should clinicians do if parents end up declining vitamin K injection?

For parents who decline vitamin K injection, counselling on the serious health risk of vitamin K deficiency bleeding is advised. If parents still refuse injection after counselling, oral vitamin K should be recommended. Prophylaxis with oral vitamin K includes a 2 mg dose during the first feed, with additional 2 mg doses between 2-4 weeks of age and between 6-8 weeks of age.

In vitamin K deficiency, an induced protein becomes measurable in the blood. This protein disappears by day five of life following vitamin K administration at birth and there does not appear to be a difference in these levels whether the vitamin K is given by oral or intramuscular route. However, at 4-6 weeks of age, biochemical signs of vitamin K deficiency are observed in up to 19% of infants who receive oral vitamin K and only 5.5% of those who receive intramuscular vitamin K. The reasons for increased benefit with intramuscular delivery are unclear, however, it may be a result of better storage and slow release of vitamin K from muscle.

When counselling parents who choose oral vitamin K for their baby, it is important to cover three main points. Firstly, parents should be made aware that oral vitamin K is less effective than intramuscular vitamin K at preventing vitamin K deficiency bleeding. Secondly, it is very important that the infant receives both follow-up doses of vitamin K after the initial dose, one at 2-4 weeks of age and one at 6-8 weeks of age. This poses challenges with compliance as families are responsible for providing multiple doses of a medication. Thirdly, the infant who receives oral vitamin K remains at higher risk for late vitamin K deficiency bleeding than those who received intramuscular vitamin K with potential for intracranial hemorrhage.

Q: Some parents ask about vitamin K supplementation during pregnancy as an alternative to vitamin K injection in the newborn. Is that an effective prevention strategy?

To prevent early vitamin K deficiency bleeding, the CPS previously recommended the administration of oral vitamin K to expectant mothers taking medications that impair vitamin K metabolism. However, a 2009 systematic review by the American Academy of Neurology concluded that there was insufficient evidence to conclude that vitamin K

supplementation during pregnancy reduces risk for vitamin K deficiency bleeding. Therefore, this is no longer routinely recommended.

Conclusion: Return to clinical case

You explain to Ruby's parents that the reason we give babies a vitamin K injection at birth is to prevent vitamin K deficiency bleeding, which can have potentially fatal consequences. They agree that they would like to protect Ruby from this, however, wonder why you can't just give her vitamin K by mouth. You explain to them that oral vitamin K is an option, however, you strongly recommend that they consider intramuscular injection, as it has been proven to be more effective than oral administration. In addition, you take this opportunity to educate them about ways to help reduce procedural pain in infants, including breastfeeding and skin to skin contact during the procedure. Ruby's parents are relieved to hear that there are ways to make the injection less painful for their baby, and now that they understand the reasoning behind the procedure, they agree that intramuscular vitamin K injection is the best option for Ruby.

Review main learning objectives

Thank you for listening to this PedsCases CPS podcast on vitamin K deficiency! Let's review our main learning objectives. You should now be able to:

1. Discuss why babies are at risk for vitamin K deficiency bleeding.
2. Know the three types of vitamin K deficiency bleeding.
3. Recognize the signs, symptoms and consequences of vitamin K deficiency bleeding.
4. Know the current recommendations for vitamin K prophylaxis in newborns.

Take away points

1. Babies are at risk for vitamin K deficiency bleeding because only small amounts of vitamin K cross the placenta during pregnancy, they have immature intestinal microbiota that lacks vitamin K producing bacteria, and breastmilk contains very low levels of vitamin K.
2. Vitamin K deficiency bleeding is classified into early (0-24 hours after birth), classic (1-7 days after birth), and late (2 weeks, up to 6 months after birth).
3. Signs and symptoms of vitamin K deficiency include bruising, bleeding from the nose and umbilical cord, blood in the stool, pallor, jaundice, and signs of intracranial hemorrhage including irritability, lethargy, seizures and vomiting. Intracranial hemorrhage can result in death or permanent neurologic disability.
4. The Canadian Pediatric Society recommends that all babies receive a single intramuscular injection of vitamin K within 6 hours of birth. The recommended dose is 1.0mg for infants weighing over 1500g and 0.5mg for infants weighing under 1500g. When parents refuse intramuscular injection, oral vitamin K is an option, however it should not be routinely recommended as it is less

effective than intramuscular administration of vitamin K at preventing vitamin K deficiency bleeding.

We hope that this podcast has been helpful. Stay tuned for more podcasts, and thanks for listening!

References

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