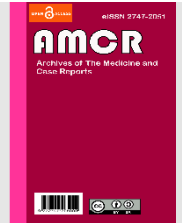




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Management of Bleeding due to Vitamin K Deficiency in Neonates: A Case Report

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ABSTRACT

Vitamin K deficiency bleeding (VKDB) is an uncommon and life-threatening bleeding condition in infancy. This study aimed to present a case of bleeding due to vitamin K deficiency in neonates. A 7-day-old male infant presented to an emergency department (ED) following bleeding from an umbilical stump for 3 hours upon arrival at the hospital. On examination of the general condition, the patient is in good health, responsive, conscious and active tonus. Physical examination revealed there were no petechiae, purpura, or ecchymoses. On the abdomen region, there was minimal bleeding in an umbilical area with periumbilical hemorrhagic crusting. Intense palpation revealed mild tenderness near the periumbilical area. When the umbilical area was palpated deeply, a thin, watery blood fluid oozed out. The results of routine blood laboratory examinations showed within normal limits (Hb 12 g/dL, leukocytes $6.9 \times 10^3/\mu\text{L}$, and platelets $150 \times 10^3/\mu\text{L}$). This patient was diagnosed with bleeding due to vitamin K deficiency. The management given is in the form of a subcutaneous injection of vitamin K 10 mg for 3 days. After administration of the third injection, the patient's condition improves, and the umbilical hemorrhage subsides.

1. Introduction

Vitamin K is required for the proper functioning of coagulation factors II, VII, IX, and X, as well as anticoagulant proteins C and S. Compared to adults, neonates have lower levels of the majority of coagulation factors.¹⁻³ The levels of vitamin K-dependent coagulation factors (F) II, VII, IX, and X are between one-half and one-third of adult levels (measured after vitamin K prophylaxis at birth). Deficiency in vitamin K is one of the leading causes of neonatal hemorrhage, which occurs in 4 to 7 babies per 100,000 alive births.²

Vitamin K deficiency bleeding (VKDB) is an uncommon and life-threatening bleeding condition in infancy.⁴ Vitamin K deficiency can happen during the newborn period, in genetic combination vitamin K-

dependent clotting factors deficiency (VKCFD), inadequate uptake from the diet, or as a result of a chronic condition, or it can be drug-related.⁵ Potential causes of vitamin K deficiency in infants consist of poor vitamin K transport to the placenta, immature intestinal flora, low vitamin K levels in breast milk, insufficient absorption of vitamin K, and decreased epoxide reductase activity of vitamin K.^{5,6} This study aimed to present a case of bleeding due to vitamin K deficiency in neonates.

2. Case Presentation

A 7-day-old male infant presented to an emergency department (ED) following bleeding from an umbilical stump for 3 hours upon arrival at the hospital. No fever or trauma occurred, and there was no previous



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history of per rectal bleeding, melena, and epistaxis. The parents reported no history of using drugs during pregnancy except prenatal multivitamins. He was exclusively breastfed. The infant was born by normal spontaneous vaginal delivery at 39 (+2) weeks of gestation in good health, weighing 3205 gr. The baby required no resuscitation, APGAR score of 8-9 at the first and fifth minutes. There is no family history of recurrent nosebleeds, mouth bleeding, menorrhagia, or excessive bleeding. He was also administered intramuscular prophylaxis 1 mg vitamin K injection.

On examination of the general condition, the patient is in good health, responsive, conscious, and active tonus. Physical examination revealed there were no petechiae, purpura, or ecchymoses. Vital signs are normal. Anthropometric measurements were as follows; weight 3210 g, length 48 cm, and head circumference 34 cm. On the abdomen region, there was minimal bleeding in an umbilical area with periumbilical hemorrhagic crusting. Intense palpation revealed mild tenderness near the periumbilical area. When the umbilical area was palpated deeply, a thin, watery blood fluid oozed out. The results of routine blood laboratory examinations showed within normal limits (Hb 12 g/dL, leukocytes $6.9 \times 10^3/\mu\text{L}$, and platelets $150 \times 10^3/\mu\text{L}$). This patient was diagnosed with bleeding due to vitamin K deficiency.

The patient was commenced on a 10 mg vitamin K subcutaneous injection for 3 days and got his first injection on that day. He was subsequently discharged home, and the parents asked to bring him to the hospital for the next two days for the 2nd and 3rd injections and to continue follow-up. On the 3rd day after the third injection, he was progressing favorably, and the bleeding had stopped.

3. Discussion

Early-onset vitamin K deficiency bleeding (VKDB) manifests within the first twenty-four hours of life and typically affects mothers who are taking drugs that interfere with vitamin K metabolism.⁶⁻⁸ Classic VKDB

occurs between 2 and 7 days after birth. Late-onset VKDB occurs between one week-six months of age, with the highest incidence between two and eight weeks. Exclusively breastfed infants who did not get vitamin K prophylaxis at birth are associated with late-onset VKDB. In addition, it may be accompanied by hepatic dysfunction due to neonatal hepatitis, bile duct atresia, or intestinal malabsorption.⁸

In this study, the patient presented a 7-day history of mild bleeding at the umbilicus. The diagnosis of classic VKDB in this patient is established based on the discovery of umbilical stump bleeding and occurs during the second and third day (up to 7th day) of life. VKDB was confirmed when the prothrombin assay results were very distinctive from what is expected for the age: international normalized ratio (INR) ≥ 4 control value, prothrombin time (PT) ≥ 4 control value, and at least one of the following was present; normal or high platelet count and normal fibrinogen, prothrombin assay test went back to normal after vitamin K was given, and the concentration of proteins caused by the lack of vitamin K was higher than in normal controls.⁹

In these cases, the patient was exclusively breastfed. Breastfeeding has been linked to VKDB because human milk vitamin K concentration (median 2.5 mg/L [0.85–9.2 mg/L]) is much lower than formula milk (4–25 mg/100 kcal, 24–175 mg/L). Breastfed newborns average 1 mg of vitamin K intake per day in the first 6 months, but formula-fed infants average vitamin K intake of 100 times more. Also, vitamin K is poorly transmitted across the placental barrier, and its stores are low at birth, with levels often below the detection limit of 0.02 ng/mL.^{8,9}

The American Academy of Pediatrics recommends that all neonates receive a single intramuscular (IM) injection containing 0.5 to 1.0 mg of vitamin K to avoid VKDB.⁹ Preterm infants weighing less than 1500 grams should receive 0.3 mg/kg to 0.5 mg/kg of vitamin K intramuscularly as a single dose. A single intravenous dose of vitamin K is not recommended for



prevention in preterm infants.⁹ According to the Indonesian Health Minister guideline, vitamin K1 injectable prophylaxis should be administered to all neonates.¹⁰ The form of vitamin K utilized is vitamin K1 (phytomenadione) injection in ampoules containing 10 mg of Vitamin K1 per 1 ml. Vitamin K parenteral prophylaxis at birth lowers the incidence of classical VKDB without causing serious adverse effects.^{11,12} However, in this case, the patient received his first vitamin K intramuscular injection right after birth.

Treatment of vitamin K deficiency bleeding is classified according to its rarity, abrupt start, and varied degrees of severity. Infants with non-life-threatening bleeds should only be treated with phyloquinone (vitamin K1; phytomenadione; phytonadione) administered slowly via intravenous or subcutaneous injection.¹³ Infants and children who have bleeding due to a deficiency of vitamin K should be given vitamin K right away. Vitamin K should not be administered intramuscularly since it will induce a hematoma at the injection site; instead, it should be administered subcutaneously because absorption is fast, and the effect is only slightly slower than systemic administration. A single dose of 5-10 mg injected subcutaneously usually results in PT improvement within 12-24 hours. Intravenous injection of vitamin K at a dose of 1 mg at intervals of 6-8 hours for 2-3 times. Vitamin K1 should be given since it is less dangerous and has fewer negative effects than vitamin K3.¹⁴

As shown in this case, the treatment given to this patient was 10 mg vitamin K subcutaneous injection for 3 days. On the third day, the patient presented a good result with no more bleeding from the umbilical stump. If there is serious bleeding, fresh frozen plasma at a dose of 10-15 mL/kg body weight should be administered in addition to vitamin K. Within 4-6 hours, the response to vitamin K treatment is marked by the stop of bleeding and the improvement of the blood clotting mechanism.¹⁴

4. Conclusion

Treatment of vitamin K deficiency bleeding is classified according to its rarity and varied degrees of severity. A single dose of 5-10 mg injected subcutaneously usually results in clinical condition within 12-24 hours.

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