Vitamin K and Hemorrhagic Disease of the Newborn

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Topics

- 1. Disease
- 2. Vitamin K
- 3. Experience of the USA
- 4. Experience of Israel
- 5. Other countries
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- 7. References
History

• Townsend in Boston (1864) described 50 cases of “hemorrhagic disease of the newborn” during first 2 weeks of life
• In 1929, Vitamin K isolated from alfalfa by Dam and Doisy (Nobel Prize, 1942), and conducted clinical trials showing Vitamin K protects against HDN
• 1961, Am Acad Pediatrics and Am College Obstetrics and Gynecology recommended routine prophylaxis with Vit K for all newborns
• Controversy in Britain in 1990s resolved to satisfaction of AAP, ACOG, Canada, Australia, New Zealand and others
Primary HDN

- Often fatal condition
- Diffuse hemorrhage in otherwise healthy infant
- During the first week of life
- Particularly in low birth weight babies
- Results of low levels of prothrombin and other vitamin K dependent clotting factors, (Factors II, VII, IX and X) caused by vitamin K deficiency
- An exaggerated of physiologic deficiency of clotting factors normal in the first few days of life
- Incidence between 2.5 to 17.0 per thousand newborns not given vitamin K prophylactically
Late HDN

• Between 2-12 weeks of life,
• Especially in breast-fed babies.
• Immaturity of liver affects production of clotting factors
• Late HDN primarily in breast fed infants without or inadequate vitamin K rates of 4.4-7.2/100,000 live births
Common Clinical Manifestations

• Bleeding in the
  – gastrointestinal tract
  – urinary tract
  – umbilical stump
  – nose
  – scalp
  – intracranial hemorrhage
  – Shock
  – death
• Prophylactic use of Vit K recommended by the American Academy of Pediatrics, and by the American College of Obstetricians and Gynecologists since 1961.
• Up until 1987, administration of vit K at birth was mandatory in only five states in the US
• AAP recommendation renewed in 1993 and remains current
New York State Review

- We reviewed vital statistics in New York State finding infant deaths and hospitalizations attributed to neonatal hemorrhagic conditions (HDN).
- Case record reviews showed absence of recorded giving of vitamin K in 65% of HDN deaths.
- Vit K was not included in standing orders in any of 22 NYS hospitals contacted.
- This review led to vit K being made a mandatory newborn care procedure in NY State Public Health Code in 1989.
Israel Experience

- Vit K was widely used
- However far from universal practice in the 1970s
- In 1977, HDN deaths in Israel were 131/100,000 live births, declining to 31/100,000 live births in 1984 and 3/100,000 in 1988
- In 1984, administration of vit K was made mandatory for newborn care by the Ministry of Health
- A large decline in deaths from intracranial and intraventricular hemorrhage, may be partly due to routine use of vitamin K.
Renewed Interest in Vit K

- Since the 1980s attention – UK, Europe, Japan, Canada, Australasia and Middle East
- HDN and vit K deficiency reported in both developed and developing countries where it is not routinely used, or where use may be waning
- Controversy re oral versus parenteral use of routine Vit K largely resolved
- Intramuscular administration within the first 6 hours after birth more effective in preventing both early and late HDN
Other Countries

- Still not routine in Japan, Germany, UK
- Routine prophylactic Vitamin K for newborns adopted in
  - Canada
  - Australia
  - New Zealand
  - Croatia, 1988
Public Health Importance

• Japanese incidence of HDN reported as 1/1,700 in breast fed babies and 1:4,500 in all infants
• Of these, 82% were reported to have intracranial hemorrhage (ICH)
• NDN still significant; even more in developing countries e.g. India, Thailand, Singapore and Taiwan
• Thailand reports incidence of 35-72/100,000 births
• ICH not always identified as HND related and may be significant factor in birth-related cerebral palsies
Recommended Implementation

• Mandatory within 6 hours of birth
• Cost $1.00 including syringe per child
• “Moderately cost-effective” (between $250-999 per DALY saved - estimates range from $52-533) – World Bank
• Requires standing orders and Ministry of Health regulation
• Professional initiative and support
Summary

- Deficiency of Vit K remains a significant worldwide cause of neonatal morbidity and mortality
- Routine prophylactic use of vitamin K should always be used to prevent HDN ("good public health practice")
- Administration by intramuscular injection (0.5-1.0 mgm) within 6 hours of birth is preferable
- May be given orally as 3 doses spread over the first 4 weeks of life
- Vit K showing up in literature on osteoporosis
- A safe, inexpensive preventive procedure that should be mandatory component of newborn care.
Bibliography


