Coagulopathy Case - 4

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CLINICAL HISTORY

- A 46-year-old woman S/P appendectomy. Patient developed postoperative wound infection shortly after appendectomy and received antibiotics for this. Now patient begins to bleed from the surgical wound. Pre-operative coagulation screen tests (before appendectomy) were normal.
- The patient had not previously been hospitalized, with the exception of obstetric admissions.
- Family history was negative for any bleeding problems.
- The patient had been taking Glucophage for adult-onset diabetes and Amlodipine for hypertension.
PHYSICAL EXAMINATION

- Physical examination revealed bleeding from the surgical wound with no obvious signs of infection.
SCREENING COAGULATION
LABORATORY RESULTS

- **PT**: 29 sec (Normal 8-14.6)
- **aPTT**: 38 sec (Normal 24-36.5)
- **Plt**: 190,000 /μL (Normal 150,000-350,000)
Coagulation Cascade

**INTRINSIC**
(surface contact)

- HMWK → F XII → KAL → F XI → F IX → F VIIIa + PF-3 → FX → F Va + PF-3 → F X → F IXa → F VIIIa → F VII → F VIIa → F Xa → Thrombin (F IIa) → Fibrin

**EXTRINSIC**
(tissue damage)

- F VII → Tissue factor → F VIIa → F X → F IXa → F VIIIa → F Xa → Prothrombin (F II) → Fibrinogen (F I) → Fibrin
Differential Diagnosis

- Vitamin K deficiency -> mixing study, clinical correlation
- Liver disease -> mixing study, clinical correlation
- Lupus anticoagulant -> mixing study, dilute Russell Viper Venom Time (dRVVT)
- Anticoagulant (heparin + coumadin) -> mixing study, Thrombin Time
- DIC: not c/w normal platelet count
Further test results

- Mixing PT = 12.1 sec (immediate), 13.6 sec (2 hr incubation)  (Normal 8-14.6 sec)
- Mixing PTT = 31.2 sec (immediate), 35.0 sec (2 hr incubation)  (Normal 24-36.5 sec)
- Optional tests: F VII = 15%, F XI = 134%
DIAGNOSIS

- Vitamin K Deficiency
Vitamin K Deficiency

- Vitamin K dependent proteins: II, VII, IX, X and protein C and S
- The Vit K-dependent factors (II, VII, IX, X) have 9-12 glutamic acid residues near the amino terminal end, which need to be carboxylated (Vit K dependent) to bind calcium to phospholipid membranes.
- In Vit K deficiency, Vit K-dependent factors cannot bind to phospholipid membranes to maintain the coagulation cascade
- The same effect is seen in Coumadin treatment (Vit K antagonist)
Vitamin K deficiency in adults and children

- Malabsorption of fat-soluble vitamins (bile duct atresia, celiac disease, short-bowel syndrome, etc.)
- Inadequate intake (prolonged fasting)
- Medications (coumadin, antibiotics esp. cephalosporins)
Vitamin K deficiency in Infancy (hemorragic disease of the newborn)

- Premature
- Maternal anticonvulsant medications (phenytoin, phenobarbital, valproic acid, carbamazepine)
- Breast-feeding (human milk is lower in Vit-K compared to cow’s)
Sites of bleeding

- GI
- CNS
- Intrathoracic
- Intra-abdominal
- Others
Typical test results

- Prolonged PT, PTT (PT $>>$ PTT)
- Mixing PT/PTT show correction
- Decreased Vit-K dependent factors (II, VII, IX, X)
- Negative DIC results (normal FSP/D-dimer, normal platelet count, no schistocytes in blood smear)
Treatment

- For bleeding patients: FFP
- For all patients: Vit-K given subcutaneously
- Dosage:
  - Adults: 10 mg
  - Infants: 1-5 mg
  - Older children: 5-10 mg
- PT is typically corrected in 4-8 hrs
Prophylactic treatment for infants

- For all infants: 1 mg Vit K₁ (IM) at birth (regardless of being premature or not)
- Breastfed infants: 1 mg Vit K₁ (oral) weekly
- Mothers on antibiotics/anticonvulsants: stop medications and take oral Vit-K (10 mg Vit K₁ daily) for 2 weeks before delivery