The Management of Common Bleeding Disorders

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Learning Objectives

After completing this Webinar, you should be able to manage:

- ITP and other thrombocytopenias
- von Willebrand’s disease
- Hereditary coagulopathies
- Anticoagulant rodenticide poisoning and liver disease
- Disseminated Intravascular Coagulation (DIC)
Hemostatic Disorders

Hemostasis

Normal

Abnormal

Primary

• Vascular abnormalities
• Thrombocytopenias
• Thrombopathias
• von Willebrand disease

Secondary

• Coagulopathies
  • Hereditary
  • Acquired
    • Liver, rodenticides, DIC

Surface bleeding

Hematoma cavity bleeding
In-house Hemostatic Test

- Cuticle bleeding time
- Buccal mucosal bleeding time
- Activated clotting time
- EDTA tube
  - Blood smears
  - CBC
- Citrated tube
  - Coag Dx™ Analyzer for aPTT and PT tests
  - Citrated plasma for Laboratory PT and PTT
  - TEG, other coagulation and platelet function tests

![Cuticle Bleeding Time](image1)

![BMBT](image2)

![ACT](image3)

![Blood Smears](image4)

![Coag Dx™ Analyzer for aPTT and PT](image5)

![Citrate tube](image6)

![CBC](image7)

![EDTA tube](image8)
Indications for Hemostatic Tests

• **Diagnostic**
  - Bleeding animals
  - Animals at risk for bleeding
  - Prior to surgery or biopsy

• **Monitoring**
  - Efficacy of therapy
  - Course of disease
General Therapy Considerations

• **Do not cause more harm**
  - No elective surgeries, cautious venipunctures
  - Remove offending agents; withdraw drugs

• **Stop bleeding**
  - Local hemostasis (hemostat, thrombin, collagen)
  - Plasma products
    - FFP, cryo plasma, cryo-poor plasma

• **Correct circulatory volume in severe cases**
  - Crystalloid fluids in case of hypovolemia
  - Red cells in case of severe anemia

• **Specific therapies**
  - Vitamin K₁, desmopressin, etc.
  - Treat underlying disease

• **Monitor efficacy**
Polling Question #1

With respect to canine thrombocytopenia, which of the following statements is correct?

1. An increased risk of hemorrhage is observed when the platelet count is below 100,000/µl.

2. Tick-born infections rarely cause thrombocytopenia.

3. Melena, petechia and ecchymoses are uncommon clinical signs.

4. An automated platelet count, confirmed by a blood-smear evaluation and platelet estimate, is ideal.

5. Platelet transfusions are commonly used and highly effective.
Thrombocytopenia

↓↓ Production  ↑↑ Destruction

Thrombocytopenia

↑↑ Consumption  ↑↑ Sequestration

Bleeding <40,000/μL

Bone marrow aplasia

Babesia

Petechiae and ecchymoses

Hemorrhage from venipuncture

Thrombocytopenia

Infection

Immune-mediated

Drugs

DIC

Bone marrow disease

Neoplasia
How I Treat Thrombocytopenia

- **Remove triggers**
  - Drug withdrawal, eliminate chemical exposure

- **Treat underlying disease**
  - Antimicrobials, vector-borne diseases
  - Chemotherapy and/or surgery for cancer
  - Immunosuppression for immune-mediated thrombocytopenia

  …however, many remain idiopathic!

- **Provide supportive care**
  - Local hemostasis
  - Transfusions for anemia, fluids

- **Stimulate platelet production**
  - Generally not very effective
How I Treat Thrombocytopenia

Remove any known drug triggers

- Any drug may cause an idiosyncratic reaction
  - Sulfonamides, cephalosporins, others
  - Propyluracil and methimazole (antithyroidal drugs in cats)

- Some drugs cause bone marrow suppression
  - Nearly all chemotherapeutics
  - Estrogens (dogs), azathioprine

- Prognosis guarded
  - Recovery time is variable
  - Days to weeks; hard to predict
  - Some effects are likely irreversible (estrogens)

- Consider alternative (antimicrobial) drug class
How I Treat Thrombocytopenia

- **Diagnostics:**
  - Use in-house and reference laboratory antibody, antigen and DNA/RNA tests
  - Results often not known for days
  - Use specific antimicrobials or antiparasitic agents, when known
  - Doxycycline: used initially
  - Tick control
  - Prognosis is often good

<table>
<thead>
<tr>
<th><strong>Ehrlichia canis</strong></th>
<th><strong>Babesia spp.</strong></th>
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<tbody>
<tr>
<td><strong>Ehrlichia platys</strong></td>
<td><strong>Anaplasma spp.</strong></td>
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<td><strong>Rickettsia rickettsii</strong></td>
<td><strong>Vaccines</strong></td>
</tr>
<tr>
<td><strong>Leptospira spp.</strong></td>
<td><strong>Others</strong></td>
</tr>
</tbody>
</table>
How I Treat Thrombocytopenia

**Treat cancer if possible**
- **Chemotherapy for various cancers**
  - Particularly lymphoma and leukemias
  - Other chemotherapy-responsive tumors
- **Surgically remove estrogen-producing tumors**
  - Sertoli’s cells, but also other testicular and ovarian tumors
- **Remove other solid tumors**
  - Inflamed and necrotic tumors are difficult to resect and are associated with excessive bleeding
- **Prognosis is guarded**
  - Poor for estrogen-producing tumors
  - Variable for other cancers; poor when DIC is present
  - Chemotherapeutics may cause thrombocytopenia
  - Do not cause more harm with surgery
Immune-mediated thrombocytopenia (IMT)

- **Classification**
  - Primary: idiopathic thrombocytopenic purpura (ITP)
  - Secondary: caused by drugs, infection and cancer

- **Treat secondary forms also specifically**

- **Immunosuppressive therapy**
  - Glucocorticosteroids
  - +/- Vincristine
  - Others

- **Splenectomy in refractory cases**

- **Prognosis is excellent-to-guarded**
  - Response seen within days to a couple of weeks
  - Use other immunosuppressive agents when failing

Bleeding stops
platelets >40,000/µL

Epistaxis
How I Treat Thrombocytopenia

Steroid-immunosuppression for ITP

- **Glucocorticosteroids**: Drug of choice
  - ↓↓ Platelet clearance, effective immediately
  - ↓↓ Macrophage activity
  - ↓↓ Inflammatory response
  - ↓↓ Platelet-IgG interaction
  - ↓↓ Antiplatelet-IgG production

- **Dexamethasone**
  - 0.1–0.2 mg/kg IV BID
  - Initially or when vomiting, nothing per os

- **Prednisone or prednisolone**
  - 1–2 mg/kg PO BID tapered over months
  - Usually used at lower dose with other agents

- **Major side effects limit their use**
  - Gastrointestinal signs, PU/PD, infection, Cushing syndrome
How I Treat Thrombocytopenia

**Immunosuppression for ITP**

- Glucocorticosteroids: First-line drug
- **Vincristine 0.01–0.02 mg/kg IV**
  - Once; could be repeated after one week
  - Strictly intravenously combined with prednisone
  - Vinca alkaloids bind avidly to tubulin and act
    - ↓↓ phagocytic system, particularly in spleen
    - ↑↑ platelet release from bone marrow
    - ↑↑ thrombopoiesis
  - Frequently, extremely rapid and high response
- Side effects:
  - Perivascular sloughing—preventable!
  - Peripheral neuropathy
  - Clinically insignificant platelet function impairment
  - Very rarely, bone marrow suppression
How I Treat Thrombocytopenia

Prednisone and vincristine for ITP

- Prednisone versus vincristine study at Penn Vet
- Prospective study, 24 dogs; platelets <15,000/µL

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Pred 1.5–2 mg/kg BID</th>
<th>Vinc 0.02 mg/kg IV + pred</th>
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<td>Response &gt;40,000/µL</td>
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<td></td>
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<tr>
<td>Days to respond</td>
<td>3–10</td>
<td>3–7</td>
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<tr>
<td>Median/mean in days</td>
<td>6.5/6.8</td>
<td>4.5/4.9</td>
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<tr>
<td>Days hospitalized</td>
<td>7.3±0.5</td>
<td>5.4±0.3</td>
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<tr>
<td>Transfusions ~10 mL/kg</td>
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<td></td>
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<tr>
<td>Transfusions required</td>
<td>0–5</td>
<td>0–3</td>
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<tr>
<td>Median/mean</td>
<td>1/1.4</td>
<td>1/0.8</td>
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</table>
How I Treat Thrombocytopenia

**Immunosuppression for ITP**

- Glucocorticosteroids: first-line drug
- Vincristine: second-line drug or in combination with prednisone from start
- Other immunosuppressive options:
  - If above treatment fails or after relapse
  - If drug side effects are unbearable

- Cyclosporine
- Azathioprine
- Danazol
- Leflunomide
- Mycophenolate

- Human IVIG may be another (expensive) alternative

- None have been shown to be effective
- None are used typically in humans
- They are highly immunosuppressive
How I Treat Thrombocytopenia

**Immunosuppression for ITP**

- **Glucocorticosteroids**: first-line drug
- **Vincristine**: second-line drug or in combination with prednisone from start
- **Other immunosuppressive agents**
  - If above treatments fail or after relapse
  - If drug side effects are unbearable
- **Splenectomy (removal of the spleen)**
  - For refractory cases
  - In case of massive splenomegaly
  - When ultrasonographic disease is present
  - Not really evaluated in animals
How I Treat Thrombocytopenia

**Transfusion Support**

- **In cases of severe anemia**
  - Anemia ↑↑ bleeding tendency
  - DEA 1.1 blood type compatible
- **Packed red blood cells**
  - Store product up to 30 days
  - No functional platelets
  - No platelet-count rise
- **Fresh whole blood** (not chilled)
  - Volume = PCV rise (%) x kg x 2
  - Contains active platelets
  - ~20,000/10 mL/kg platelet-count rise
  - Also has coagulation factors
How I Treat Thrombocytopenia

Supportive Care

- **Transfusion support**
  - Packed red blood cells
  - Fresh whole blood
    - Volume = PCV rise (%) x kg x 2
  - Platelet-rich plasma/concentrate
    - Only when life-threatening bleeding
    - Frozen or lyophilized platelets?
  - Fresh frozen plasma
    - Only when a coagulopathy present

- **Local hemostasis**
  - Compression
  - Sutures
  - Fibrin glue
  - Gel foam
  - Thrombin
  - Bone wax
How I Treat Thrombocytopenia

Case: Trixi, 4-year-old spayed female

- Severe epistaxis for 3 days
- Also, petechiae and melena
- Rest of PE normal, easy bruising
- No drugs, vaccines, ticks or fleas
- PCV 18% (normal 35–55); DEA 1.1
- Total protein: 5 g/dL (5.5–7)
- Blood smear: no platelets
- Plt count: 3,000/μL
- Infectious disease screen submitted
- Prednisone 2 mg/kg PO BID
- Doxycycline 10 mg/kg PO BID
- 500 mL Fresh Whole Blood DEA 1.1 negative
How I Treat Thrombocytopenia

<table>
<thead>
<tr>
<th>Tag</th>
<th>PCV</th>
<th>PLT/μL</th>
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<td>0</td>
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<td>41,000</td>
</tr>
<tr>
<td>10</td>
<td>33</td>
<td>80,000</td>
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</table>
How I Treat Thrombocytopenia

Case: Trixi, 4-year-old spayed female

- Epistaxis and melena stopped
- Infectious screen negative
- PU/PD, exercise intolerant
- Prednisone tapered
- **Relapse on day 42; routine exam**
- Prednisone 2 mg/kg short-term and tapering
- Vincristine 0.02 mg/kg IV by catheter once; flushing catheter!
- Rapid response within 2 days
- Reactive thrombocytosis clinically not a concern

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<td>2</td>
<td>27</td>
<td>1,000</td>
</tr>
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<td>6</td>
<td>26</td>
<td>41,000</td>
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<td>10</td>
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<td>52</td>
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<td>818,000</td>
</tr>
<tr>
<td>55</td>
<td>43</td>
<td>1.4 MM</td>
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</table>
How I Treat Thrombocytopenias

- **Remove triggers**
  - Drug withdrawal, eliminate chemical exposure

- **Treat underlying disease**
  - Renal and hepatic disease
  - Myeloproliferative diseases (multiple myeloma)

- **Provide supportive care**
  - Local hemostasis (do no harm)
  - Transfusions for anemia, fluids

- **Platelet transfusion**
  - Only with severe hemorrhage
Polling Question #2

In regards to von Willebrand disease, which one of the following statements is true:

1. The plasma von Willebrand factor (vWF) is primarily functioning in the intrinsic coagulation cascade.
2. Induced (e.g., traumatic and surgery) hemorrhage is rarely observed.
3. The best clinical diagnostic test is the measurement of vWF by ELISA in EDTA blood or citrated plasma.
4. Affected animals need constant treatment and have a poor prognosis.
5. Cryo-poor plasma is the blood product of choice to treat dogs with von Willebrand’s disease.
How I Treat von Willebrand Disease

vWF < 35%
often < 10%

Mild to severe hemorrhage

Mostly induced hemorrhage
Plasma von Willebrand factor (vWF)

- **vWF quantity**: use citrated or EDTA blood
  - ELISA test expressed in % of control plasma
  - Normal: 65–150% vWF
  - Bleeding: <35% vWF

- **vWF function**
- **vWF multimer analysis**
- **vWF DNA test**

- *Normal PT and aPTT!*
How I Treat von Willebrand Disease

- Local hemostasis
- Cryoprecipitate
  - Contains enriched vWF and FVIII
  - Produced from fresh frozen plasma
  - Ideal treatment: 2–5 mL/kg, repeatedly
- Fresh or fresh frozen plasma at 5–10 mL/kg
  - Every 6–12 hours until bleeding is controlled
- Fresh whole blood 10–20 mL/kg
  - To control hemorrhage and correct anemia
- Desmopressin (DDAVP) at 1 µg/kg sc
  - Once or twice
  - Prevents or stops minor bleeding
How I Treat von Willebrand Disease

Desmopressin (DDAVP): 1-deamino-8-D-arginine vasopressin

- 1 µg/kg subcutaneously once or twice
- Stops minor bleeding and shortens BMBT
- Has minimal effects on vWF quantity
Case: King, 2-year-old male Doberman pinscher

- Precastration surgery assessment
- Healthy dog according to owner
- Purchased at 3 months; regular vaccinations
- Bled only twice from nail clippings
- Evaluation: TPR normal
  - CBC normal; platelets adequate
  - PT, aPTT normal
  - BMBT >10 min (normal <4 min)
  - vWF 6% (normal 60–150%)
- Diagnosis: vWD Type I
- Management?
How I Treat von Willebrand’s Disease

**Case: King, 2-year-old male Doberman pinscher**
- Precastration surgery assessment
- Healthy dog according to owner
- Purchased at 3 months; regular vaccinations
- Bled only twice from nail clippings
- Evaluation: TPR normal
  - CBC normal; platelets adequate
  - PT, aPTT normal
  - BMBT >10 min (normal <4 min)
  - vWF 6% (normal 60–150%)
- Diagnosis: vWD Type I

**Management**
- Desmopressin 1 µg/kg sc
- Special local hemostatic care
- DEA 1.1 matched FFP or cryo plasma available
- No long-term treatment needed; prevent injury
Polling Question #3

With respect to coagulopathies (secondary hemostatic disorders), which one of the following statements is true:

1. Surface bleeding is a classic presentation.
2. A citrated fresh blood or fresh frozen plasma sample is needed for coagulation studies.
3. Screening tests can only be performed in reference laboratories.
4. The buccal-mucosal bleeding time is typically prolonged.
5. The PIVKA test is most helpful to confirm rodenticide poisoning.
How I Treat Hereditary and Acquired Coagulopathies

Clinical Signs
• Hematoma and cavity hemorrhage
• Localized or generalized
• Mild to life-threatening
• Recurrent or isolated

Diagnostics
• Prothrombin time (PT)
• Activated partial thromboplastin time (aPTT)
• Thrombin Time (TT)

Coag Dx™ Analyzer for aPTT and PT Tests
How I Treat Hereditary Coagulopathies

- Commonly seen in many breeds

<table>
<thead>
<tr>
<th>Deficiency</th>
<th>Breeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibrinogen</td>
<td>Bichon frise, mixed</td>
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<tr>
<td>Prothrombin</td>
<td>Cocker spaniel, boxer</td>
</tr>
<tr>
<td>Factor VII*</td>
<td>Beagle, others</td>
</tr>
<tr>
<td>Factor VIII*(A)</td>
<td>Many breeds, cats</td>
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<tr>
<td>Factor IX*(B)</td>
<td>Many breeds, cats</td>
</tr>
<tr>
<td>Factor X</td>
<td>Cocker spaniel</td>
</tr>
<tr>
<td>Factor XI*</td>
<td>Kerry blue terrier</td>
</tr>
<tr>
<td>Factor XII</td>
<td>Domestic, Oriental shorthair</td>
</tr>
<tr>
<td>Vitamin K dep. coag.</td>
<td>Devon rex, sphynx cat</td>
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</tbody>
</table>

*Mutation identified

* "Jersey" fibrinogen deficient

Sphynx
How I Specifically Treat Coagulopathies

- Local hemostasis
- Remove trigger or treat underlying disease
- Correct coagulopathy with plasma
- Fresh Frozen Plasma 10 mL/kg 1–3x/day
- Cryo or cryo-poor plasma for some specific defects
  - Smaller volume, second product
- Correct severe anemia
  - Packed red cells
  - Fresh whole blood
  - Typing and cross matching required
- Monitor with screening tests
- Treat until proper hemostasis is achieved
- Specific therapies
- Future therapies
How I Treat Hereditary Coagulopathies

- Prevent hemorrhage
- When bleeding or preoperative

<table>
<thead>
<tr>
<th>Deficiency</th>
<th>Products</th>
</tr>
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<tbody>
<tr>
<td>Fibrinogen</td>
<td>Cryo, FFP</td>
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<tr>
<td>Prothrombin</td>
<td>FFP</td>
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<td>Factor VII*</td>
<td>Cryo-poor, FFP</td>
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<td>Factor VIII*(A)</td>
<td>Cryo, FFP</td>
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<td>Factor IX*(B)</td>
<td>FFP</td>
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<td>Factor X</td>
<td>FFP</td>
</tr>
<tr>
<td>Factor XI*</td>
<td>FFP</td>
</tr>
<tr>
<td>Factor XII</td>
<td>No treatment</td>
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<tr>
<td>Vitamin K dep. coag.</td>
<td>FFP, vitamin K sc/oral</td>
</tr>
</tbody>
</table>

*Mutation identified
How I Will Treat Hereditary Coagulopathies in the Future

- Recombinant products
  - Human clotting factors: rFVIIa

PT in FVII deficient beagles

*PT normalized at 15 minutes with all treatments*
How I Will Treat Hereditary Coagulopathies in the Future

- Gene therapy: experimental in dogs
- Genetic Control
  - Prevent the generation of affected animals
  - Genetic screening and counseling

High, et al.
Liver-Derived Expression of cFIX in Hemophilia B Dogs Infused with ~1x1012 AAV-(ApoE)4/hAAT-cFIX/kg
How I Treat Coagulopathies

Case: Scooby, 8-month-old male Chihuahua

- **Presenting Complaints:**
  - Swelling over right hip
  - Some dyspnea and melena
- **History**
  - Litter of 3 puppies
  - Parents are well
  - Single dog in owner’s home
- **Diagnostics**
  - PCV / TP 32% / 5.2 g/dL; plts 4/HPF
  - Aspirate of mass: Nonclotting blood

<table>
<thead>
<tr>
<th>Dog</th>
<th>PT (sec)</th>
<th>aPTT (sec)</th>
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</thead>
<tbody>
<tr>
<td>Scooby</td>
<td>100</td>
<td>300</td>
</tr>
<tr>
<td>Normal</td>
<td>11–14</td>
<td>60–93</td>
</tr>
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</table>

![Coagulation diagram](image)
Polling Question # 4

Scooby most likely has:

1. A right luxating hip
2. Hemophilia A or B
3. Fibrinogen deficiency
4. Disseminated Intravascular Coagulation (DIC)
5. Anticoagulant rodenticide poisoning
How I Treat Vitamin K Deficiency and Antagonism

- **Rodenticides, anticoagulant-type**
  - Warfarin, pindone and indandione
  - Bromadiolone and brodifacoum
- Coumadin therapy/toxicity
  - Sweet clover poisoning in cattle
- **Gastrointestinal malabsorption**
- Oral antibiotic therapy
- **Nutritional vitamin K deficiency**
- Hepatic diseases
  - Cholestatic disorders
    - History, discolored feces
    - Prolongs PT and aPTT
    - Prolonged PIVKA time
    - ± Thrombocytopenia
    - Normal thrombin time
    - Toxicology

Needed for carboxylation step
Polling Question #5

How would you treat Scooby?

1. Induce emesis
2. Give orally vitamin K
3. Give stored whole blood
4. Drain hematoma
5. All of the above
How I Treat Vitamin K Deficiency and Antagonism

- **Induce emesis only within 1 day of exposure/PT normal**
  - Never in an animal that is bleeding
  - Monitor PT q24 hours
- **Emergency Management**
  - Stop hemorrhage locally
  - Rehydrate
  - In severe cases: transfusion support
  - Cryo-poor plasma, FFP 10/kg as needed
  - When also anemic: fresh whole blood
- **Specific therapy: Vitamin K₁**
  - Vitamin K1 at 1-5 mg/kg q12-24 hours
  - Monitor PT until normal
- **Prevent reexposure**
  - Remove poison, monitor
How I Treat Coagulopathies

Case: Scooby, 8-month-old male Chihuahua

- Exposure possible (prior house owner)
  - No emesis induced (too late/dangerous)
  - Severe due to pulmonary disease
  - PIVKA test not performed

- **Transfusion support**
  - FFP 10 mL/kg q12 hours for 2 days
  - No need for pRBC or whole blood
  - Blood type DEA 1.1 positive

- **Vitamin K₁** 3 mg/kg q12 hours
  - Treat for 4 weeks

- **Monitor** to assure PT is normal
  - Day 1: much clinically improved
  - Home after 2 days; platelets repeatedly normal
  → **Uneventful recovery**

<table>
<thead>
<tr>
<th>Day</th>
<th>PCV %</th>
<th>PT (sec)</th>
<th>aPTT (sec)</th>
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<tr>
<td>Normal</td>
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</table>
How I Treat Coagulopathies Associated with Hepatic Disease

- Any hepatic failure (mycotoxicosis, shunt, fatty liver, hepatitis, amyloidosis)
- Cholestasis—vitamin K deficiency
- Others impair factor synthesis

**Bleeding tendency is difficult to predict**
- Severe hypoproteinemia, hypofibrinogenemia, diffuse disease

**Therapy**
- Treat underlying disease
- (Pre-) treat with vitamin K
- FFP when serious bleeding
- FFP available for biopsy
- Other blood products available
- Interventions are only for short-term
Disseminated Intravascular Coagulation (DIC)

- Syndrome, not a disease
- Thrombocytopenia
- Schistocytes
- Variable PT and aPTT

↑ Fibrin split products
↑ D-dimers
↓ Antithrombin III
↓ Fibrinogen concentration
↓ Thrombin time (TT)
Two Opposing Presentations

- Hemorrhage
- Thrombosis
Polling Question #6

In regards to the treatment of DIC, which one of the following statements is true?

1. DIC is successfully treated in humans by standard methods which are (slowly) being adapted to animals.
2. FFP would not be helpful in any DIC case and only “add to the fire” (cause more thrombosis).
3. Heparin has been shown to be effective in treating DIC.
4. Low Molecular Weight (LMW) Heparin has been shown to be superior to unfractioned heparin.
5. Unless the trigger can be removed or the underlying disease can be treated, any therapy is doomed to fail.
How I Treat DIC

• Remove trigger or treat underlying process
• Administer electrolyte fluids to maintain tissue perfusion
• Correct shock, acidosis, and hyperthermia
• Stop intravascular coagulation (controversial)
  • May not be needed if inciting cause is removed
  • Regular heparin 20–250 IU/kg sc QID in acute DIC
    • Acts on ATIII which may have to be supplemented
    • Monitor (PTT) and continue for several days (rebound)
  • LMW heparin (dalteparine)
    • 150 IU/kg every 12 hours subcutaneously
    • Monitor tenase in laboratory; does not affect PTT or PT
    • Aspirin 0.2 mg/kg instead of heparin
• Blood component therapy as indicated (controversial)
Heparin Particularly Affects Intrinsic Cascade

Heparin acts through antithrombin III
Anticoagulant Effects

- Aspirin—pain medications
- Unfractionated heparin—heparin flush
- Warfarin—rodenticides

<table>
<thead>
<tr>
<th>Canine</th>
<th>PT</th>
<th>aPTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspirin</td>
<td>Normal</td>
<td>Normal</td>
</tr>
<tr>
<td>Heparin</td>
<td>Mild prolongation</td>
<td>Severe prolongation</td>
</tr>
<tr>
<td>Warfarin</td>
<td>Severe prolongation</td>
<td>Severe prolongation</td>
</tr>
<tr>
<td>Normal</td>
<td>11–14 seconds</td>
<td>60–93 seconds</td>
</tr>
</tbody>
</table>
General Management Considerations

- **Collect samples for diagnostic tests prior to treatment**
  - Correct tubes and volumes
- **Stop bleeding locally**
  - Compression, hemostat, thrombin, epinephrine
- **Supportive emergency care**
  - Correct hypovolemia with crystalloid fluids
- **Transfusion therapy**
  - Packed RBCs for severe anemia
  - Plasma products for coagulopathies and vWD
  - Platelet concentrates rarely for life-threatening hemorrhage
- **Specific treatments**
  - Vitamin K₁, desmopressin, rFVII, prednisolone, vincristine
- **Treat underlying disease**
- **Do not cause more harm** — no surgery or delay it
- **Monitor efficacy of therapeutic interventions**
Summary

After completing this Webinar, you should be able to manage:

• ITP and other thrombocytopenias
• von Willebrand disease
• Hereditary coagulopathies
• Anticoagulant rodenticide poisoning and liver disease
• Disseminated intravascular coagulation
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*Archived Webinar

The Most Frequently Asked Questions about Bleeding Disorders by Dr. Urs Giger
Thank you

Thank you for attending today’s Webinar:

The Management of Common Bleeding Disorders

Urs Giger, Dr. med. vet, MS, FVH, DACVIM, DECVIM, DECVCP

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