1. **Neuroanatomical Review**
   a. Peripheral
      i. Inner ear
      ii. Receptors
      iii. Ganglion
      iv. Axon of CN VIII
   b. Central
      i. Vestibular nuclei
      ii. Projections
         1. Cerebellum
         2. Brainstem
         3. Spinal cord

2. **Neurological Examination Findings**
   a. Mentation
      Normal to reduced
   b. Gait
      Normal to non-ambulatory
      Vestibular ataxia
      Circling, falling, head tilt
   c. Postural reactions
      Normal to reduced
   d. Spinal reflexes
      Normal
   e. Cranial nerves
      CN VIII
      +/- others
   f. Central vs. Peripheral

<table>
<thead>
<tr>
<th></th>
<th>Peripheral</th>
<th>Central</th>
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<tbody>
<tr>
<td><strong>Nystagmus</strong></td>
<td>Horizontal/rotary</td>
<td>Vertical</td>
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<td>Changes direction with change in head position</td>
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<tr>
<td><strong>Cranial nerve deficits</strong></td>
<td>CN VII (Facial)</td>
<td>Other CN deficits</td>
</tr>
<tr>
<td><strong>Mentation</strong></td>
<td>Normal</td>
<td>Normal to reduced</td>
</tr>
<tr>
<td><strong>Postural reactions</strong></td>
<td>Normal</td>
<td>Deficits (ipsilaterial)</td>
</tr>
</tbody>
</table>
g. “Special” cases
   i. Bilateral Vestibular Disease
      1. Crouched posture
      2. Wide head excursions
      3. No pathologic or physiologic nystagmus
   ii. Paradoxical Vestibular Disease
      1. Head tilt, loss of balance opposite to side of lesion
      2. Localization MUST be central vestibular

3. Case Examples
   a. Case 1 – “Harry”
      4 yo MC DSH
      Presented for evaluation of an acute onset of left head tilt

      Neurological examination findings:
      Mentation –
      Gait –
      Postural reactions –
      Spinal reflexes –
      Cranial nerves –

      Neuroanatomical localization:

   b. Case 2 – “Marley”
      7.5 yo MC Cocker Spaniel
      Presented for evaluation of an acute onset of left head tilt

      Neurological examination findings:
      Mentation –
      Gait –
      Postural reactions –
      Spinal reflexes –
      Cranial nerves –

      Neuroanatomical localization:

   c. Case 3 – “Bruno”
      8 yo MC Boxer
      Presented for evaluation of an acute onset, progressive ataxia of 4 days duration

      Neurological examination findings:
      Mentation –
      Gait –
      Postural reactions –
      Spinal reflexes –
Cranial nerves –

Neuroanatomical localization:

4. **Differential Diagnoses**
   a. **Peripheral**
      i. **Infectious/Inflammatory**
         1. Otitis media/interna
         2. Primary secretory otitis media
         3. Naso- and otopharyngeal polyps
      ii. **Trauma/Toxin**
         1. Trauma to inner ear/bulla
         2. Toxin – ototoxic drugs
            a. Aminoglycoside antibiotics
            b. Furosemide
            c. Salicylates
            d. Some chemotherapeutics
            e. Most ear cleaning solutions
      iii. **Anomalous**
         1. Reported in both dogs and cats
         2. Consider age of onset and breed
         3. No treatment
      iv. **Metabolic**
         1. Hypothyroidism
   v. **Idiopathic**
      1. Dogs
      2. Cats
   vi. **Neoplastic**
      1. Aural neoplasia
      2. Peripheral nerve sheath tumor

b. **Central**
   i. **Vascular**
      Cerebrovascular disease (“stroke”)
   ii. **Infectious/Inflammatory**
      1. Infectious
         a. Viral
         b. Bacterial
         c. Protozoal
         d. Mycotic
      2. Inflammatory
         a. Meningoencephalitis of unknown etiology
   iii. **Trauma/Toxin**
      1. Trauma
         Head trauma affecting brainstem
      2. Toxin
         Metronidazole
   iv. **Anomalous**
1. Cysts
2. Chiari-like malformations
3. Hydrocephalus
   v. Idiopathic
   vi. Neoplastic
   1. Primary CNS tumors
   2. Secondary tumors
   3. Metastatic neoplasia

5. Take Home
   a. Localization, Localization, Localization

We hope to see you at our next event on Saturday, March 24th!

Lakeshore’s 10th Annual Swing Into Spring Symposium
at the North Shore Event Centre (Previously called Radisson North Shore)