

Question

A 5-year old male castrated Chihuahua mix presents with a 2 day history of limping in the hind limbs. The owner reports that he is usually very active and now he seems very hesitant to jump on and off of the couch. On physical exam, the patient appears to be slightly weak in the hind, reminiscent of a drunken gait. There are no conscious proprioceptive deficits. The patellar and gastrocnemius reflexes are normal. There is resistance noted when turning the neck to the left and pain elicited on deep neck palpation. Mentation is appropriate and the cranial nerves are intact. The owners have financial concerns and can only afford limited treatment and diagnostics. In light of these constraints, what is the best treatment option?

- Immunosuppressive doses of prednisone with strict rest
- Tramadol and acepromazine with strict rest
- Non-steroidal anti-inflammatory therapy and strict rest
- IV dexamethasone sodium phosphate at 6 hour intervals for 36 hours and strict rest

Explanation - The most recent literature shows that 50% of dogs with clinical signs of intervertebral disc disease (**this patient has and IVDD type 1**) will improve with medical management alone. Medical management involves restricted activity and anti-inflammatory therapy. **Prednisone, methyl-prednisolone sodium succinate, and NSAIDs** are commonly used. Prednisone, if used, should be prescribed at an anti-inflammatory dose and not immunosuppressive. Dexamethasone sodium phosphate has only been shown to increase the likelihood of side effects and complications such as urinary tract infection and is therefore not recommended.

Question

A 3 year old mixed breed dog presents after falling from a height of 10 feet and landing on the caudal half of his body. Since the fall, the dog has been dribbling urine and dropping feces as it walks. Neurologic exam reveals no abnormalities in the thoracic limbs, and hypo-reflexive patellar, gastrocnemius, and withdrawal reflexes in the pelvic limbs. Where is the lesion in the spinal cord?

- C1-C5
- L4-S3
- C6-T2
- T3-L3

Explanation - The correct answer is L4-S3. The spinal cord is divided into the 4 regions listed above in the dog. Lesions at C1-C5 would manifest as UMN signs in the thoracic and pelvic limbs. Lesions at C6-T2 would manifest as LMN for the thoracic limbs and UMN for the pelvic limbs. Lesions at T3-L3 would not affect thoracic limbs and would cause UMN signs for the pelvic limbs. Lesions at L4-S3 would manifest as normal thoracic limbs and LMN signs in the pelvic limbs, anus, and bladder.

Question

Based on the direction of this dog's head tilt, where would you localize the lesion to if he has a paradoxical vestibular syndrome?



- Right cranial nerve VIII (vestibulocochlear nerve)
- Right cerebellum
- Left cranial nerve VIII (vestibulocochlear nerve)
- Left cerebellum
- Left cerebral hemisphere

Explanation - The correct answer is the right cerebellum. This dog has a left head tilt by definition because his left ear is closer to the ground. The key to answering this question is seeing the left head tilt and reading that the question asks about PARADOXICAL vestibular disease.

Vestibular disease can be peripheral or central, and central vestibular disease can be classic in appearance or paradoxical. Peripheral vestibular disease is due to a lesion in the **inner ear** or **vestibular portion of CN VIII (Vestibulocochlear)**. Classic central vestibular disease is due to a lesion in the **brainstem** or **cerebellum**. Signs with peripheral and classic central vestibular disease include head tilt, falling, and circling to the same side as the lesion with nystagmus with fast phase to the opposite side.

With paradoxical vestibular disease, the lesion is in certain regions of the cerebellum (**flocculonodular lobe**) or caudal cerebellar peduncle and produces signs to the opposite sides from which is seen with peripheral and classic central disease.

Question

A 7 year old Poodle presents for a left sided head tilt, a ventral strabismus on the left, and right horizontal nystagmus. The dog is obtunded, has conscious proprioception deficits in both right limbs, and a right sided facial paralysis. Where is the lesion?

- Central nervous system on the right
- Peripheral nerve on the right
- Central nervous system on the left
- Peripheral nerve on the left

Explanation - The correct answer is central nervous system on the right. This dog has paradoxical vestibular disease. This disease is usually caused by a destructive lesion in the CNS in which there is loss of inhibition of the vestibular output on the side of the lesion. There is therefore a relative increase in vestibular output on the side of the lesion, causing vestibular signs on the side opposite the lesion (yes, this can be confusing). In this case, the right sided lesion has vestibular signs that would normally localize the lesion to the left side. **When the lesion causes vestibular signs and proprioceptive deficits, the lesion is usually ipsilateral to the side with the proprioceptive deficits.**

Question

What is the prognosis for a dog with spinal trauma that has no deep pain for greater than 24 hours?

- Poor with surgical repair of the lesion
- Good with surgical repair of the lesion
- Guarded with surgical repair of the lesion
- Guarded with strict cage rest and high dose corticosteroid treatment
- Fair with strict cage rest and high dose corticosteroid treatment

Explanation - The correct answer is poor. The lack of deep pain with spinal cord trauma is a poor prognostic indicator, and even with surgical intervention at this point, there is **less than a 5% chance of a return to function.**

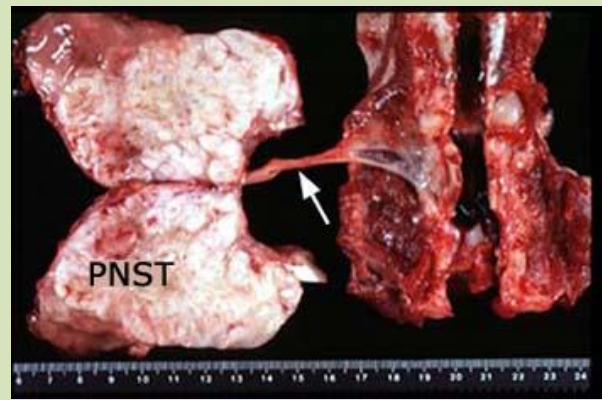
Question

A 6 year old female spayed Labrador Retriever presents for a progressive lameness of the left thoracic limb over the past 3 months. Physical exam findings include no conscious proprioception, no withdrawal reflex, and atrophy of the muscles of the affected limb. An ultrasound of the left axilla shows a soft tissue mass lesion extending up from the axilla to the vertebral canal. What is the most likely diagnosis?

- Osteosarcoma

- Hemangiosarcoma
- Fibrosarcoma
- Peripheral nerve sheath tumor

Explanation - The correct answer is peripheral nerve sheath tumor. The presentation of the dog described is classic for a peripheral nerve sheath tumor. They are **slow growing tumors** arising from the peripheral nerve sheath cells. They are most commonly found in the **brachial plexus**. Limb amputation and tumor excision may be curative if the spinal canal has not been invaded.



In the gross photograph on the left, note the enlargement of two of the nerves forming the brachial plexus of a dog. It is not uncommon for peripheral nerve sheath tumors to cause enlargement of multiple nerve trunks.

They may also form discrete masses (PNST) associated with a nerve (arrow) as seen in the right hand photograph. Tumors of the peripheral nervous system are not rare in dogs. The brachial plexus is most frequently involved, but any cranial nerve (especially the trigeminal nerve) or spinal nerve root may be involved.

Question

A 9 year old male Labrador Retriever presents for acute onset of circling to the right, head tilt to the right, nystagmus to the left, and vomiting. The rest of the physical exam is unremarkable. CBC, chemistry panel, urinalysis, and otic exam were unremarkable. After 14 days of supportive care, the dog has completely recovered on its own. What is the most likely disease this dog had?

- Canine idiopathic vestibular disease (Old dog vestibular disease)
- Otitis interna
- Inflamed polyp in the middle ear
- Bacterial meningitis

Explanation - The correct answer is **canine idiopathic vestibular disease** (Old dog vestibular disease). This disease is usually diagnosed after all other vestibular causes have been ruled out.

Otitis interna would be ruled out with an otic exam, CBC, and lack of pain and fever. Bacterial meningitis could be ruled out by a CBC and lack of pain and fever. Polyps in the ear rarely occur in dogs; most aural polyps occur in cats. In addition, an otic exam would rule this out anyway.

Question

Which of the following is the most likely side effect of KBr therapy in epileptic dogs?

- Pancreatitis
- Sedation
- Vomiting
- Polyuria and polydipsia

Explanation - The correct answer is **sedation**. Possible side effects of KBr therapy include polyphagia, polyuria and polydipsia, ataxia, skin reactions, pancreatitis, and vomiting. However, sedation is more likely to occur than these (**NB: KBr is good in dogs with hepatopathy**).

Question

A 10 year male castrated German Shepherd dog presents for an acute onset of ptosis, drooping of the lip, and drooping of the cheek all on the left side. What nerve has been damaged?

- CN III
- CN VI
- CN VII
- CN V

Explanation - The correct answer is CN VII. This is the facial nerve which is responsible for **motor of the facial muscles** as well as **sensation in the ear** and **lacrimation**. CN V is mostly responsible for sensation. CN III is the oculomotor nerve and serves in movement of the eye. CN VI is also involved in movement of the eye.

Question

You get called to a farm that is having trouble with mid-term abortion in their cows. As you are driving up to the farm you see one of the farm dogs and you notice that the dog appears to be suffering from diffuse muscle atrophy and has trouble ambulating in the hindlimbs. You immediately make an association between the dog and the abortions. What is your primary differential?

- Chlamydophila felis
- Toxoplasma gondii
- Brucella bovis

- Neospora caninum

Explanation - The correct answer is Neospora caninum, a **protozoan** parasite. The definitive host is the dog (or coyote or other canidae) which acquires the infection by eating infected meat, and spreads it to cows by shedding oocysts in the pasture or feed. Although clinical signs are mainly seen as abortions and abnormal calves in herbivores, **dogs may suffer from neurologic and muscular abnormalities**. Infection to other dogs is usually as a result of **transplacental spread**. **IFA** is usually performed to make the diagnosis.

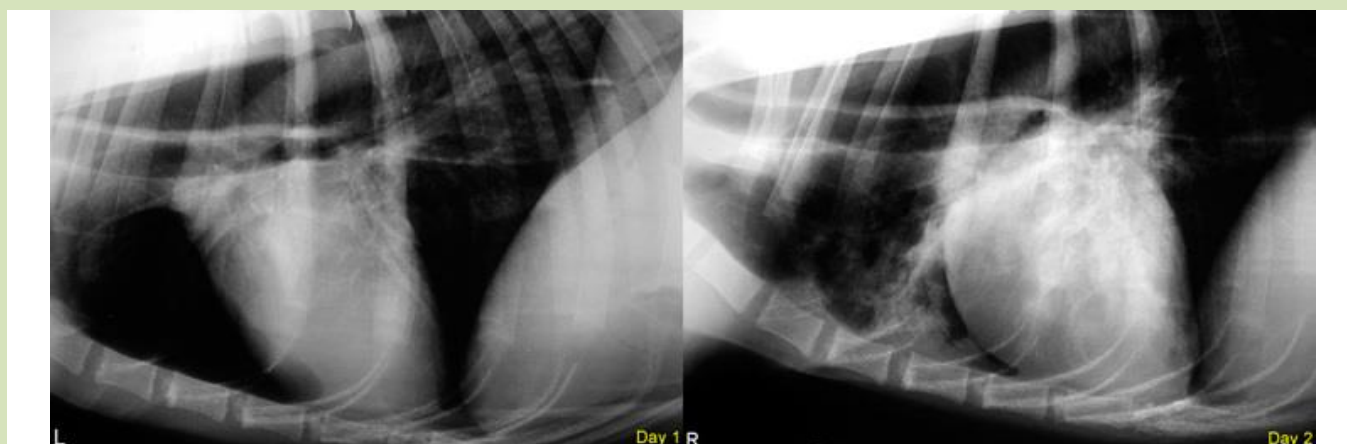
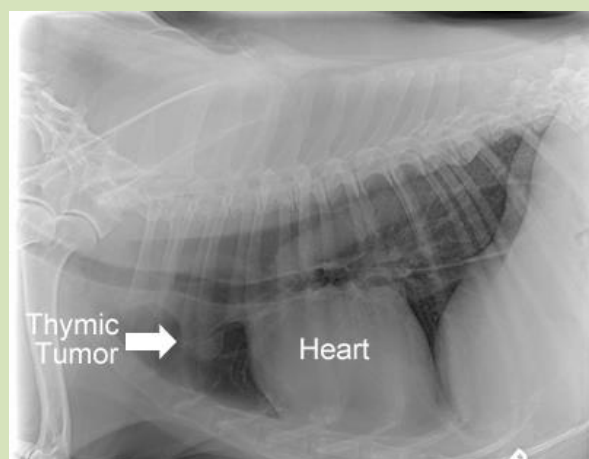
Question

A 9 year old male Queensland Heeler presents with a four day history of progressive tetraparesis. Physical exam showed him to be weakly ambulatory with support, and with delayed conscious proprioceptive reactions in all 4 feet. As part of your initial workup, you take chest X-rays which are shown below. Which of the following next steps is the most appropriate test to confirm your clinical suspicion about the cause of the dog's signs?



- CT scan of the thorax
- Tensilon response test
- MRI of the brain
- Myelogram
- Bronchoalveolar lavage and culture

Explanation - The correct answer is a Tensilon response test. Hopefully, you were able to identify the mass in the cranial mediastinum on the chest radiograph, as this was one of the keys to this case. This, in conjunction with the dog's other signs, are suggestive that this dog has a thymoma and associated **secondary myasthenia gravis**. Tensilon (edrophonium) is a rapidly acting anticholinesterase that reverses signs of myasthenia within minutes in most dogs. A chest CT would be a valid test to confirm the presence of the mediastinal mass and might be an appropriate test before surgery but would not bring you closer to a diagnosis if you already have identified the mass. An MRI of the brain would assess a CNS cause of the dog's signs, which are unlikely, given the other findings. Similarly, a myelogram would assess if a spinal cord lesion caused the dog's signs, but the rest of the findings in this case should point you in a different direction.



Megaesophagus & aspiration pneumonia in a German Shepherd with acquired MG



Lateral thoracic radiograph demonstrating megaesophagus and thymoma in a Labrador Retriever with MG

Question

Which of the following is the most common presentation for a patient with idiopathic epilepsy?

- A 2-month old Chihuahua that presents in status epilepticus after vomiting and not eating for a day. This is the first seizure the dog has been observed having.
- A 3-year old Labrador Retriever that recently began having generalized tonic-clonic seizures approximately once weekly, most frequently at night when resting. The dog appears and behaves normally between seizures.
- A 9-year old Boxer that recently began having focal motor seizures that began weekly but are now becoming more severe and frequent.

- A 5-month old Yorkshire Terrier that has generalized tonic-clonic seizures, often after eating. The dog is sometimes obtunded between seizures.

Explanation - Despite the term, idiopathic epilepsy refers to a specific condition and should not be applied to any patient with seizures of unknown cause. Most dogs with idiopathic epilepsy begin having seizures between 1 and 5 years of age. Breeds commonly affected include Beagles, Keeshonds, Dachshunds, Labrador and Golden Retrievers, Shetland Sheepdogs, Irish Wolfhounds, Vizslas, and English Springer Spaniels. Idiopathic epilepsy is **much less common in cats**.

While not always the case, the classic descriptions of patients with idiopathic epilepsy describe generalized tonic-clonic seizures without interictal abnormalities with seizures beginning during the 1 to 5 year age range.

The Yorkshire Terrier described shows signs most consistent with a portosystemic shunt.

The Chihuahua described shows signs most consistent with hypoglycemia.

The Boxer's signalment and signs are most consistent with intracranial neoplasia.

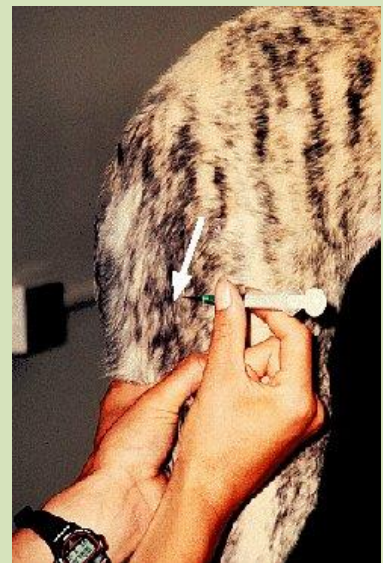
Question

Intramuscular injections into the caudal aspect of the quadriceps muscles are most often associated with damage to which major nerve in the dog?

- Lateral cutaneous sural
- Tibial
- Sciatic
- Peroneal

Explanation - The correct answer is sciatic. The sciatic is the most commonly damaged nerve from intramuscular injections given into the caudal musculature of the thigh. The sciatic, also known as the ischiatic nerve, is the largest nerve in the body of the dog. It arises from L6, L7, S1, and sometimes S2 nerve roots. It begins as the lumbosacral trunk exits the pelvis and travels down the caudal thigh. It then splits into the tibial nerve and common peroneal nerve further distal down the thigh.

When administering an injection into the semimembranosus/semitendinosus muscle group, the tip of the needle (white arrow) should be directed toward the caudal aspect of the limb so if the patient moves, the needle will not advance toward the sciatic nerve. Notice the left hand is being used to isolate the muscle group caudal to the femur.



Question

What is the drug of choice for **head trauma patients** with increased intracranial pressure?

- Opioids
- Non-steroidal anti-inflammatory drugs
- Glucocorticoids
- Mannitol

Explanation - The correct answer is mannitol. Mannitol is a hyperosmotic diuretic. It decreases cerebral edema by establishing an osmotic gradient between plasma and cells. Some also believe that it **increases oxygen delivery to the brain** by decreasing the hematocrit, which reduces blood viscosity and increases cerebral blood flow. Increasing oxygen delivery to the brain leads to decreased intracranial pressure.

Question

A 5 year old male castrated German Shepherd Dog presents for a right thoracic limb monoplegia after jumping out of the back of a moving pickup truck. On physical exam, you observe superficial abrasions over his body, a right sided Horner's syndrome, and dragging of his right thoracic limb. He has no conscious proprioception, motor function, or deep pain anywhere in the right thoracic limb. What should you tell the owner?

- The dog suffered a brachial plexus avulsion and will most likely need to have the leg amputated.
- The dog has damage to the radial nerve. Electrodiagnostic procedures should be run to determine how much nerve function remains in the limb.
- The dog has a brachial plexus avulsion but will likely regain function in the limb in several months.
- Physical therapy will greatly improve the chances that the dog will regain function of the limb.

Explanation - The correct answer is the dog suffered a brachial plexus avulsion and will most likely need to have the leg amputated. Dogs that are hit by cars or who jump out of moving cars often suffer brachial plexus avulsions. **Complete nerve root avulsions are not treatable and usually require amputation of affected limbs.** Partial avulsions carry a better prognosis but require large amounts of time and physical therapy before seeing any improvement. The lack of deep pain and motor function in the limb is a negative prognostic indicator supporting the diagnosis of a complete brachial plexus avulsion.

Question

A 5 year old intact male Labrador Retriever presents for acutely progressive ascending paralysis starting in the pelvic limbs progressing to the thoracic limbs. The dog is used as a hunting dog and was in a fight with a raccoon a week ago. What do you tell the owner of the dog?

- Most dogs with this disease will start to recover spontaneously in several weeks and usually fully recover in several months.
- The dog will progressively get worse and will have to be euthanized.
- The raccoon fight is not significant. The disease is caused by ingestion of toxins.
- Steroid administration is the most important therapy for returning the dog to health.

Explanation - The correct answer is most dogs with this disease will start to recover spontaneously in several weeks and usually fully recover in several months. The dog has idiopathic **polyradiculoneuritis** or **Coonhound paralysis**, which is often (but not always) associated with raccoon exposure. The actual etiologic factor is unknown. Steroid administration is controversial. Nursing and supportive care is the most important therapy. Death can occur if the respiratory nerves become affected. Rabies should be also included as a differential if vaccine status is in question.

Question

A 7-year old male castrated Doberman presented for lethargy, anorexia, and a left forelimb lameness. He was started on meloxicam two days ago for neck pain and improved significantly but became very lethargic and inappetent last night. On physical exam, he had full range of motion in his neck, a hunched stance, conscious proprioceptive deficits in all feet, and his left forelimb was held in an abducted stance. He had a short choppy gait in his thoracic limbs and long lanky gait in his hind limbs. Hematochezia was noted on rectal palpation. Brief ultrasound did not show any evidence of pleural, pericardial, or abdominal effusion. The owners do not wish to pursue any diagnostics. What is your recommended treatment plan for the neurologic disease process you suspect?

- Add an opioid pain medication (such as Tramadol) and recommend strict cage rest for 14 days.
- Recommend euthanasia; it is likely a tumor.
- Discontinue meloxicam. Start an oral opioid-based pain medication for 5 days. Then start an anti-inflammatory dose of a steroid.
- Switch him from meloxicam to prednisone and recommend strict cage rest.

Explanation – The correct answer is Discontinue meloxicam. Start an oral opioid-based pain medication for 5 days. Then start an anti-inflammatory dose of a steroid. This dog has the classic two-engine gait characteristic of Wobbler's syndrome. The hematochezia is likely due to gastric ulceration secondary to meloxicam administration, which should be discontinued immediately. Medical management for Wobbler's syndrome involves an **anti-inflammatory dose of a steroid**.

There is a **three to five day wash out period** needed after stopping meloxicam and before starting prednisone.

Further diagnostics for Wobbler's syndrome involves imaging (cervical radiographs, myelogram, MRI or CT) and it can be helpful in ruling out neoplasia or traumatic injuries. The left forelimb lameness and abducted stance are likely due to a pinched nerve however further imaging would be needed for confirmation.

Question

A 10-year old female spayed German shepherd mix presented to you after being hit by a car. She is laterally recumbent and her forelimbs are rigid but when you stand her up, she will voluntarily move them. She has normal conscious proprioception. Her hind limbs are paralyzed. What do you tell the owner?



- She has the Schiff-Sherrington posture, but her prognosis cannot be determined yet.
- She has the Schiff-Sherrington posture and her prognosis is poor.
- She has a C1-C5 lesion, but her prognosis cannot be determined yet.
- She has the decerebrate rigidity posture and her prognosis is poor.

Explanation - She has the Schiff-Sherrington posture, but her prognosis cannot be determined yet. The Schiff-Sherrington posture is defined as thoracic limb extensor rigidity with hind limb paralysis. This posture is a result of a severe lesion caudal to T3 where the border cell neurons in the TL spine are injured. These cells are located between L1-L6. The cells normally project their axons cranially and inhibit thoracic limb motor nerves so loss of inhibition results in extensor rigidity. The UMN and LMN pathways are undisturbed so conscious proprioception and reflexes are normal in the thoracic limbs and they are able to voluntarily move them if stood up. Prognosis for animals with Schiff-Sherrington cannot be determined from the presence of this posture alone.

Prognosis is determined by the cause and severity of the spinal cord trauma which can be assessed by clinical signs such as the **presence or absence of deep pain in the pelvic limbs**. Thoracic limb extensor rigidity can be seen with C1-C5 lesions; however, these animals should have postural and reflex deficits. Decerebrate rigidity occurs following a cerebral lesion that results in rigidity of all four legs and altered mentation (stupor or coma).

Question

A 4-year old male castrated Dachshund presents for further evaluation after developing acute hind end paresis. A neurologic exam warranted advanced imaging and a myelogram was performed. Based on the image below, where is the lesion?



- Left side T12-T13
- Right side T12-T13
- Right side T13-L1
- Left side L2-L3
- Right side L2-L3

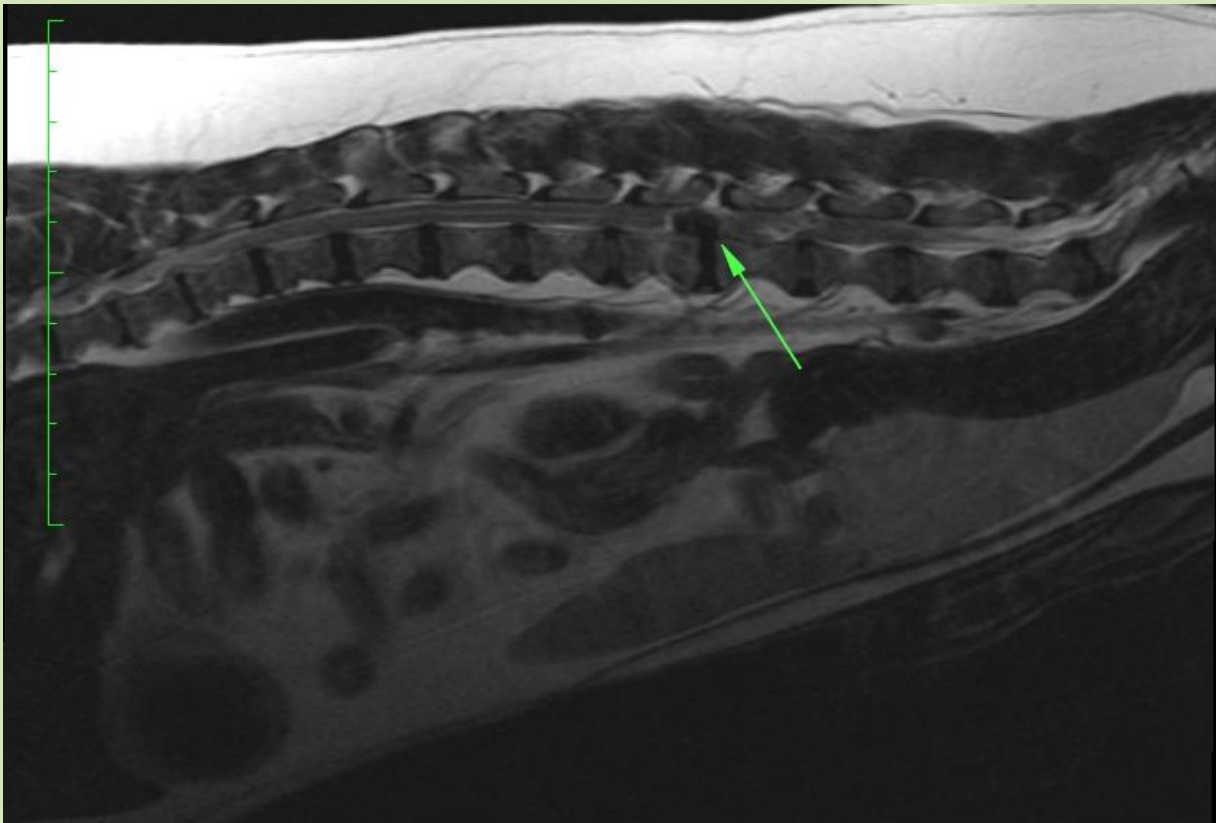
Explanation - The correct answer is right side T12-T13. Looking at the myelogram one can appreciate the contrast column on the right side acutely stop at approximately the level of T12-T13. Furthermore, the dye column appears to be deviated toward midline both cranial and caudal to the region of the disruption (more dramatic cranially). This is characteristic of extradural compression. The most common cause of this in a Dachshund is a **disc herniation**.

Question

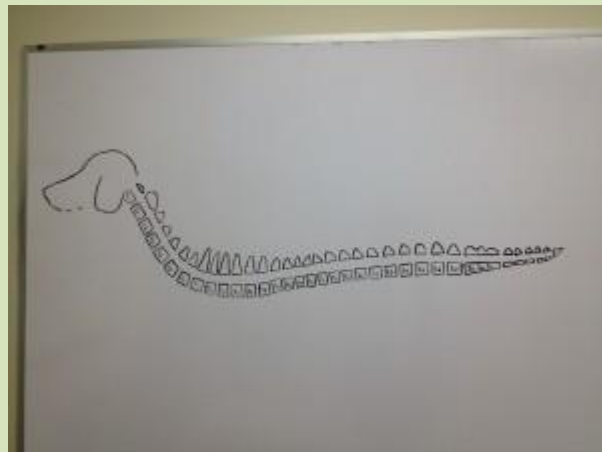
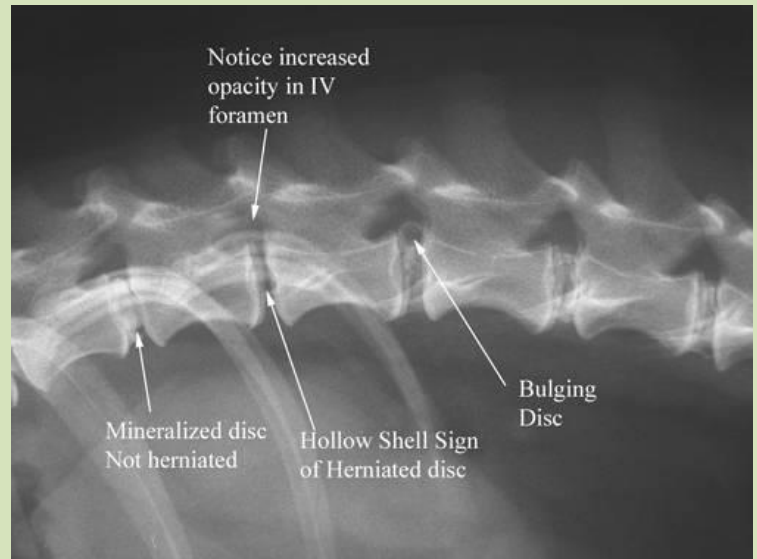
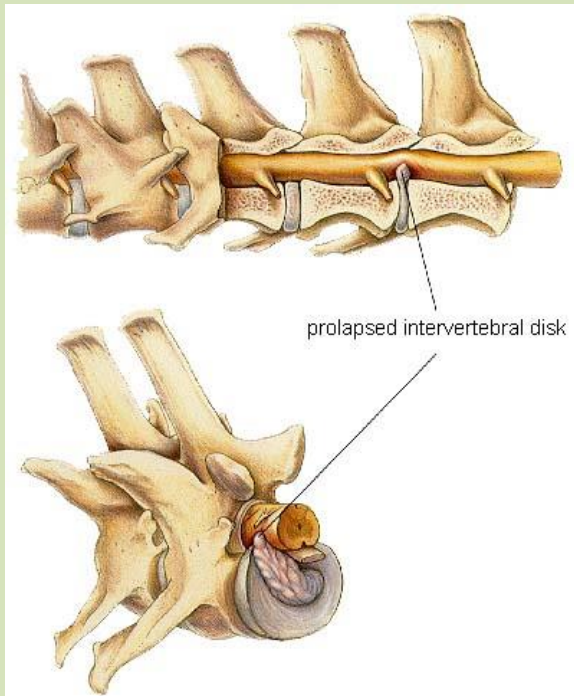
A 4 year old Dachshund has just presented for an acute onset of hind limb ataxia. On physical exam, there is a lack of voluntary motion of the pelvic limb along with conscious proprioceptive deficits. There is no panniculus reflex caudal to L3. Of the following choices, which is the best imaging modality to identify the lesion?

- Computerized tomography
- Radiographs
- Ultrasonography
- Magnetic resonance imaging

Explanation - The correct answer is magnetic resonance imaging. The clinical signs are extremely suggestive of a Type 1 disc herniation. In dogs, there are two general kinds of disc herniation described. In Type 1 the herniation is acute, while in Type 2 the herniation is slow and chronic. Dachshunds are very predisposed to disc disease (**particularly Type 1 disc herniation**). Since you are trying to visualize the spinal cord, the best imaging modality is an MRI. A CT is inferior because soft tissues do not image as well. If you are interested in analyzing bone, then CT is the preferred method. A radiograph would not be helpful unless you suspect neoplasia or discospondylitis. Still, only some neoplasias are recognized on radiographs. Ultrasound is useless for imaging the spine.



MRI of the thoracolumbar spine showing a herniated intervertebral disk (arrow)



The fact that our surgeon has a dachshund drawn on his whiteboard in permanent marker showing the spinal column for consults is sad evidence of how common IVDD really is with the breed.

Question

A dog presents to you after being struck in the head with a baseball bat. The dog is obtunded, but the rest of the physical exam is normal. Which of the following factors should you try to achieve in this patient to minimize intracranial pressure?

- High cerebral metabolic rate
- Low mean arterial pressure
- High PaCO₂
- High PaO₂

Explanation - The correct answer is high PaO₂. PaCO₂, blood pressure, PaO₂, cerebral metabolism, and certain drugs can affect cerebral blood volume and intracranial pressure. In head trauma patients, you want to prevent an increase in intracranial pressure by keeping cerebral blood flow relatively low without causing hypoxia. To keep cerebral blood flow in the low-normal range, the cerebral metabolic rate and PaCO₂ should be kept low. Factors that would cause the cerebral metabolic rate to go up include fever, seizures, pain, etc. Mean arterial pressure should be maintained in the normal range to prevent hypotension, hypoxia, and cerebral ischemia.

Question

A 2 year old male castrated mixed breed dog presents for an altered gait after being hit by a car. On physical exam, the thoracic limbs had decreased biceps and triceps reflexes and decreased muscle tone. The pelvic limbs had hyper-reflexive patellar and gastrocnemius reflexes and increased muscle tone. Where is the spinal cord lesion?

- C1-C5
- L4-S3
- C6-T2
- T3-L3

Explanation - The correct answer is C6-T2. In a dog, the spinal cord is divided into the four regions listed above. Upper motor neuron signs include hyper-reflexia of spinal reflexes and increased muscle tone. Lower motor neuron signs include decreased or absent spinal reflexes and decreased muscle tone. A lesion between the C6-T2 spinal cord segments would result in lower motor neuron signs in the thoracic limbs and upper motor neuron signs in the pelvic limbs, as described in the patient in the question. A lesion between C1-C5 spinal cord segments would manifest as upper motor neuron signs in the thoracic and pelvic limbs. Lesions between T3-L3 spinal cord segments would not affect the thoracic limbs, but would manifest as upper motor neuron signs in the pelvic limbs. Lesions between L4-S3 spinal cord segments would result in normal thoracic limbs and lower motor neuron signs in the pelvic limbs.

Question

A 6-year old male castrated Dachshund presented for further evaluation after an acute onset of a "drunken gait". On physical examination, hind limb ataxia is confirmed as well as decreased motor on both hind limbs (worse on the right), conscious proprioceptive deficits, and hyper-reflexive patellar reflex on the right. The forelimbs appear to be unaffected. Where is the lesion localized?

- C1-C5 myelopathy
- T3-L3 myelopathy
- L4-S3 myelopathy
- T11-T13 myelopathy
- C1-T2 myelopathy

Explanation - This signalment and clinical signs are consistent with intervertebral disc disease (disc herniation). Dachshunds are the most common breed to develop IVDD. The clinical signs described in this case are not complete but do give you enough information to determine that upper motor neuron signs are present (hyper-reflexive). This immediately eliminates the possibility of having a caudal spinal cord injury as those result in lower motor neuron signs (hypo-reflexia). Deficits of the forelimbs are usually associated with neck lesions. A Schiff-Sherington posture is one exception in which the forelimbs are affected but the lesion is not in the neck.

Although it is very common for lesions to be between T11-T13 such a specific location is not defined by the neurologic exam findings provided. The neurological exam description is not very specific and the localization is T3-L3.

Question

Which of the following statements is true about degenerative disc disease in dogs?

- Hansen's Type 1 disc disease usually involves chondrodystrophic dogs. It is usually chronic, non-painful, and is not considered an emergency.
- Hansen's Type 2 disc disease usually involves non-chondrodystrophic dogs. It is usually chronic, painful, and should be considered an emergency.
- Hansen's Type 1 disc disease usually involves chondrodystrophic dogs. It is usually acute, painful, and should be considered an emergency.
- Hansen's Type 2 disc disease usually involves non-chondrodystrophic dogs. It is usually acute, painful, and should be considered an emergency.

Explanation - The correct answer is Hansen's Type 1 disc disease usually involves chondrodystrophic dogs (Dachshunds, Corgis, Shih-Tzus, etc.). It is usually acute, painful, and should be considered an emergency.

Question

Which of the following is a possible sequela to a CN VII (facial nerve) deficit?

- Exposure keratitis
- Loss of motor function in the muscles of mastication
- Strabismus of the eyes
- Nystagmus

Explanation - The correct answer is **exposure keratitis**. CN VII is responsible for lacrimation. Deficits in lacrimation would cause exposure keratitis. Loss of motor function in the muscles of mastication would occur in CN V (mandibular branch) deficits. Strabismus of the eyes would be

caused by deficits in CN III (oculomotor nerve), CN IV (trochlear nerve) or CN VI (abducent nerve). Nystagmus occurs with CNS disease or CN VIII deficits.

Question

Which branch of the cranial nerve V (trigeminal nerve) is responsible for motor function?

- Ophthalmic branch
- Maxillary branch
- Mandibular branch
- Facial branch

Explanation - The correct answer is mandibular branch. The mandibular branch supplies innervation to the muscles of mastication (temporalis, masseter, medial and lateral pterygoids, rostral digastricus, and mylohyoid). The maxillary and ophthalmic branches contain sensory afferents to the eyes, face, eyelids, pinnae, corneas, nasal septum, etc. There is no such thing as the facial branch of the trigeminal nerve. The facial nerve is CN VII.

Innervation	Muscle	Function	Lesion
Sensory 3 br <ul style="list-style-type: none">• Ophthalmic• Maxillary• Mandibular	Face, mouth, ears and cornea	Sensation of face, ears, mouth and cornea	Lack of sensation of face and absence of globe retraction after palpebral reflex
Motor <ul style="list-style-type: none">• Mandibular	Muscles of mastication	Mastication of food	Atrophy of these muscles - dropped jaw
Sympathetic	involuntary (smooth) muscles of the eyes	control pupil size	Horner's syndrome

Question

A 6 year old Cocker Spaniel with a chronic history of ear infections presents to you circling to the left, with a left head tilt, and both rotary and horizontal nystagmus with the fast phase to the right. No other neurologic deficits are apparent except for a possible hearing deficit. It is difficult to perform a thorough otoscopic examination on the patient without sedation. The dog has been on multiple topical and systemic medications to treat otitis over the past few weeks, but the owner is not sure what they are. Which of the following drugs is a commonly implicated cause of peripheral vestibular disease?

- Dimethyl sulfoxide (DMSO)
- Metronidazole

- Enrofloxacin
- Miconazole
- Chlorhexidine
- Ticarcillin

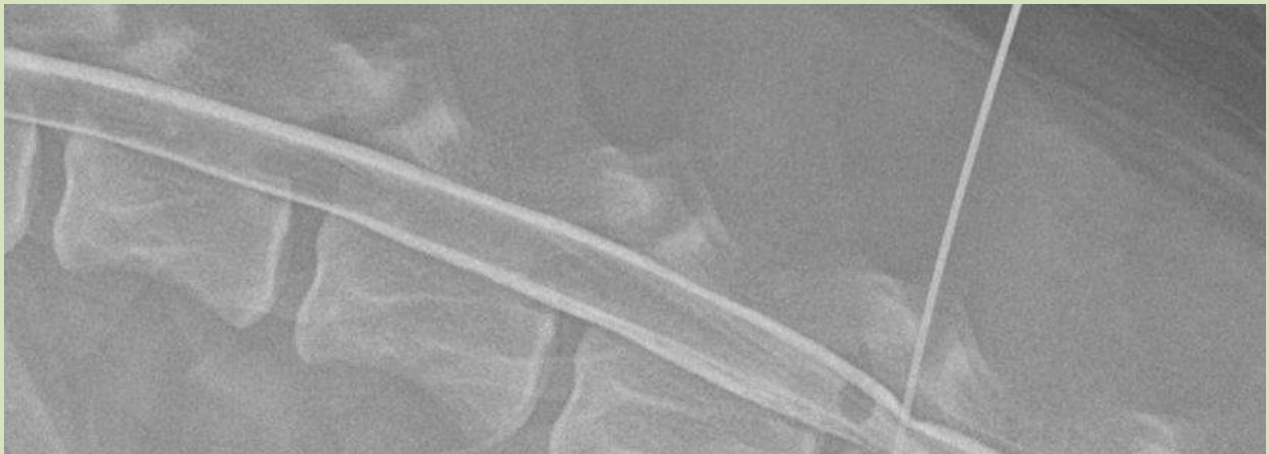
Explanation - The key here is to recognize that the question is asking about peripheral vestibular disease; otherwise, metronidazole would be a good choice as a cause of central vestibular disease.

Chlorhexidine is a topical drug implicated in ototoxicity and peripheral vestibular disease.

Another excellent choice would be aminoglycosides including neomycin, kanamycin, tobramycin, amikacin and **gentamicin**.

Question

You are reviewing a myelogram of a 7-year-old male neutered Border Collie with its owner. As you show the radiographs to the owner (see below), you explain that a positive contrast agent (iohexol) was injected to help visualize lesions. More specifically, where is the contrast injected during a myelogram?



- Subarachnoid space
- Subdural space
- Intramedullary space
- Epidural space
- Intraventricular space

Explanation - A myelogram is a positive-contrast radiographic study where a contrast agent such as iohexol or iopamidol is injected into the **subarachnoid space** where CSF accumulates.

Question

A 3 year old Golden Retriever presents for acute onset of a non-painful myelopathy localized to the spinal segments from T3-L3. The dog has superficial and deep pain perception and some motor function present in its pelvic limbs. It also has hyperreflexive patellar and gastrocnemius reflexes. The dog is diagnosed with a fibrocartilagenous embolism (FCE). What do you tell the owners?

- The dog should be treated with heparin to prevent further emboli
- The dog will probably continue to get worse and has a poor prognosis
- Most dogs with FCE usually get better on their own with nursing care
- The dog should have decompressive surgery

Explanation - The correct answer is most dogs with FCE usually get better on their own with nursing care. FCE is caused by an embolus of disc material in the spinal vasculature. It is unknown how the disc material gets into the vasculature. The prognosis of dogs with FCE varies. Most dogs get better with supportive and nursing care. **The loss of pain perception and lower motor neuron signs are poor prognostic indicators.**

FCE (Non-progressive – Non-painful condition)

Question

A 3 year old male neutered Doberman presents for weakness and difficulty walking. Your physical exam shows the dog is ataxic in all limbs, has conscious proprioception deficits in all limbs, and has a stiff, stilted gait in all limbs. All spinal reflexes are hyper-reflexive, and all limbs have increased muscle tone. Where is the anatomic localization of the lesion?

- C1-C5 of the spinal cord
- C6-T2 of the spinal cord
- T3-L3 of the spinal cord
- L4 and caudal of the spinal cord

Explanation - The correct answer is C1-C5 of the spinal cord. All 4 limbs are showing signs of an upper motor neuron lesion, which would be consistent with a C1-C5 myelopathy or multifocal spinal lesions. A C6-T2 lesion would manifest as lower motor neuron signs in the thoracic limbs and upper motor neuron signs in the pelvic limbs. A T3-L3 lesion would manifest as upper motor neuron signs in the pelvic limbs with normal thoracic limbs. A L4 and caudal lesion would manifest as lower motor neuron signs in the pelvic limbs with normal thoracic limbs. Remember that multifocal lesions in different areas of the spinal cord can make neuroanatomic localization trickier.

Question

Which of the following is not true about cranial nerve VII (facial nerve) in a dog?

- A branch of the facial nerve innervates the lacrimal and nasal mucosa glands

- Lesions of the facial nerve can cause vestibular signs
- Facial nerve deficits can often be seen in animals with otitis media
- A branch of the facial nerve is responsible for taste in the rostral 2/3 of the tongue

Explanation - Lesions of the facial nerve can cause vestibular signs. Note that the question asks which is NOT true. While conditions such as otitis media can be seen concomitant to facial nerve and vestibular signs, this occurs due to effects on CN VIII (auditory-vestibular nerve), not CN VII. Otitis media often causes deficits in CN VIII and CN VII since the two nerves run adjacent to each other through the middle ear.

The major petrosal branch of the facial nerve innervates the lacrimal and nasal mucosa glands. The chorda tympani nerve, which branches off CN VII, is responsible for taste in the rostral 2/3 of the tongue.

Question

A 9 year old female spayed mixed breed dog presents for regurgitation of food after meals and exercise intolerance. Thoracic radiographs showed megaesophagus and a mediastinal mass. What is the treatment for the most likely disease that the dog is presenting for?

- Fluoroquinolone antibiotics, nebulization, and coupage
- Cholinesterase inhibitors
- L-asparaginase and prednisone
- Calcium gluconate

Explanation - The correct answer is cholinesterase inhibitors. The dog has Myasthenia Gravis, which is caused by antibody-mediated destruction of acetylcholine receptors. **Cholinesterase inhibitors (Pyridostigmine)** decrease the breakdown of acetylcholine, making more acetylcholine available to bind to the remaining acetylcholine receptors.

Question

A 4-year-old male castrated Beagle presented with an acute onset of being down in the hind end.

On neurological examination, the patient's cranial nerves are intact. He has bilateral hind limb conscious proprioceptive deficits and no motor function in either hind limb. There are normo-reflexive gastrocnemius reflexes and normal to hyper-reflexive patellar reflexes bilaterally. The thoracic limbs are neurologically normal. Superficial and deep pain responses are present.

A myelogram shows the lesion in the photo below. You discuss treatment options with the owner and she declines surgery. Which of the following is the most important aspect of medical management of the likely condition?



- Muscle relaxants
- Strict cage rest
- Exercise and physical therapy
- If the owner declines surgery, euthanasia is the only humane alternative
- Non-steroidal anti-inflammatory drugs (NSAIDs)

Explanation - By far, the most likely diagnosis is intervertebral disc disease (IVDD) based on the history and myelogram showing a collapsed intervertebral space at T12-13 and an extradural compressive lesion originating from the same site. IVDD can be managed by surgical decompression or non-surgically. The most important aspect of non-surgical management of IVDD is **STRICT cage rest, usually for a full 8 weeks.**

Exercise should be avoided during the period of cage rest. Steroids, analgesics, and/or muscle relaxants may be useful additions to the management of these dogs.

Question

This 4-year old male castrated Chinese Crested presented with an acute onset of being down in the hind end. On neurological examination, the patient's cranial nerves are intact, there is bilateral hind limb conscious proprioceptive deficits, no motor function in either hind limb, superficial pain is absent in the hind limbs. There are normo-reflexive gastrocnemius reflexes bilaterally, hyper-reflexive patellar reflexes bilaterally, and no obvious pain on palpation of the spine. The patient was hesitating to move the neck to the left and right on manipulation, but when offered a treat to the side the patient did not seem to have trouble moving the head from side to side. The most likely diagnosis is intervertebral disc herniation. Based on the neurological exam where is the site of your laminectomy most likely to be?



- C2-C3
- L4-L5
- T13-L1
- C7-T1

Explanation - The neurological exam findings, signalment, and history are all consistent with intervertebral disc disease. All small breed dogs are predisposed to disc herniation as compared to larger breeds. The most over-represented breed is the Dachshund.

The findings in the neurological exam that help determine the location are the following:

- 1) Conscious proprioceptive deficits only in the hind
- 2) Hyper-reflexive patellar reflex
- 3) Loss of motor in the hind
- 4) Lack of superficial pain in the hind

These findings should help you realize that the lesion is between T3-L3 or L3-S1. However, hyper-reflexia in the hind should stand out. Hyper-reflexia in the hind limbs is an upper motor neuron sign and is supportive of a T3-L3 lesion. Therefore, L4-L5 is not the best answer. Approximately 80% of T3-L3 herniations are located in the **T13-L1 region**.

There is no indication of forelimb involvement or neck pain which makes neck involvement less likely.

Question

An owner just arrived from a camping trip with his dog. He is worried about his dog that seems to have undergone a change in behavior after being attacked by a wild animal. Additionally, the owner thinks that the dog's voice has actually changed. What is your top differential?

- Canine Distemper
- Botulism
- Rabies
- Tetanus

Explanation - The correct answer is rabies. If it sounds like it could be rabies, diagnose it until proven otherwise. The signs to focus on are attacked by a wild animal, a behavior change, and a voice change. This should put rabies at the top of your list. This dog is exhibiting signs of the **prodromal stage of rabies**. Canine distemper is a potential differential, but you will most likely see other symptoms such as respiratory and GI signs. Tetanus will manifest itself as rigidity and botulism as flaccid paralysis. Remember that any animal with an acute behavioral change or flaccid paralysis is a rabies suspect

Question

How would you evaluate whether or not the mandibular branch of cranial nerve V (trigeminal nerve) is functionally intact in a dog?

- Drooping of the upper lip on one side
- Deviation of the nose to one side
- Trigemino-facial reflex
- Look for symmetry and tone of the muscles of mastication

Explanation - The correct answer is look for symmetry and tone of the muscles of mastication. The mandibular branch of CN V carries sensory and motor function to the muscles of mastication. If the mandibular branch was not functional, there would initially be decreased tone in the muscles of mastication. After a long period of time, contracture of the muscles would cause an increased tone. The trigemino-facial reflex tests the maxillary branch of CN V (sensory afferent) and CN VII (facial nerve). Deviation of the nose to one side occurs with facial nerve paralysis. The nose deviates away from the lesion when the problem is acute due to lack of muscle tone on that side. The nose deviates toward the side of the lesion when the problem is chronic due to contracture of the muscles on the affected side. Drooping of the upper lip on one side would also be due to a lesion of the facial nerve.

Question

A 4-year old female spayed German Shepherd Dog presents to your clinic for a 3 day onset of progressive, symmetric, ascending paralysis, which started at the pelvic limbs and is now beginning to work its way up the thoracic limbs. You notice the paralysis is flaccid with decreased muscle tone, decreased to absent reflexes, and cranial nerve involvement. Pain perception and mental attitude are normal. What of these choices is the most likely differential diagnosis?

- Tick paralysis
- Clostridium tetani
- Clostridium botulinum
- Myasthenia gravis

Explanation - The correct answer is *C. botulinum*. With *C. tetani* you would see stiffness. Tick bite paralysis can be put lower on the list of likely differentials because there is **cranial nerve involvement**.

An alternative differential for a presentation such as this one is Coonhound paralysis (idiopathic polyradiculoneuritis) may be seen after a raccoon bite, systemic illness, or vaccination; the cause is often unknown. Cranial nerve involvement is usually limited to the facial and pharyngeal/laryngeal region. Additionally, diffuse hyperesthesia may be present with Coonhound paralysis.

NB: MG tends to take a slow progressive course (chronic condition that develops over months).

Question

An 8 year old female spayed Labrador presents to you for progressive muscle loss on the skull. You examine the dog and see the changes visible in the photograph. The changes appear to be confined to the right side only. Which of the following conditions is most likely?



- Right facial neuropathy
- Myotonia
- Masticatory muscle myositis
- Right trigeminal neuropathy
- Idiopathic polyradiculoneuritis

Explanation - The correct answer is right trigeminal neuropathy. Hopefully, you were able to identify the presence of significant muscle atrophy of the right masseter and temporalis musculature. The nerve innervating these muscles is the trigeminal nerve. Recall that the trigeminal nerve (cranial nerve V) has primarily a sensory function, with the exception of innervating the muscles of mastication. The facial nerve (CN VII) innervates the muscles of facial expression and is the main motor nerve innervating the face but is not responsible for the muscles that are atrophied in this case. Masticatory muscle myositis is an autoimmune condition that chronically leads to atrophy of the same muscle group, but what differentiates this case is that the signs are unilateral. Idiopathic polyradiculoneuritis is the medical term for a condition sometimes referred to as Coonhound paralysis, which is a condition that diffusely affects all motor nerves.

Question

A 3 year old female spayed mixed breed dog presents for lethargy and back pain. Survey radiographs of the spine show vertebral endplate lysis at C3-C4, C4-C5, and L6-L7. What is your next step?

- Prescribe NSAIDs and cage rest at home
- Perform a bone scan
- Take the dog to surgery to stabilize the spine
- Look for an occult infection somewhere else in the dog and perform blood cultures

Explanation - Look for an occult infection somewhere else in the dog and perform blood cultures. The dog has discospondylitis, which is usually caused by hematogenous spread of bacteria from a distant infected site. Radiography showing vertebral endplate lysis is definitive for a diagnosis, but blood cultures and sensitivities should be run to determine what type of antibiotics should be used. Surgery is usually indicated if neurologic deficits are severe. Bone scans are usually only used when radiographic changes are not yet visible.

TABLE 1 Radiographic Signs of Vertebral Diseases

Disease	Radiographic Signs
Diskospondylitis	Bony lysis of one or both vertebral end plates and, occasionally, the vertebral bodies Bone proliferation on and within infected vertebrae including ventral osseous proliferation bridging the affected disk space Narrowing of the affected disk space Reactive sclerosis in both vertebral bodies of affected disk space



Diskospondylitis occurs commonly in the lumbosacral intervertebral disk space.



Diskospondylitis affecting multiple disk spaces in the lumbar region

Question

A 4 year old female spayed German Shorthaired Pointer presents with the complaint of exercise intolerance and lethargy. Thoracic radiographs are taken and are shown below. What therapy is appropriate for the most likely diagnosis?

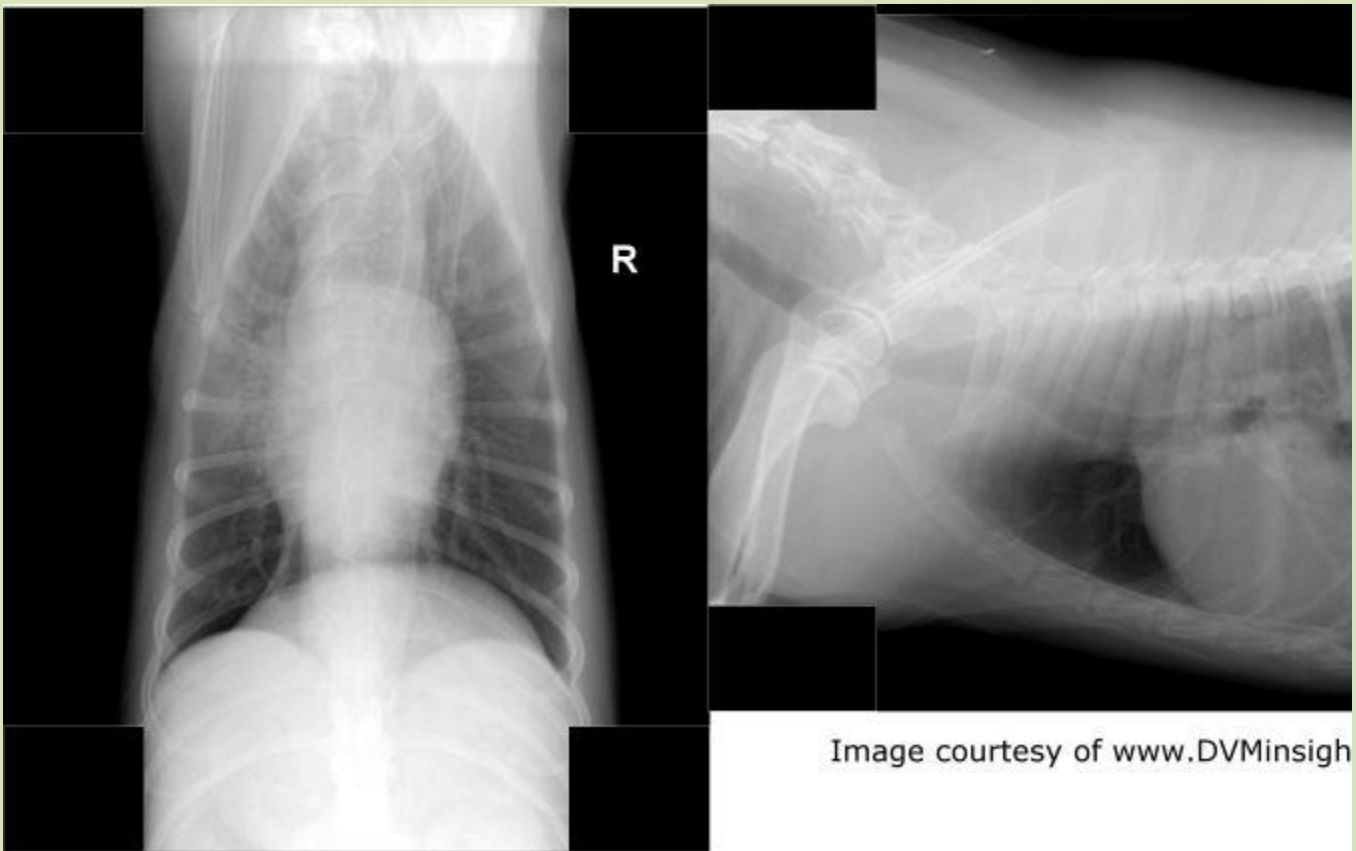


Image courtesy of [www.DVMinsight](http://www.DVMinsight.com)

- Sucralfate
- Inhaled fluticasone
- Enalapril
- Rimadyl
- Pyridostigmine

Explanation - The correct answer is pyridostigmine. The important thing to do in this case is to both read the question carefully and view the radiograph in concert with each other. This dog has signs and findings that are most consistent with myasthenia gravis and resultant megaesophagus. Accordingly, pyridostigmine, which is an acetylcholinesterase inhibitor (anticholinesterase), is the best answer choice. If you chose sucralfate because you saw the megaesophagus and thought the dog must have esophagitis, your thinking was accurate but you ignored the dog's clinical signs of weakness. If this dog had presented for regurgitation, that would have been a more appropriate course of action. Acquired myasthenia gravis can also be treated with systemic corticosteroids to decrease immune attack of acetylcholine receptors, but inhaled fluticasone would not do the trick. Enalapril and NSAIDs are not indicated in this patient.

Question

A 5 year old male castrated Welsh Corgi presents for acute paralysis of its pelvic limbs. The owners note that the dog was fine in the evening, but became paralyzed in the pelvic limbs in the morning after it jumped off of the owner's bed. The dog has hyper-reflexive spinal reflexes and no motor function or deep pain in the pelvic limbs. CBC, chemistry panel, and urinalysis are unremarkable. Survey spinal radiographs show a narrowed disc space between T11-T12. What is the next appropriate step for this dog?

- Contrast myelogram and decompression surgery
- Ventral slot surgery
- Cage rest and NSAIDs
- Dorsal hemilaminectomy

Explanation - The correct answer is contrast myelogram and decompression surgery. The dog has Hansen's Type 1 degenerative disc disease. The survey radiographs are enough to diagnose the disc rupture, but myelography should be performed to better assess the areas of the spinal cord affected and to definitively identify which side should be approached for decompression surgery. The lack of deep pain is a poor prognostic indicator, so cage rest and NSAIDs are not adequate in this patient.

Question

A 10 year old female spayed Labrador Retriever has presented for difficulty getting up in the hind and apparent back pain for the last 3-4 weeks. Upon questioning the owner, you are told that her appetite is diminished but she is still eating. An orthopedic exam finds no pain or discomfort elicited on manipulation of the hips or stifles. A neurologic exam identifies substantial pain in the

lumbosacral region; however, conscious proprioception is intact, and patellar reflexes are normal.

Radiographs of the lumbosacral region identify a lytic lesion at the L7-S1 endplates as well as surrounding bony proliferation. Which of the following diagnostic tests is likely to provide the most helpful additional information given your findings?

- Stifle arthrocentesis
- Abdominal ultrasound
- Urine culture
- Blood draw for creatine kinase levels
- Chest radiographs

Explanation - The diagnosis you should have in mind is discospondylitis. Be sure not to confuse this with spondylosis, which is typically not clinically significant and can be expected in most older dogs. The radiographic description is relatively specific for this condition. Neoplasia in the spine should be lower on your differential list because it typically does not cross joints. Disc herniation cannot be ruled out, and advanced imaging would be necessary to know for certain, but given the exam and radiographic findings, discospondylitis should be your top differential.

Discospondylitis is usually bacterial in origin, with Staphylococcus being the most common organism involved. Other organisms identified include Brucella canis, E. coli, Pasteurella, Aspergillus, and Streptococcus.

In an attempt to identify the causative agent, urine and blood cultures should be considered. The other answer choices are not as high yield in identifying the specific bacterial cause or underlying etiology.

Question

Which breed and differential diagnosis are most commonly associated with canine degenerative myelopathy?

- Shih Tzu with Hansen's Type 1 degenerative disc disease
- Golden Retriever with bilateral elbow dysplasia
- Labrador Retriever with bilaterally ruptured cruciate ligaments
- German Shepherd Dog with hip dysplasia

Explanation - The correct answer is German Shepherd Dog with hip dysplasia. Canine degenerative myelopathy is a progressive, degenerative spinal cord disease that occurs most commonly in **German Shepherd Dogs between 5-9 years of age**. This disease causes random axonal degeneration in all spinal cord segments, but it is usually most severe in the thoracic cord. It is a diffuse myelopathy that can look like a transverse myelopathy, and is often confused with hip dysplasia.

Question

A 4 year old Doberman Pinscher presents for slowly progressive ataxia and paresis of all four limbs. The owners note that the ataxia is sporadic. On physical exam, the dog has hyperreflexive spinal reflexes in all four limbs, delayed conscious proprioception in all four limbs, and neck pain on ventroflexion. What is the most likely diagnosis?

- Canine degenerative myelopathy
- Cervical spondylopathy
- Hansen's Type 2 degenerative disc disease between C1-C5
- Vertebral fracture between C1-C5

Explanation - The correct answer is cervical spondylopathy. The signalment and clinical signs are most helpful in answering this question. Doberman Pinschers, Great Danes, and Thoroughbred horses are predisposed to cervical spondylopathy, which is a cervical vertebra malformation that causes cervical myelopathy in dogs and horses. The malformation is usually stenosis or wedging of the vertebral canal, vertebral malalignment, or vertebral instability. This disease usually manifests as ataxia and paresis of all four limbs and UMN signs of all four limbs.

Question

An 8 year old female spayed Golden Retriever presents for inability to get up in the pelvic limbs. Your physical exam reveals normal spinal reflexes, motor function, and conscious proprioception in the thoracic limbs. The pelvic limbs show no voluntary motor function, hyperreflexive spinal reflexes, absent conscious proprioception and increased muscle tone. Where is the anatomic localization of the dog's lesion in the central nervous system?

- T3-L3 of the spinal cord
- C6-T2 of the spinal cord
- Caudal to L4 in the spinal cord
- C1-C5 of the spinal cord
- Diffuse spinal cord disease

Explanation - The correct answer is T3-L3 of the spinal cord. Since the thoracic limbs are normal, the lesion is unlikely to be between C1-C5 or C6-T2. The hyper-reflexive spinal reflexes and increased muscle tone in the pelvic limbs are consistent with an upper motor neuron lesion, which can be localized to T3-L3. An L4 and caudal lesion would result in lower motor neuron signs in the pelvic limbs. Remember: C1-C5 lesions cause upper motor neuron signs in all limbs; a C6-T2 lesion causes lower motor neuron signs in the thoracic limbs and upper motor neuron signs in the pelvic limbs; a T3-L3 lesion causes only upper motor neuron signs in the pelvic limbs; and an L4 caudal lesion will only cause lower motor neuron signs in the pelvic limbs. Beware that multiple lesions in different areas of the spinal cord may cause confusion as to where the lesion should be localized.

Question

You are examining the eyes of a dog and see that he has a positive menace response and dazzle reflex is visual but lacks a palpebral reflex. Where does he have a lesion?

- Visual cortex
- CN V
- CN VII
- CN II

Explanation - The correct answer is CN V. This animal has no visual deficits, as evidenced by his menace and dazzle, which rules out lesions in CN II or the visual cortex. The normal menace response indicates that CN VII is functioning as well. The lack of a palpebral then indicates a sensory deficit for which CN V is responsible.

Question

An 11-year old male castrated Border Collie presents in laterally recumbency. The owners noticed he had been limping on his right front leg for the past three days. He has free access to the backyard, but did not come back to the house this morning for breakfast and the owners found him outside laterally recumbent. On physical exam, he has extensor rigidity of all four legs with extension of his head and neck (as seen in the image). His lips and ears are contracted and pulled back. There is a wound between digits 2 and 3 on the right forelimb with a draining tract. Which of the following should be discussed with the owner?



- Tetanus antitoxin can cause anaphylaxis.
- Confirmatory diagnosis involves finding the exotoxin from *Clostridium botulinum* in serum, feces, vomit, or food samples.
- Removal of the tick will help reverse clinical signs.
- Tetanus antitoxin will help to reverse the clinical signs.

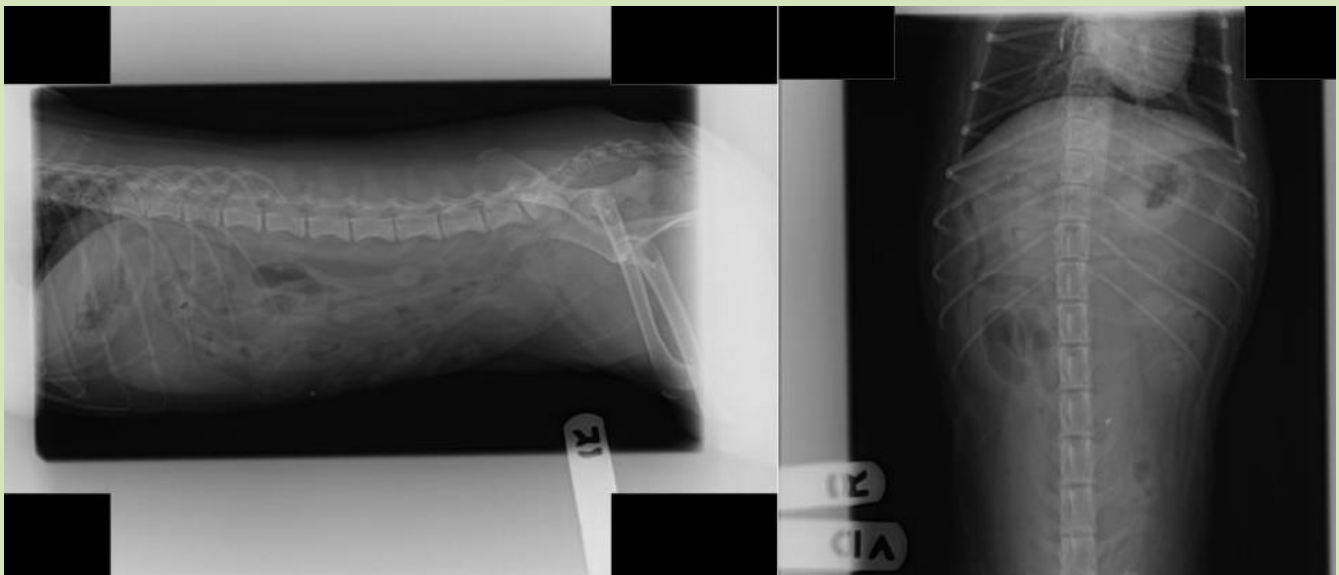
Explanation – The correct answer is Tetanus antitoxin can cause anaphylaxis. The facial contraction and smirk is a characteristic sign of tetanus. Tetanus is caused by the neurotoxin produced by *Clostridium tetani*. This bacteria enters the body through a wound and begins producing tetanospasmin, a potent neurotoxin that blocks GABA release at the motor end plate and causes sustained muscle contraction.

Treatment involves wound debridement, sedation, antibiotics, and minimizing external stimuli as these animals are hyperesthetic. Tetanus antitoxin is given after an initial test dose to monitor for anaphylaxis. Antitoxin prevents further toxin binding but does not affect already bound toxin so it helps decrease progression of clinical signs but will not reverse the signs present.

Tick paralysis starts with hind limb weakness which progresses to a stiff forelimb gait and flaccid paralysis. Patients will improve quickly after removal of the tick. *Clostridium botulinum* causes botulism which is characterized by lower motor neuron paresis/paralysis starting in the pelvic limbs and progressing to quadriplegia. There is decreased muscle tone in all limbs.

Question

A 5-month old Scottish terrier presents to you with signs of head pressing and seizures. It was previously diagnosed with a portosystemic shunt, and its abdominal radiographs show a small liver (see radiographs). Which of these should NOT be used to manage hepatic encephalopathy in dogs with a liver shunt?



- Oral neomycin
- Substituting dairy and vegetable protein instead of feeding meat proteins
- Lactulose
- Low carbohydrate and fat, high protein diet

Explanation - The answer is low carbohydrate and fat, high protein diet. Animals with hepatic encephalopathy require protein reduction in their diets. Lactulose is given because it decreases colonic pH, trapping ammonia, and decreases transit time through the gut, leading to decreased ammonia uptake because ammonia contributes to hepatic encephalopathy. Oral neomycin is used to dampen urease-producing microflora of the gut and consequently, decrease ammonia production in the gut. It has also been shown that vegetable and dairy proteins are better tolerated than meat proteins.

On the radiograph, note the liver tucked well under the rib cage and the corresponding cranial shift of the gastric axis consistent with microhepatica.

Question

Which of these is least likely to result in Horner's syndrome?

- An idiopathic cause
- Chorioretinitis
- Hypothyroidism
- Neoplasia of the chest
- Chronic otitis

Explanation - The answer is chorioretinitis. Recall that sympathetic innervation to the eye is a 3 neuron pathway originating in the hypothalamus, **traveling to T1-T3** where they synapse and course back to the **cervical sympathetic trunk**, and then synapse in the **cranial cervical ganglion**. The last neuron goes by the middle ear and to the eye. Otitis can affect this neuron. Chest neoplasia can affect the sympathetic trunk. Idiopathic Horner's syndrome is the most common scenario. Hypothyroidism and diabetes mellitus can also cause Horner's, but it cannot occur as a sequela to chorioretinitis. Other causes of Horner's are trauma, retrobulbar disease and in horses, guttural pouch disease.

Question

The radiograph below is of a stray Dachshund that was brought in to your clinic. The dog appears to be a young adult, but no other information is available. Based on the radiographic findings, which of the following would you expect on your physical examination?



- Pronounced panniculus reflex
- No anal tone
- Excessive straining to urinate
- Severe hind limb pain and hyperesthesia

Explanation - The correct answer is no anal tone. This patient likely has a functional transection of the spinal cord based on the fracture/luxation seen on the single lateral projection. If you look carefully, there is evidence of subcutaneous emphysema, which suggests that there is superficial skin trauma present as well. The injury appears to be at the level of T10 with the cranial segment of the spine displaced dorsally. The majority of animals that have these radiographic findings will be deep pain negative and have no anal tone. These findings indicate a grave prognosis and the likelihood of return to function has been said to be less than 5%.

Question

You are performing one of your first myelograms on a 6-year old Dachshund dog. On recovery from anesthesia, the dog starts to seizure. What should be your first intervention?

- Put the dog on a 5% dextrose containing IV fluid
- Give 0.05 mg/kg acepromazine IV
- Give a loading dose of potassium bromide (KBr) IV
- Give 0.5 mg/kg diazepam IV
- Re-anesthetize the dog

Explanation - It is likely that the radiographic contrast used in the myelogram has caused this seizure. **Diazepam** (or midazolam) is the first drug you should reach for in a seizing dog.

Re-anesthetizing the patient may not stop the seizure activity. KBr is loaded over several hours and would not be effective acutely; in addition, this is not a patient that should need maintenance therapy for seizures, and therefore would not benefit from a loading dose of KBr. Due to the inciting cause, hypoglycemia is unlikely to have caused the seizure and giving dextrose immediately is unnecessary.

Question

A 3 year old female Shih Tzu presents to you as an emergency for seizures and tetany. In the history, you learn that the bitch had a litter of 7 pups one week ago. What is the most likely treatment this dog will need to correct the cause of its problem?

- Diazepam per rectum
- Tetanus anti-toxin
- Diazepam IV
- Calcium gluconate IV

Explanation - The correct answer is calcium gluconate IV. Puerperal tetany (eclampsia) is often seen in post partum toy breed dogs. Emergency treatment for these patients is IV calcium in the form of calcium gluconate. Diazepam (either IV or per rectum) can be given to stop the seizures, but does not treat the problem of hypocalcemia. Tetanus intoxication is less likely in this patient.

Question

A new client brings his 4-year old female spayed Bulldog in for a yearly exam. The dog was started on phenobarbital 6 months ago for seizures. They have not done any follow up labwork since starting the medication. You advise that the phenobarbital level and general labwork should be checked since this medication is primarily metabolized by which organ or organ system?

- Central Nervous System
- Gastrointestinal tract
- Kidneys
- Liver

Explanation - Phenobarbital is primarily metabolized by the liver. It is contraindicated in cases of severe liver or kidney disease. It can cause an elevation of liver enzymes. There is no direct effect on the kidney by barbiturates, but with high doses, renal impairment can occur due to hypotension from the drug. Liver and kidney values should be frequently monitored in patients on phenobarbital.

Question

In a dog, Cushing's response is characterized by a _____.

- Compensatory decrease in systolic blood pressure to maintain peripheral perfusion
- Compensatory elevation in blood glucose to enhance cerebral function
- Compensatory hyperadrenocorticism to maintain cerebral perfusion
- Compensatory increase in mean arterial pressure to maintain cerebral perfusion pressure

Explanation - The correct answer is a compensatory increase in mean arterial pressure to maintain cerebral perfusion pressure.

Cerebral perfusion pressure= Mean arterial pressure - intracranial pressure or (CPP=MAP-ICP).

This response is seen in situations where intracranial pressure increases such as in brain trauma. In this case, you need to think before you intervene to decrease your patient's mean arterial pressure as this might eliminate cerebral blood flow and kill your patient.

Question

A 10 year old male castrated Shetland Sheepdog presents to you with progressive neurologic signs including ataxia and seizures. Bloodwork and serum chemistry values are within normal limits. You are preparing to anesthetize the dog for imaging of the brain to determine if there is an intracranial mass. The Cushing's reflex describes what response to increased intracranial pressure in a dog?

- Tachycardia and hypertension
- Bradycardia and hypertension
- Bradycardia and hypotension
- Tachycardia and hypotension

Explanation - The correct answer is bradycardia and hypertension. In order to perfuse the brain when there is increased ICP, the body needs to increase systemic blood pressure to overcome that pressure. This occurs primarily through reflex vasoconstriction. The increase in blood pressure leads to decreased heart rate. Therefore, Cushing's reflex is when increased ICP leads to hypertension and bradycardia.

Question

How does Clostridium botulinum toxin affect the nervous system?

- The toxin destroys acetylcholine so it cannot bind with the post-synaptic receptor
- The toxin binds acetylcholine, making it unable to bind with the post synaptic receptor
- The toxin acts as an acetylcholinesterase and breaks down acetylcholine as it is released
- The toxin blocks acetylcholine release by binding the presynaptic membrane

Explanation - The correct answer is the toxin blocks acetylcholine release by binding the presynaptic membrane. Clostridium botulinum produces a toxin that causes progressive motor paralysis and generalized progressive weakness. Death usually occurs due to respiratory paralysis. The bacteria often proliferate in decomposing animal or plant tissue.
