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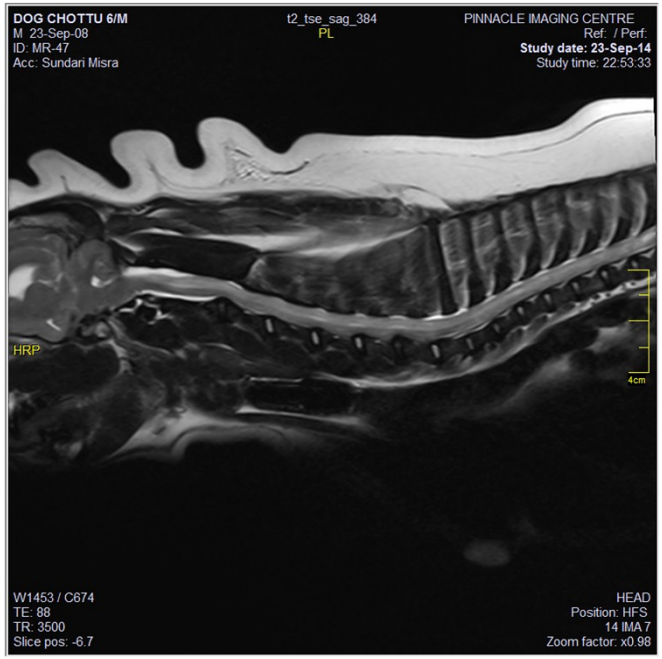
In order to learn the most important lessons of life,
One must everyday surmount a fear !
- Ralph Waldo Emerson.

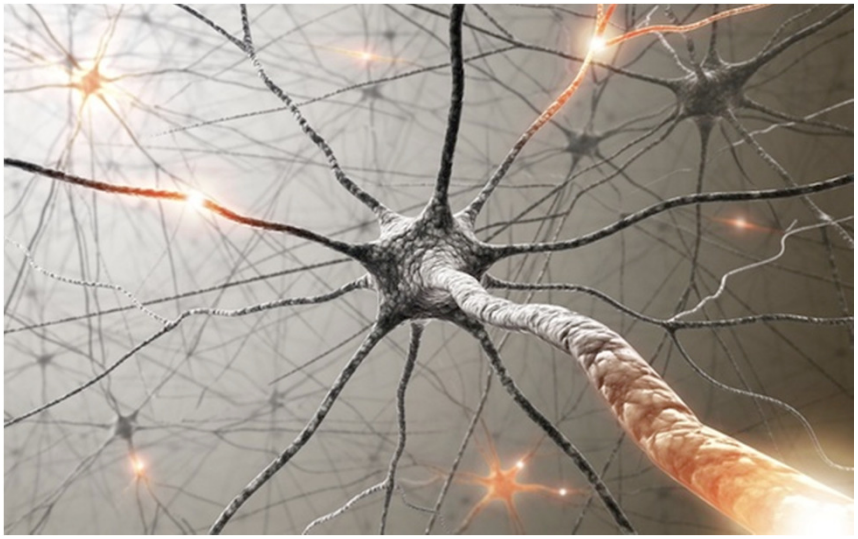


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Approach to a Neurological Patient





-Dr. Prathmesh Deshmukh
(B.V.Sc & A.H , C.V.A.)

Board Of Director WATCVM.
Chief Veterinarian AcuMed Veterinary Specialty
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Neurological or Not ?

- Neurological examination is absolutely crucial for working out

1. Where things are going wrong (Orthopedic v/s Neurologic)
2. Where in the nervous system things are going wrong.

Neurological or Orthopedic ?

If Neurological then Where is it ?



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Protocol

- Approach to a neurological patient requires consistency and following a set of protocols.
- Advance imaging only helps verify the location of the lesion and should not be used to localize the lesion



AVIAN NEUROLOGIC EXAMINATION

Patient_____ Date & Time_____

Species_____ Age_____ Sex_____

SUBJECTIVE:

OBJECTIVE:

Observation

Mentation: _____
alert, depression, stupor, coma, delirium

Posture: _____
normal, recumbency, opisthotonos

Attitude: _____
normal, strabismus, head tilt, falling

Movement: _____
normal, spasm, tremble, twitch, seizure

Gait: _____
normal, ataxia, dysmetria, circling, weakness

Cranial Nerve Reflexes

L	*nerve, test*	R
	I odor	
	II & V menace	
	II & III direct PLR	
	III, IV, VI strabismus	
	III, IV, VI, VIII nystagmus	
	V palpebral, sensation	
	VII expression	
	VIII startle, balance	
	IX bitter taste	
	IX, X, XI, XII gag , visceral	
	XII tongue grab	



OBJECTIVE:

Palpation

Muscle/Skeleton_____
symmetry, tone, strength, tenderness

Postural reactions

L	*reaction*	R
	Conscious proprioception	
	wings	
	legs	
	Drop and flap	
	wings	
	Hopping	
	legs	
	Extensor postural thrust	
	legs	
	Tactile Placing	
	legs	
	Visual Placing	
	legs	

Spinal Reflexes

L	*reflex, segment*	R
	Vent sphincter	
	LSP-P & LSP-Cd	
	Leg withdrawal	
	LSP-S	
	Patella	
	LSP-L	
	Wing withdrawal	
	BP	

Sensory response

_____pelvic

_____thoracic

hyperesthesia, superficial pain, deep pain

ASSESSMENT: localizing deficits

- Normal
- Brain
  - Cerebrum_____
  - Cerebellum_____
  - Brain stem_____
  - Vestibular_____
- Spinal cord
  - Cervical_____
  - Brachial plexus _____
  - Thoracic_____
  - Lumbosacral plexus_____
- Peripheral nerve_____
- Generalized neuromuscular_____

PLAN: Recommended tests

Differential diagnosis:

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Obtaining History

- Ask open ended questions. Videographs ?
- Signalment : Age,Breed,Sex,Coat Colours.
- Previous medical / surgical conditions and medications.
- Onset Of Disease : Acute,Chronic,Episodic



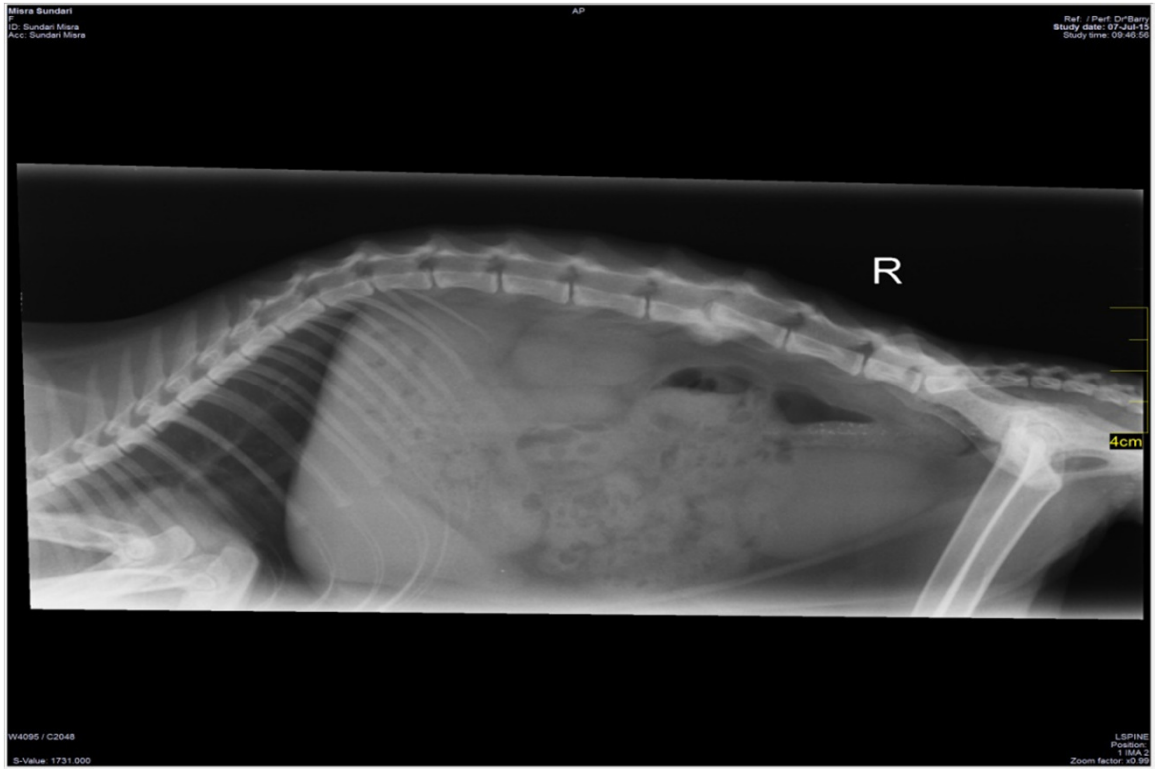


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General Physical Examination

- Important before starting a neurological evaluation
- Spinal fractures may be accompanied with Bladder ruptures.



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Equipment Needed

- Quiet Room



- Non Slippery Surface
- Pleximeter



- Pen Torch

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Equipment Needed

- Curved Haemostat
- Ophthalmoscope
- Cotton Balls









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Hands Off Examination

1. Mentation & Behaviour
2. Posture
3. Gait
4. Identification of Abnormal body movements.



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Mentation & Behaviour

- **BAR**
  Bright,Alert,
  Responsive.



- Abnormal :
  Delirious,
  Depressed,
  Comatose.

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Posture

- Schiff Sherrington Posture.
- Decerebrate / Decerebellate



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Gait

- Ataxia : Loss of control of body movements

1. Cerebellar
2. Vestibular
3. Proprioceptive

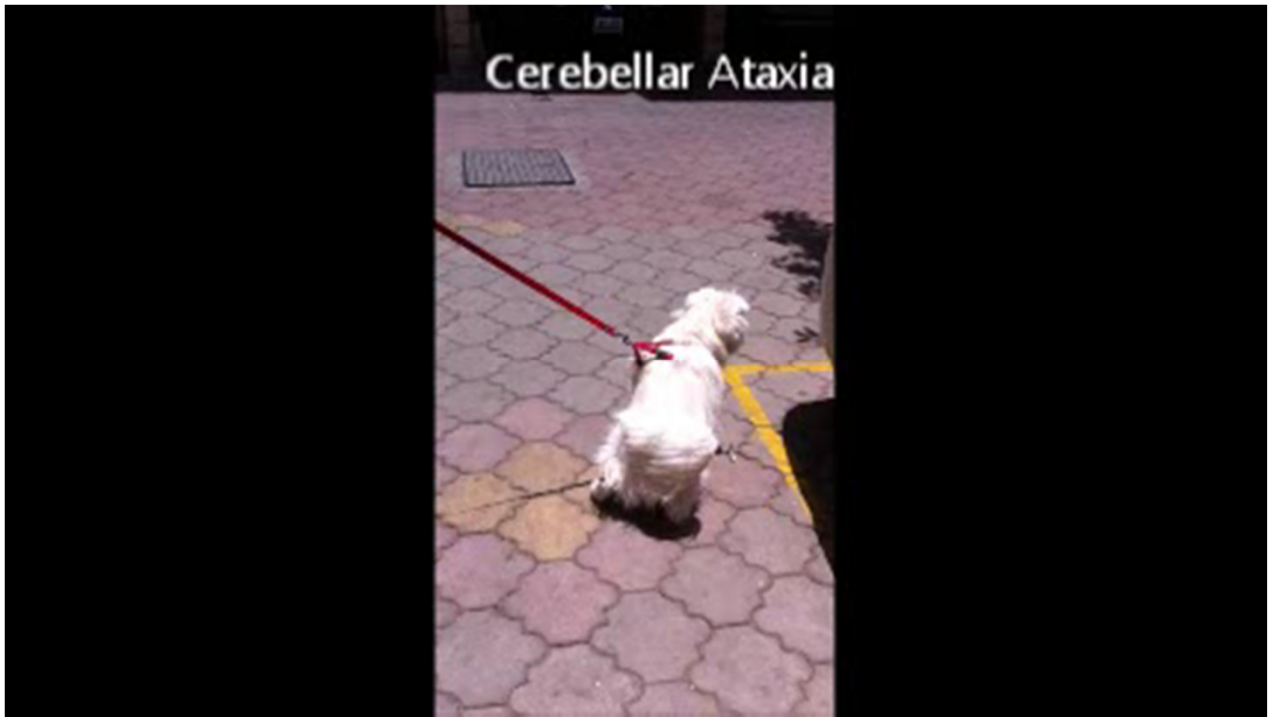


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Cerebellar Ataxia

- Inability to control rate and range of motion, truncal sway.



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Vestibular Ataxia.

- Leaning / Falling to one side, head tilt, nystagmus.



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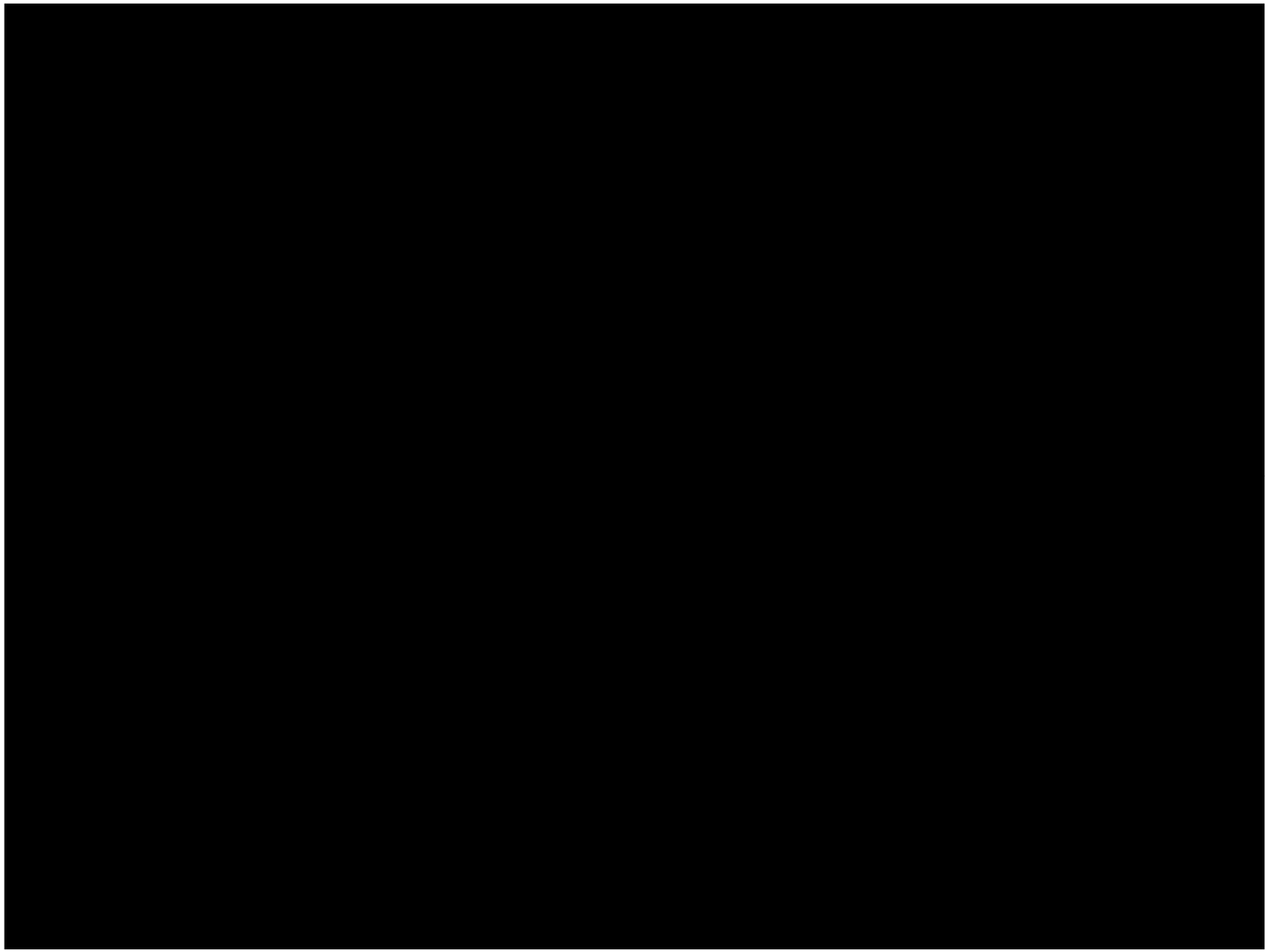
Proprioceptive Ataxia

- Loss of sense of limb, Dragging, knuckling.



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Identification of abnormal body movements



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Hands On Examination

1. Postural Reaction Testing
2. Spinal reflexes , muscle mass and tone.
3. Cranial nerve examination.



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Postural Reaction Testing.

- Proprioception is the awareness of precise position and movements of the body especially the limbs.



Abnormal – Delayed to Absent Proprioception

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Postural Reaction Testing.

- Visual and Tactile Placing.
- Wheelbarrow and Extensor postural thrust



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Spinal Reflexes



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Muscle Mass and Tone

1. Spastic tone in UMN.(C1-C5, T3-L3)
2. Flaccid tone in LMN. (C6-T2, L4-S3)





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Sensory Evaluation

- Cutaneous Truncii



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Sensory Evaluation

- Deep pain perception is not to be confused with Withdrawal reflex.

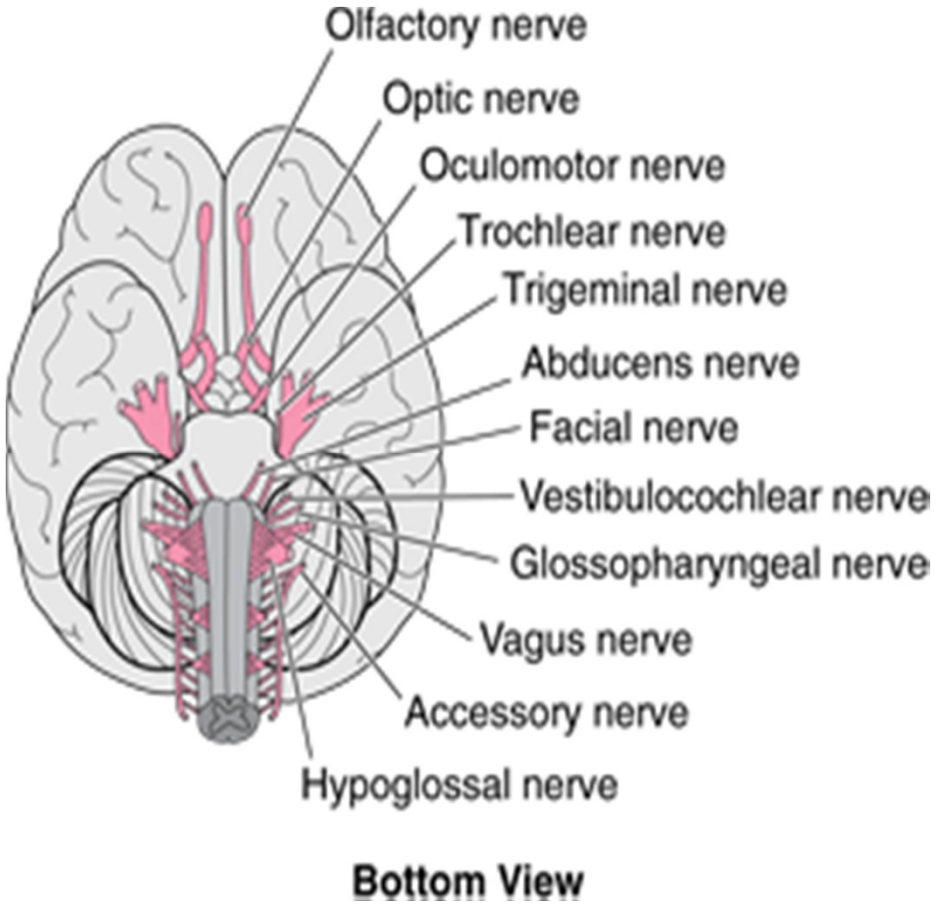


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Cranial Nerves

- 12 Cranial Nerves.

1. Olfactory.
2. Optic
3. Occulomotor
4. Trochlear
5. Trigeminal
6. Abducens
7. Facial
8. Vestibulocochlear
9. Glossopharyngeal
10. Vagus.
11. Accessory.
12. Hypoglossal



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Evaluation Of Cranial Nerves

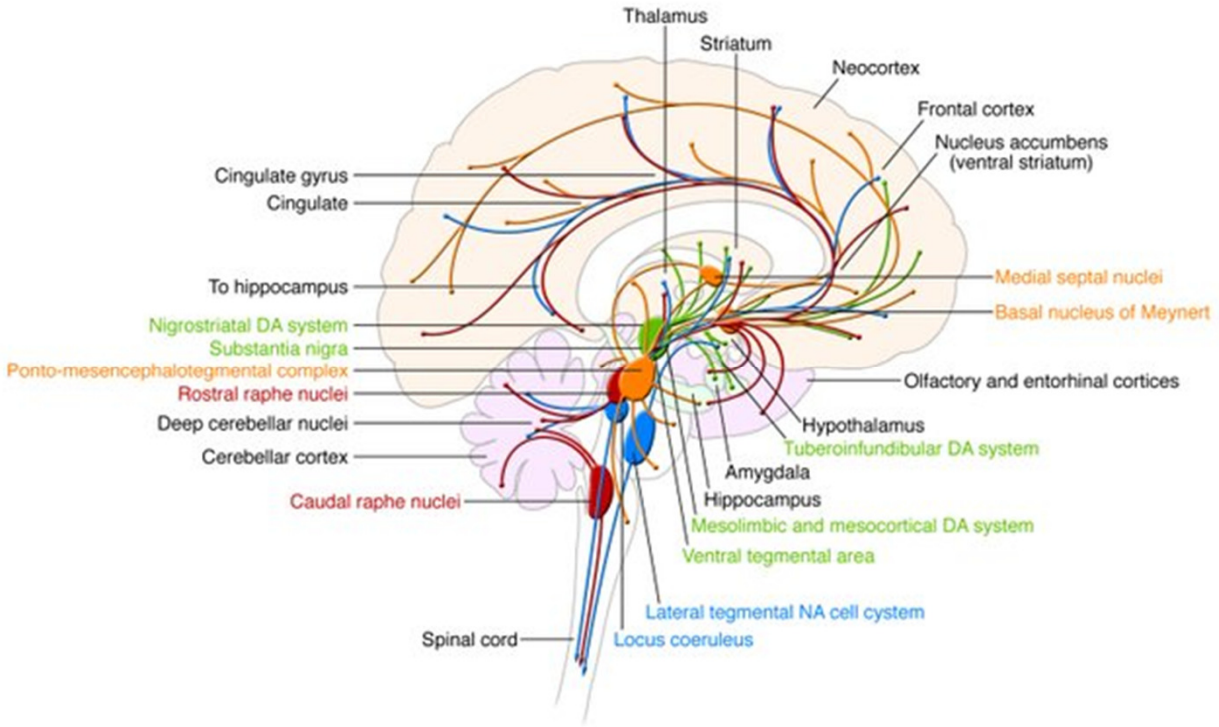


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Functional Neuroanatomy

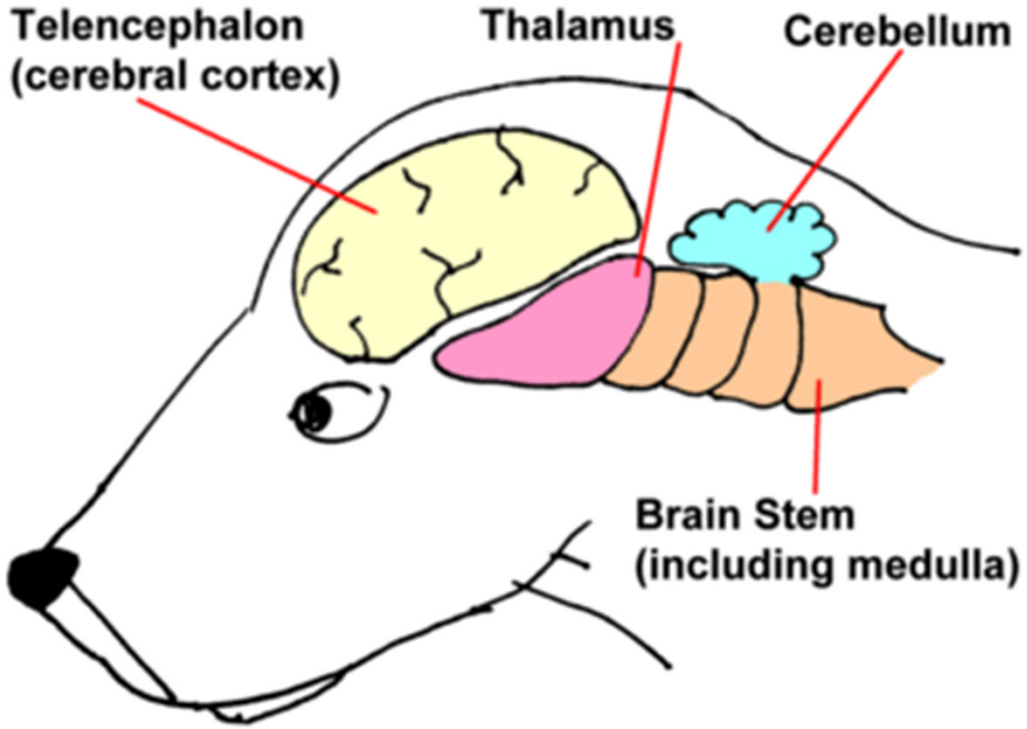
- Understanding Neuroanatomy is important, however for a clinical practice it is not important to memorize various nucleii, their functions or projections of their tracts.
- Clinical neurology requires an understanding of “Functional Neuroanatomy” . **(3 : 4 : 3)**



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Intracranial Structures (3)

1. Cerebral Cortex.
2. Brainstem.
3. Cerebellum



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Intra Cranial Structures – Cerebral Cortex : Epilepsy



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Brainstem : Central Vestibular Disease



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Cerebellum





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The Spinal Cord (4)

- 4 Functional divisions.

a) C1-C5 : UMN. Tetraparesis/Tetraplegia/Monoplegia/Normal to exaggerated spinal reflexes

b) C6-T2 : LMN . Tetraparesis/Tetraplegia/Monoplegia. (Brachial Plexus) Delayed to absent Withdrawal and spinal reflexes.

c) T3-L3 : UMN. Paraparesis/Paraplegia/Monoplegia/Normal to exaggerated spinal reflexes.

d) L4-S3 : LMN. Paraparesis/Paraplegia/Monoplegia (Lumbar Plexus) Delayed to absent withdrawal and spinal reflexes

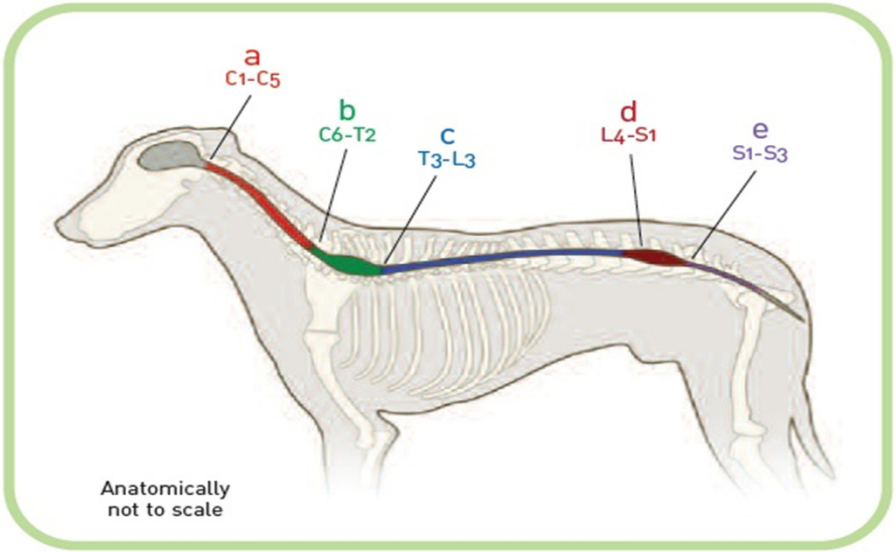


Fig 5. The functional divisions of the spine

Neuromuscular (3)

1. Nerves - Neuropathies : Nerve sheath tumour,Idiopathic facial paralysis.
2. Neuromusclular junction : Myesthenia Gravis
3. Muscles - Myopathies : Masticatory Muscle Myositis.



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Differential Diagnosis:VITAMIN-D

- Vascular : Fibrocartilagenous Embolism(FCE),Spinal haemorrhage.
- Infectious/ Inflammatory : Canine distemper,Neosporosis,Disckospondylitis/ Granulomatous Meningioencephalitis (GME),Meningitis.
- Trauma/Toxic : Vertebral fractures,Peroneal and tibial nerve injuries/ Metronidazole toxicity,Lead toxicity.
- Anamalous : Hydrocephalus,Syringomyelia, Feline cerebellar hypoplasia,congenital deafness.
- Metabolic : Hepatic encephalopathy,Diabetes mellitis, Potassium and Sodium abnormalities.
- Idiopathic : Idiopathic epilepsy,Horner's syndome,Lafora's disease.
- Neoplastic / Nutritional : Spinal meningiomas,lymphomas, Nerve sheath tumors/ Thiamine deficiency.
- Degenerative : Degenerative myelopathy,Lumbosacral stenosis, Intervertebral disc disease.

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Diagnostics

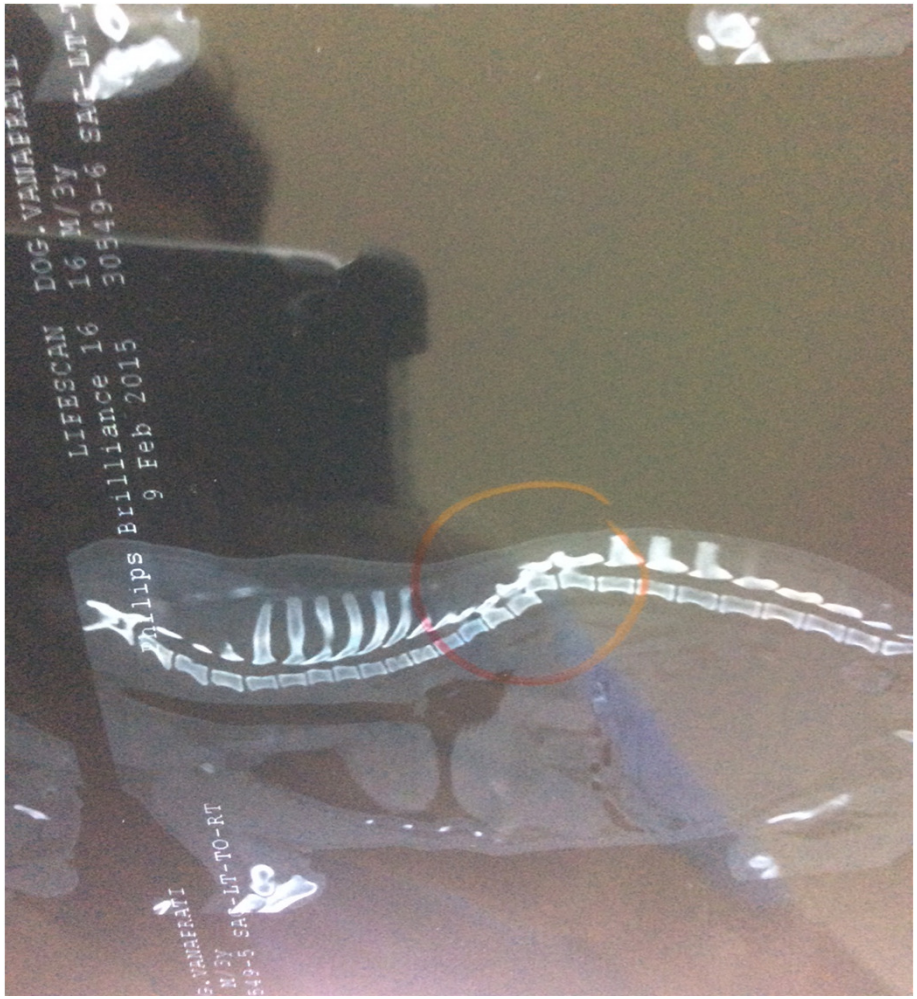
1. Survey Radiographs.
2. Myelography.
3. Cerebro-Spinal Fluid analysis.
4. Electrophysiology.
5. Specific Disease Testing.
6. Computed Axial Tomography.
7. Magnetic Resonance Imaging.

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Survey Radiographs

- Proper Restraint and Positioning



Never Choose Advanced Diagnostics Without a Survey Radiograph.

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Myelography

- Contrast injected into the arachnoid space to highlight the edges of the spinal cord on a radiograph.



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Cerebro-Spinal Fluid analysis

- Fluid from Cisterna Magna / Lumbar tap.
- Infectious / Inflammatory diseases.
- Have to be processed in 30 mins due to low protein content



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Electrophysiology

- Electromyography
- Electroencephalography.
- Brainstem Auditory Evoked Response (BAER).

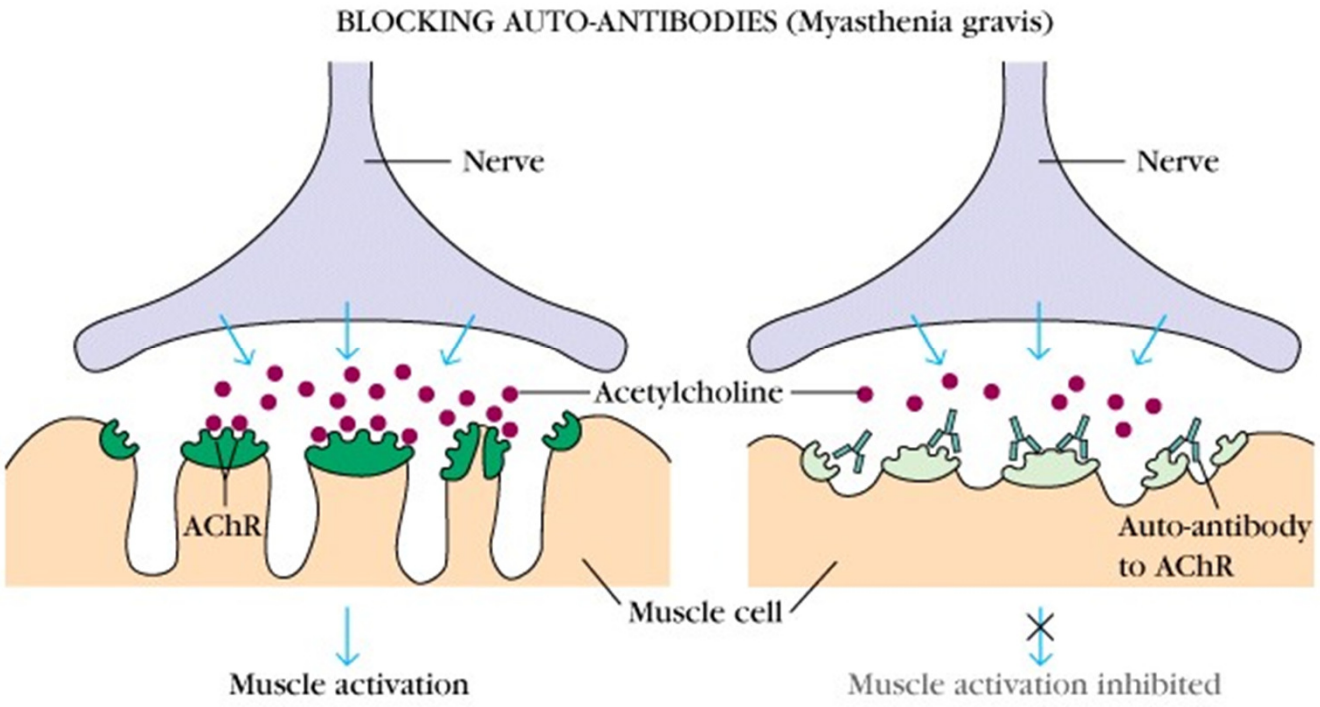


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Specific Disease Testing

- Antibody against Acetylcholine receptor.
- Blood draw to be done before giving corticosteroids or neostigmine/pyridostigmine.



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Computed Axial Tomography

- Good for Bony imaging of neurological patients.
- Requires short sedation/anaesthesia



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Magnetic Resonance Imaging

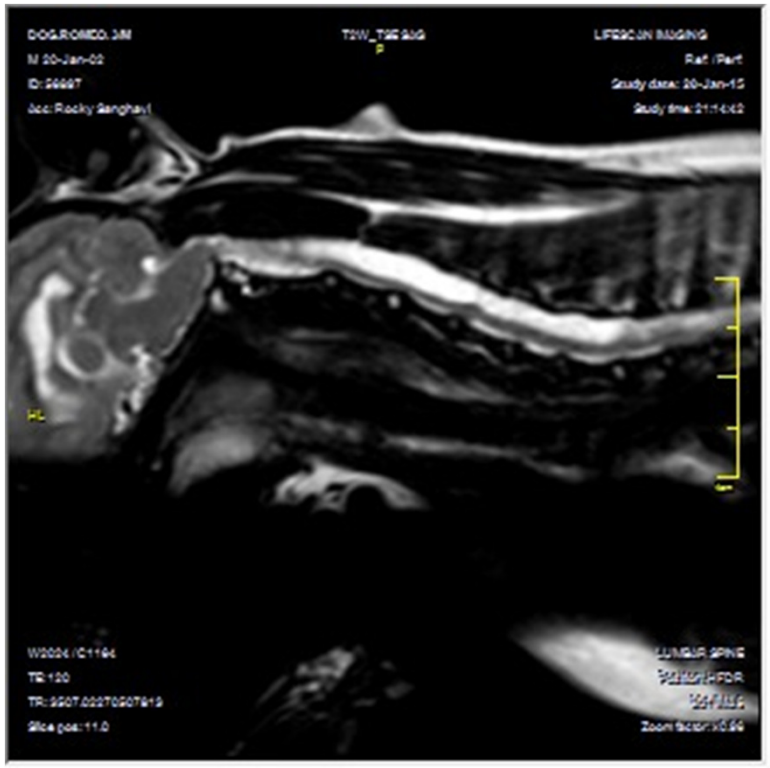
- High resolution soft tissue imaging.
- Patient has to be under general anesthesia for 25-30 mins.
- Expensive.

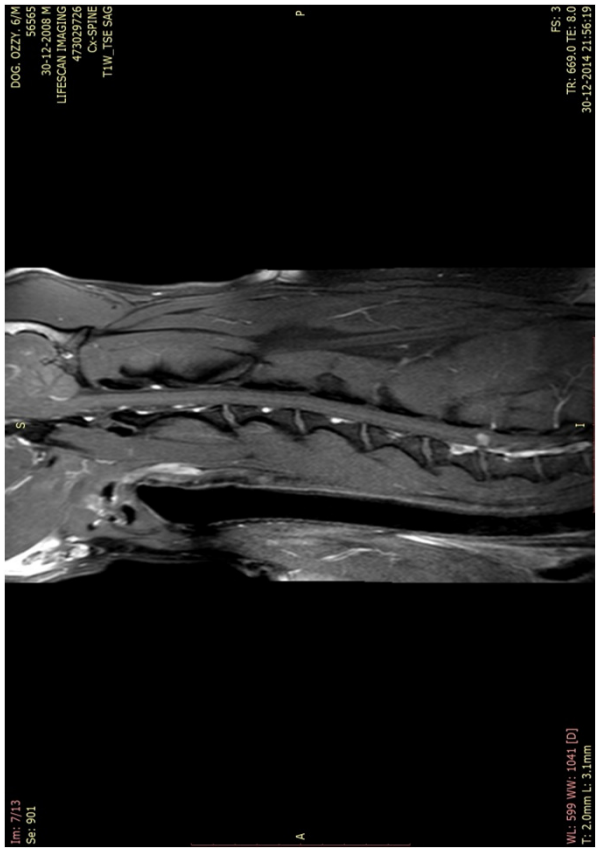


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2 Dogs presenting with Tetraparesis & Cervical Pain.





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Take Home Message

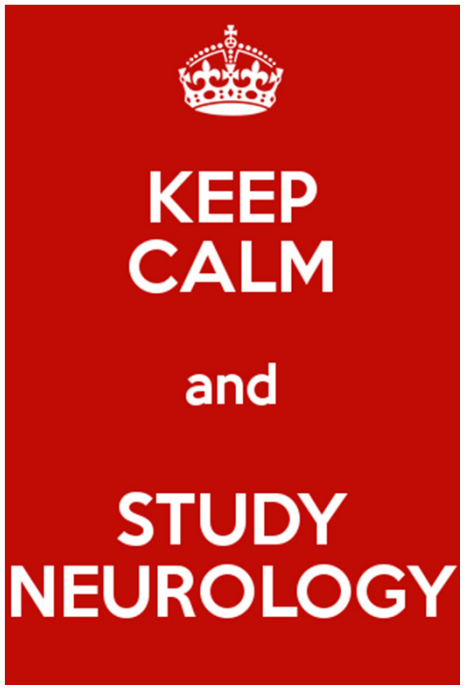
- Approach systematically.
- Keep a neurology exam form alongside.
- Perform neurology exam on atleast 100 normal patients to understand abnormal better.
- Neurology is very volatile, keep updating yourself and reading basics over and again.
- Widen your Differential Diagnosis **– "Not All Spine Diseases are Disc Diseases & Not all Brain diseases are Brain tumors"**
- There are no two similar cases. Each case is different.

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References

- BSAVA Manual of Canine & Feline Neurology.
- Handbook of Veterinary Neurology.
- www.neuropetvet.com
- Clinicians Brief



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Some of the best lessons are learned from past mistakes.
The error of the past is the wisdom of the future
- Dale Turner



- Dr. Prathmesh Deshmukh.
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