13. ULUSAL ACİL TIP KONGRESİ
ATUDER Acil Tıp Uzmanları Derneği
EPAT Emergency Physicians Association of Turkey
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Systematic Approach to Weakness

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Subarachnoid hemorrhage ?

Hypoglycemia ?

Guillain-Barré syndrome ?

Sepsis ?

Dehydration or hypovolemia ?

Tick paralysis ?

Adrenal insufficiency ?

Myasthenia gravis ?

Todd's paralysis ?

Ischemic stroke ?

Brainstem stroke ?

Hemiplegic migraine ?

Botulism ?

Hypokalemic periodic paralysis ?

Medications ?

Multiple sclerosis ?

Hypothyroidism ?

Myositis ?

Magnesium and phosphate disorders ?

Organophosphate and carbamate poisoning ?

Spinal cord compression ?

Carbonmonoxide poisoning ?

Anemia ?

Acute coronary syndrome ?

Intracerebral hemorrhage ?

Calcium disorders ?

Hyperkalemic periodic paralysis ?

Infection ?

Ketoacidosis ?

DEFINITION

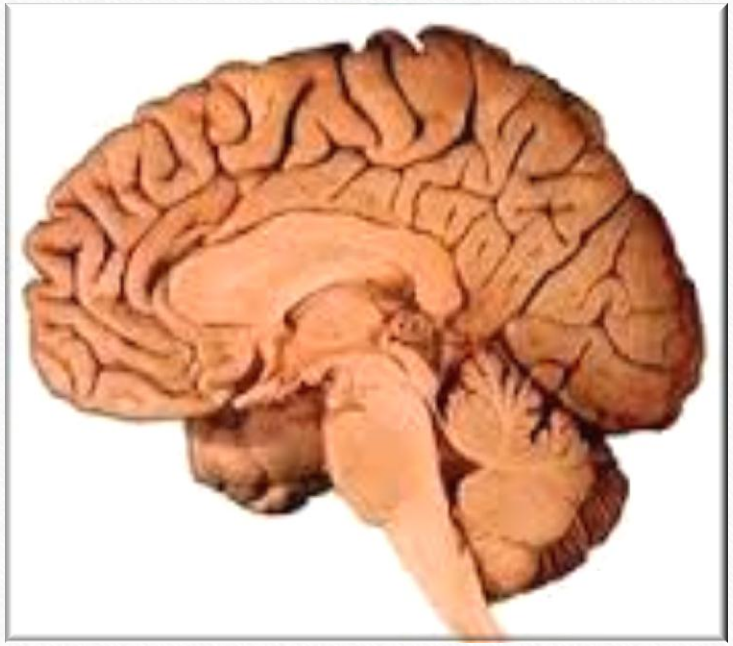
- Weakness is the inabilitiy to perform a desired movement with normal force because of reduction in muscle strength

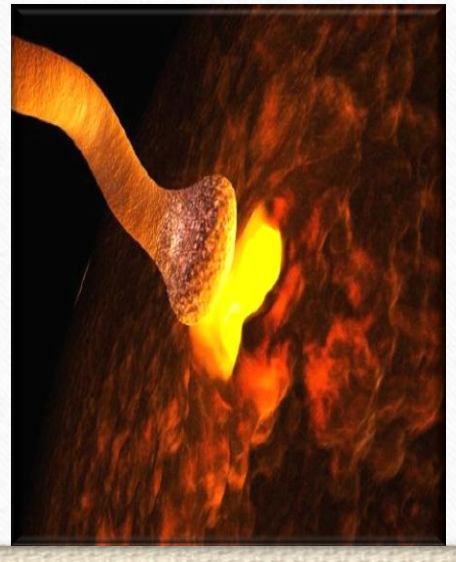
HISTORY

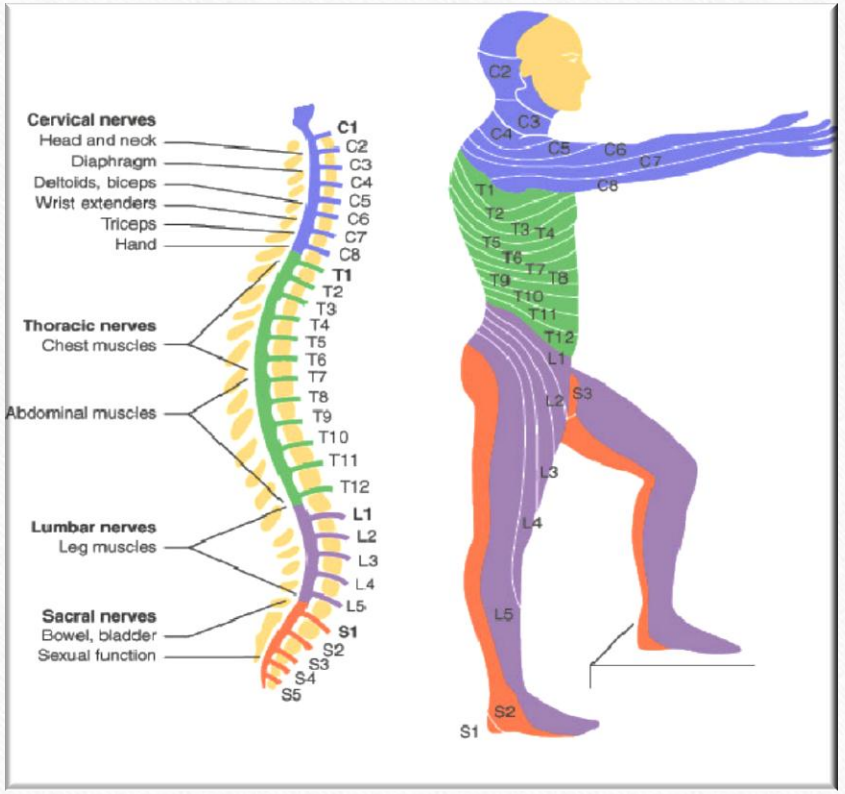
Weakness?

Malaise?

HISTORY






Cervical nerves
Head and neck
Diaphragm
Deltoids, biceps
Wrist extenders
Triceps
Hand
Thoracic nerves
Chest muscles
Abdominal muscles
Lumbar nerves
Leg muscles
Sacral nerves
Bowel, bladder
Sexual function
C1
C2
C3
C4
C5
C6
C7
C8
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
L1
L2
L3
L4
L5
S1
S2
S3
S4
S5

- The diagnosis of potentially life-threatening neurologic and neuromuscular processes requires a systematic, anatomic approach based upon a careful history, physical examination, and in most cases, imaging studies

TAKE HOME MESSAGE

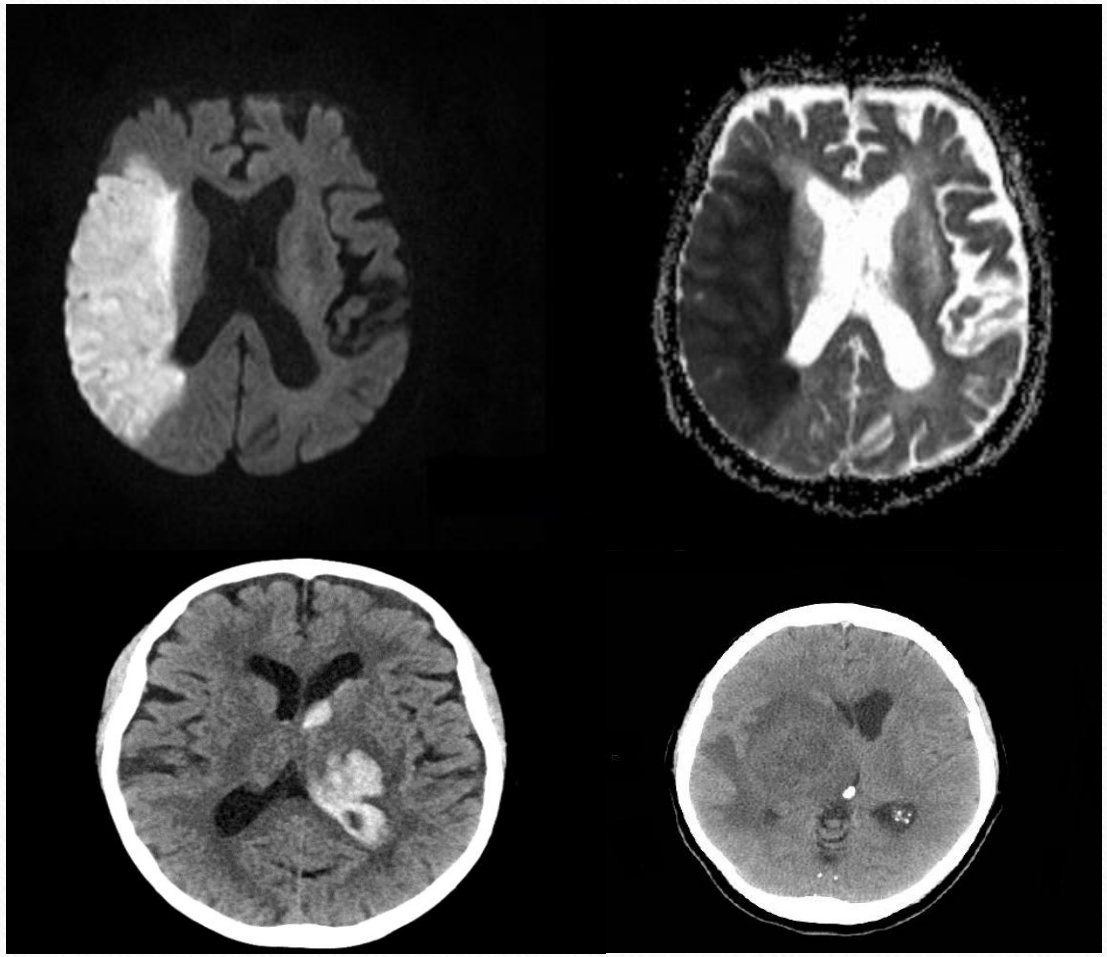
- The first important step in an algorithmic approach is to determine whether the weakness is unilateral (asymmetric) or bilateral (symmetric) and to look closely for signs of central neurologic involvement

UNILATERAL WEAKNESS

- Cortical signs?

Are there any cortical signs like aphasia, neglect, Vulpian's sign, agnosia or apraxia?

Seizure?



TAKE HOME MESSAGE

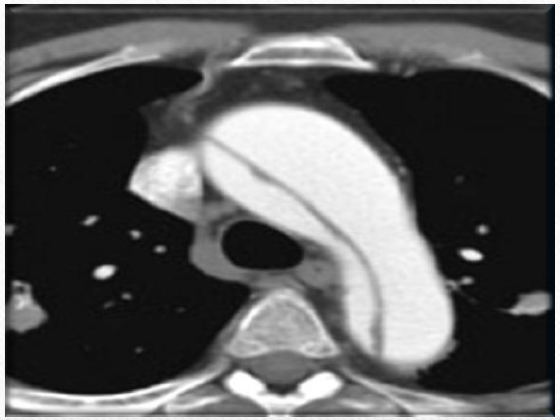
- Patients diagnosed with an acute ischemic stroke should be rapidly evaluated to determine appropriate treatment ⟹ Systemic thrombolytic therapy or emergency endovascular revascularization

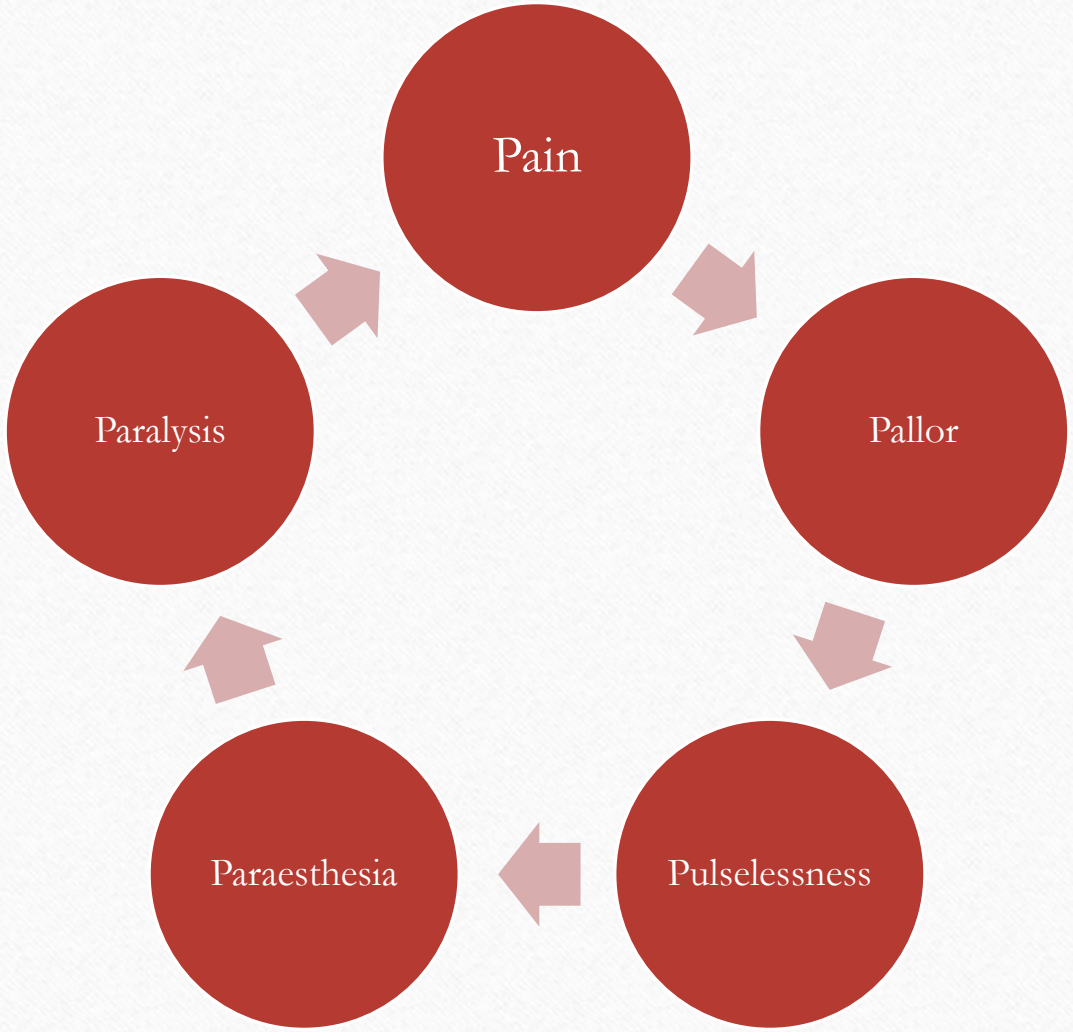
UNILATERAL WEAKNESS

- Facial asymmetry?

UNILATERAL WEAKNESS

- Is arterial pulse intact on the limb?
- And does chest pain complicate it?





UNILATERAL WEAKNESS

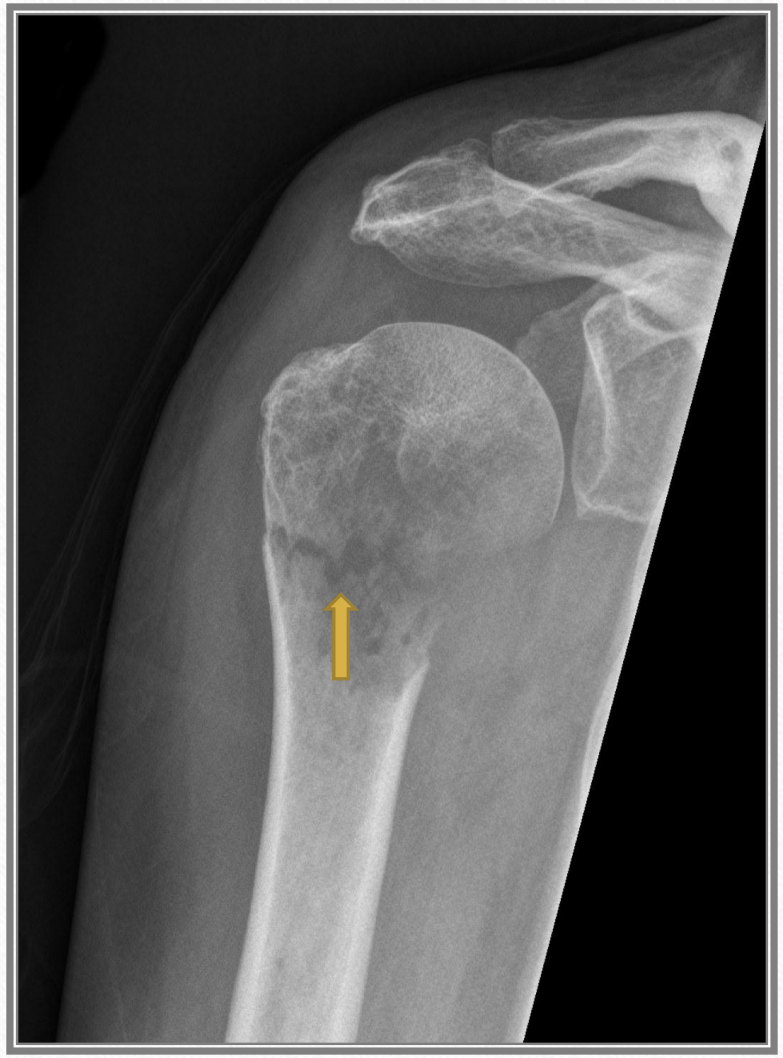
- Is it related with peripheral nervous system?

- Saturday night?

UNILATERAL WEAKNESS

- Trauma?
- Pathologic fracture?
- Radiculopathy

  (cervical or lumbar)



TAKE HOME MESSAGE

- If unilateral weakness is identified ⟹ Look carefully for signs suggestive of cortical, subcortical (lacunar) or brainstem lesions
- If these are absent, a peripheral process (radiculopathy, plexopathy or peripheral nerve injury) most likely accounts for the patient's symptoms

BILATERAL WEAKNESS

- **Transverse myelitis**

- Bilateral spinal cord involvement
- Segmental
- Thoracic zone is the most frequently affected part
- %50 idiopathic
- Maybe related with postinfectious situations, spinal cord infarction, radiation, SLE, vaccination or MS

BILATERAL WEAKNESS

➢ **Transverse myelitis**

- Acute or subacut onset
- Mostly in children under 5 years old
- Typically, sensory-motor deficit is seen under the level of affected zone
- Autonomic dysfunction findings such as urinary bladder or intestinal disorders, hypertensive crisis, body temperature alterations

BILATERAL WEAKNESS

➢ **Transverse myelitis**

- Stiff neck, fever and myalgia are seen in most of the patients
- Back pain (in the affected area), leg pain and pareshtesia are early signs
- Flask paralysis with absent DTR initially, followed by spasticity and hyperreflexia after two weeks
- Absent superficial reflexes (abdominal reflex and cremasteric reflex)

BILATERAL WEAKNESS

➢ **Transverse myelitis**

- Cervical medullary involvement occurs in 20% of cases and may lead to respiratory failure
- In most cases patients have a sensory level of findings
- Incontinence or retention
- MRI of the spinal cord typically shows a gadolinium-enhancing signal abnormality, usually extending over one or more cord segments; the cord often appears swollen at the affected levels
- Cerebrospinal fluid (CSF) is abnormal in approximately one-half of patients, with a moderate lymphocytosis (typically< 100/mm^3) and an elevated protein level (usually 100 to 120 mg/dL); glucose levels are normal

TAKE HOME MESSAGE

- When assessing acute weakness, it is helpful to begin cephalad and centrally and then progress caudad and peripherally
- This approach provides a reliable framework for neuroanatomic localization and accurate diagnosis

BILATERAL WEAKNESS

- **Guillain-Barré syndrome**

- Most often, GBS presents as an acute monophasic paralyzing illness provoked by a preceding infection
- Progressive (generally ascending), fairly symmetric muscle weakness accompanied by absent or depressed deep tendon reflexes
- The weakness can vary from mild difficulty with walking to nearly complete paralysis of all extremity, facial, respiratory or bulbar muscles

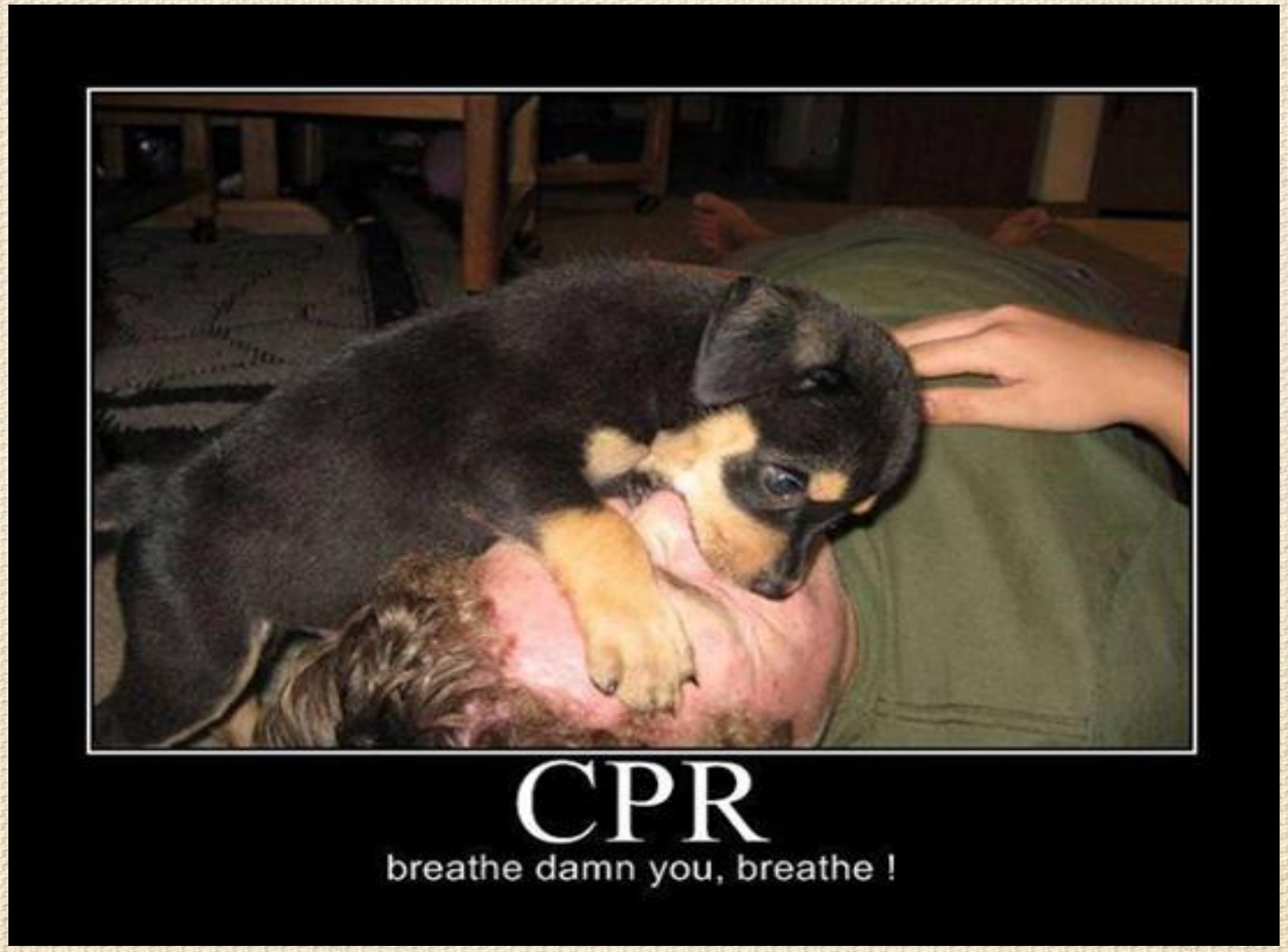
BILATERAL WEAKNESS

- **Guillain-Barré syndrome**
  - Albuminocytologic dissociation (elevated CSF protein with a normal CSF white blood cell count)

BILATERAL WEAKNESS

- **Multiple sclerosis**

- Nearly in 90% of all MS patients, spinal cord is involved
- Approximately 35% of all MS patients suffer spinal symptoms only
- Cervical spinal cord is twice as likely to be involved as the lower levels


CPR
breathe damn you, breathe !

BILATERAL WEAKNESS

- **Myasthenia Gravis**

- The most common disorder of neuromuscular transmission
- Ocular, bulbar, limb, and respiratory muscles might be involved
- Postsynaptic membrane of the neuromuscular junction becomes a target for the immune system

BILATERAL WEAKNESS

- **Myasthenia Gravis**

- Myasthenia gravis can be seen in two clinical forms: ocular and generalized
- In ocular type, only eyelids and extraocular muscles are involved
- In generalized form of disease, weakness might involve bulbar, limb, and respiratory muscles in different combinations

BILATERAL WEAKNESS

- **Myasthenia Gravis**

- Serologic tests for autoantibodies and electrophysiological studies are generally diagnostic, but it would be unpractical to use them as an element of emergency diagnostic approach
- The edrophonium ("Tensilon") test can be used in this matter

TAKE HOME MESSAGE

- If bilateral weakness is identified, check patient's mental status and look carefully for signs of upper or lower motor neuron lesions and associated abnormalities
- Compilation of examination findings should allow approximate identification of the site of the lesion and determination of the need for imaging studies, consultation and treatment

LESS FREQUENT ETIOLOGIES FOR WEAKNESS

TICK PARALYSIS

- Most commonly related with Dermacentor ticks
- Paresthesias and a sense of fatigue and weakness are early symptoms
- Fever is typically absent

LESS FREQUENT ETIOLOGIES FOR WEAKNESS

TICK PARALYSIS

- Albeit some patients describe paresthesia, sensory exam is typically normal
- Deep tendon reflexes are characteristically absent
- Most patients eventually develop an unsteady gait that progresses to an ascending complete paralysis
- Respiratory paralysis and death can occur in severe cases

LESS FREQUENT ETIOLOGIES FOR WEAKNESS

ORGANOPHOSPHATE AND CARBAMATE POISONING

- Acute toxicity from organophosphorus agents presents with manifestations of cholinergic excess

S - Salivation
L - Lacrimation
U - Urination
D - Diarrhea
G - Gastrointestinal distress
E – Emesis

D - Diarrhea
U - Urination
M - Miosis
B - Bradycardia
E - Emesis
L - Lacrimation
L - Lethargy
S - Salivation

LESS FREQUENT ETIOLOGIES FOR WEAKNESS

BOTULISM

- Patients with food-borne botulism may have a prodrome of vomiting, abdominal pain, diarrhea, and dry mouth

- Cranial nerve involvement related symptoms such as fixed pupillary dilation, diplopia, nystagmus, ptosis, dysphagia, dysarthria might be seen, which followed by descending muscle weakness, usually progressing from the trunk and upper extremities to the lower extremities

- Smooth muscle paralysis leads to urinary retention; diaphragmatic paralysis can lead to respiratory distress requiring intubation

LESS FREQUENT ETIOLOGIES FOR WEAKNESS

HEMIPLEGIC MIGRAINE

- An uncommon migraine variant which is characterized with unilateral motor and sensory symptoms

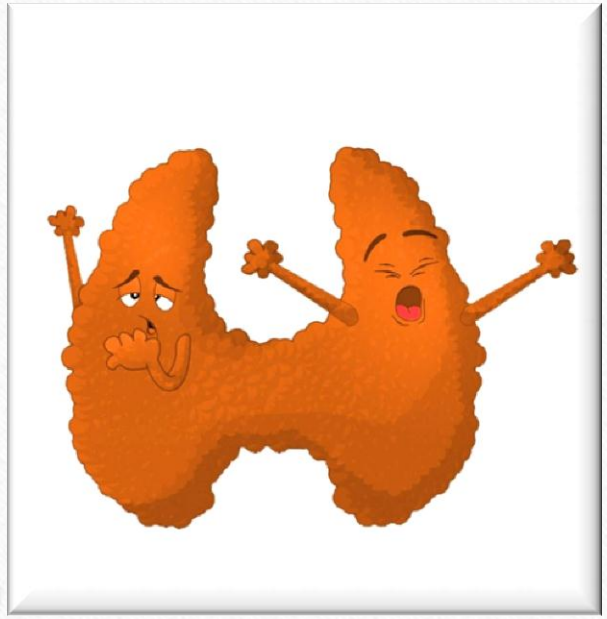
LESS FREQUENT ETIOLOGIES FOR WEAKNESS

POSTICTAL (TODD'S) PARALYSIS

- Generalized or complex partial seizures may be followed by a focal motor deficit that can persist for hours, but typically resolves within 30 to 60 minutes
- Often related to a structural abnormality of the brain

LESS FREQUENT ETIOLOGIES FOR WEAKNESS

HYPOTHYROIDISM

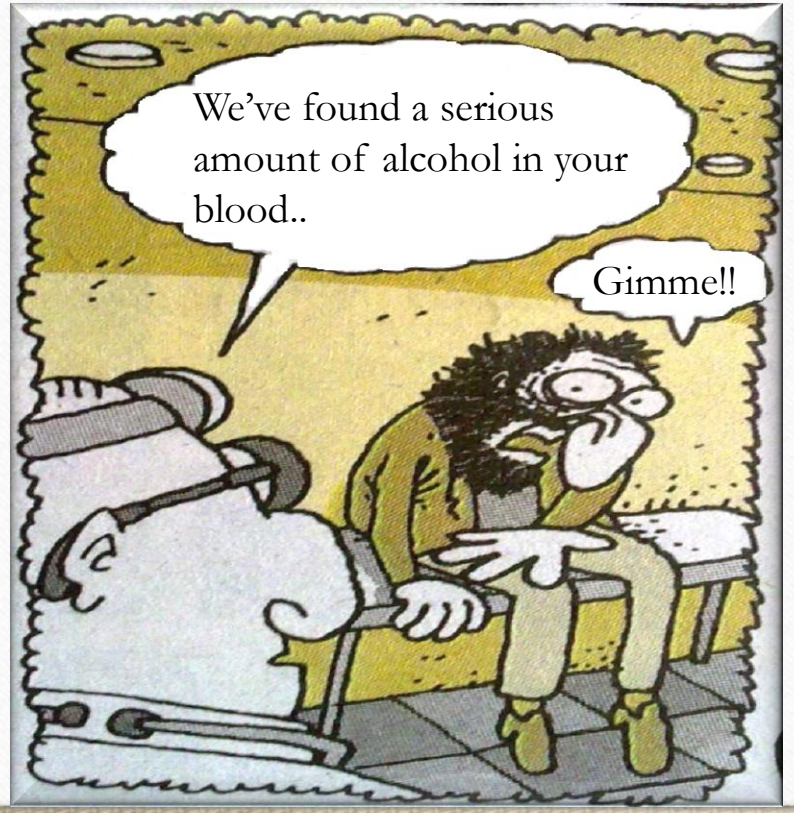


- Generalized slowing of metabolic processes can lead to fatigue, slow movement and slow speech, cold intolerance, constipation, delayed relaxation of deep tendon reflexes and bradycardia

- Accumulation of matrix glycosaminoglycans in tissues can lead to coarse hair and skin, puffy facies, enlargement of the tongue and hoarseness

MUSCLE DISEASES

ALCOHOLIC MYOPATHY



- This myopathy occurs in long-standing alcoholics
- A major cause of nontraumatic rhabdomyolysis
- Presents with muscle cramps, tenderness and swelling

MUSCLE DISEASES

MYOSITIS

- Both dermatomyositis and polymyositis usually present with symmetric proximal muscle weakness, which has often been worsening over several months

- Muscle pain and tenderness is present in up to half of cases

FLUCTUATIONS IN BLOOD BIOCHEMISTRY OR CBC

HYPOGLYCEMIA

- Symptoms and signs of severe hypoglycemia are nonspecific and can include fatigue, dizziness, visual disturbances, drowsiness, dysarthria and depressed mental status

- Symptoms can progress to seizures or coma

FLUCTUATIONS IN BLOOD BIOCHEMISTRY OR CBC

PERIODIC PARALYSIS

- Severe electrolyte abnormalities can cause generalized or focal muscle weakness

- Hypo- or hyperkalemia, hypo- or hypercalcemia, hypomagnesemia or hypophosphatemia may be the cause

FLUCTUATIONS IN BLOOD BIOCHEMISTRY OR CBC

ANEMIA

- The differential diagnosis of anemia is broad, but the presentation often includes progressive weakness and pallor

TAKE HOME MESSAGE

- Emergency physician's first responsibility is to rule out life-threatening or permanently disabling causes of weakness that require urgent treatment
- The immediate life threats from acute neuromuscular weakness include inability to protect or maintain the airway, respiratory failure from thoracic and diaphragmatic muscle weakness and circulatory collapse from autonomic instability

DIAGNOSES NOT TO MISS!

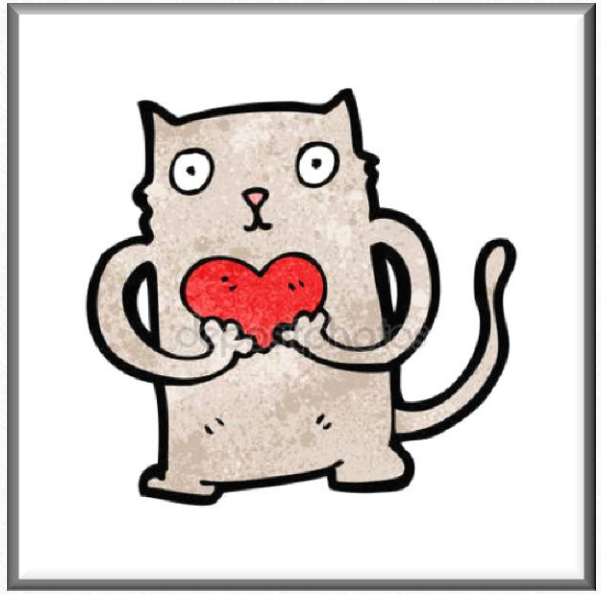
SEPSIS

- Among other symptoms, malaise and generalized weakness may be a manifestation of sepsis

DIAGNOSES NOT TO MISS!

ACUTE CORONARY SYNDROME (ACS)

- A significant percentage of elderly patients with ACS complain only of generalized weakness
- Diabetics and women may also complain of weakness rather than chest discomfort when experiencing an ACS



DIAGNOSES NOT TO MISS!

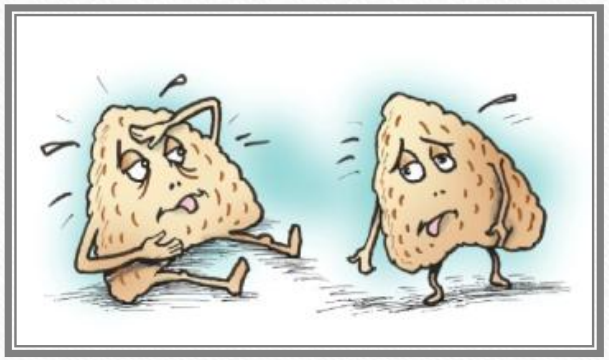
CARBONMONOXIDE (CO) POISONING

- Clinical findings of CO poisoning are highly variable and largely nonspecific
- Moderately or mildly CO-intoxicated patients often present with classic symptoms including headache (the most common presenting symptom), malaise, nausea, and dizziness
- May be misdiagnosed with acute viral syndrome

DIAGNOSES NOT TO MISS!

ADRENAL INSUFFICIENCY

- Patients with chronic, progressive adrenal insufficiency most often develop chronic malaise, lassitude, fatigue that is worsened by exertion and improved with bed rest, generalized weakness, anorexia and weight loss



TAKE HOME MESSAGE

- Weakness is a common, nonspecific emergency department complaint that encompasses a bunch of differential diagnoses including neurologic and non-neurologic diseases
- In the elderly infection, cardiovascular disease, and dehydration must be considered in the differential diagnosis

Thanks for your patience..