THE NERVOUS SYSTEM-PART 2

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Welcome to the second part of our presentation on the NERVOUS SYSTEM. In part one we began covering the diseases of the nervous system. We have a few more diseases to cover and once we're done with that, we'll go over diagnostic procedures and treatments. We're going to begin by talking about:

1) NEURODEGENERATIVE DISEASES: this is a group of diseases that affect the CNS in which neurons are sickening, not working and dying off. Neurodegenerative diseases start off slow but get worse over time. We're going to mention 5 diseases that belong to this group. First we have:

   - ALZHEIMER'S DISEASE → AFFECTS COGNITION

   Cognition is a group of mental processes that include:
   • learning
   • attention
   • reasoning and
   • memory

   Alzheimer's begins with memory problems and progresses to a complete loss of mental, emotional and physical functioning. Also in the group is:

   - PARKINSON'S DISEASE (↓ DOPAMINE)
   &
   → AFFECT MOVEMENT

   - HUNTINGTON'S DISEASE (GENETIC)

   Parkinson's and Huntington's disease both affect a patient's movements. In Parkinson's disease there is a problem with a neurotransmitter called DOPAMINE. The neurons that secrete dopamine are dying and apparently that lack of dopamine causes the tremors and rigidity seen in the patients who have this disease. Cognition is also affected in the last stages of the disease.

   Huntington's disease is a genetic (inherited) disorder that produces choreic movements which are brief, involuntary, jerky movements which the patient can't control. Patient may stop recognizing family members and develop psychiatric symptoms.

   By the way, the general medical term for abnormal movements is DYSKINESIA—which includes:
   • ATHETOSIS: http://www.youtube.com/watch?v=48_NgI3ncL4
   • CHOREA: https://www.youtube.com/watch?v=OveGZdZ_sVs
   • HEMIBALLISMUS: https://www.youtube.com/watch?v=fCL7RWaC3RA
The best way to understand these is to see them so click on the links to watch videos. Just let me quickly say that:

- **athetosis** are continuous slow, writhing movements.
- **chorea** almost looks like the patient is doing a weird dance and
- **hemiballismus** are quicker, rotating movements on one side of the body.

Another neurodegenerative disease is:

- **AMYOTROPHIC LATERAL SCLEROSIS (ALS) → AFFECTS STRENGTH**

This disease **kills off motor neurons** in the spinal cord. The motor neurons are the ones that transmit the nerve impulses to our muscles and are the ones being destroyed in this disease. ALS starts with some twitching and progresses to severe wasting of the muscles leaving the patient progressively weaker and weaker with difficulty walking, writing and speaking.

The last neurodegenerative disease we'll mention is:

- **MULTIPLE SCLEROSIS (MS) → AFFECTS MYELIN**

which destroys the myelin coating on the neurons. Just as a copper wire is covered by a plastic jacket, the nerve fiber—also known as the axon—has a sheath of myelin around it. We all know that if a wire's jacket is damaged the electricity can escape and cause a short circuit. Something similar is happening in MS. The axon is missing some of its myelin coating and that affects the transmission of the nerve impulse through the neuron. This process is known as demyelination and leads to problems with eyesight, muscle weakness, trouble with balance, coordination and also affects thinking and memory.

Another disease where demyelination occurs is:

2) **GUILLAIN BARRÉ SYNDROME**: the difference with MS is that Guillain Barré is an acute disease which only affects the nerves—peripheral nervous system (PNS). In Guillain Barré an ascending weakness (paresis) appears. First the legs get weak, then the arms get weak and patient may become paralyzed. The danger is that it can affect the nerves that go to our breathing muscle, the diaphragm, causing it to get paralyzed and you need to move that muscle or you're not breathing! Regardless, with proper supportive measures most of the patients make a complete recovery.

Another disease which affects the PNS is:

3) **DIABETES**: which causes a peripheral neuritis which is so important that they gave it its very own name: diabetic neuropathy.

Other times we may see just one nerve affected which is the case of:

4) **BELL'S PALSY**: which is a temporary paralysis of one side of the face due to inflammation of one of the cranial nerves (the **FACIAL NERVE**). Patients can't shut their eye and their mouth droops.
Another nerve disorder is:

5) **COMPLEX REGIONAL PAIN SYNDROME (CRPS) aka REFLEX SYMPATHETIC DYSTROPHY (RSD):** which is characterized by **chronic pain** and **changes in skin color and temperature** in an arm or leg which becomes very **SENSITIVE** to touch. Patients with CRPS avoid brushing their extremity against anything. CRPS can come on **after an injury or surgery to an extremity**.

Now when an infection spreads to the brain we can get what's known as:

6) **ENCEPHALITIS:** which is the **inflammation of the brain** usually caused by a virus, for example **West Nile Virus**, transmitted by mosquito bite. If the infection affects the meninges we get **MENINGITIS**

7) **BRAIN CANCER:** usually called a **brain tumor**. Sounds less threatening. The problem with brain cancer is that it is growing inside an enclosed space which is the skull. This causes an **increase in pressure inside the skull** this is known as **INTRACRANIAL HYPERTENSION** which affects the brain and causes symptoms like **headache, vomiting and drowsiness**. The most frequent brain tumor is actually not a brain tumor but a **metastasis** to the brain of a cancer located elsewhere.

Some common names of primary brain tumors are:
- **GLIOMAS**
- **ASTROCYTOMAS**
- **GLIOBLASTOMAS**: this last one being the **most frequent malignant** brain tumor. If a brain tumor grows large enough it can press on the rest of the brain’s structures pushing them away from their normal position in the skull causing a **BRAIN HERNIATION**.

**SOME DIAGNOSTIC PROCEDURES:**

1) **PHYSICAL EXAM:** the neurologist will examine the patient using certain medical instruments like a **REFLEX HAMMER** to check the patient's reflexes or a **PINWHEEL** to test nerve sensation by rolling it over the skin and then asking the patient if it feels sharp.

2) **SKULL X-RAY:** is useful to detect tumors of the hypophysis, skull fractures and brain calcifications. If I haven't already mentioned this, let me say that **X-rays are electromagnetic radiation beams** used to make images. The x-rays pass through the body and then onto specially treated plates (similar to a camera film) and a “negative” type picture is made. The **more solid a structure the whiter it appears on the film**.

3) **CAROTID ULTRASOUND:** is used to study the neck’s carotid arteries to see if there's plaque build-up (known as arteriosclerosis) **narrowing** the artery.

4) **NERVE CONDUCTION TEST/ ELECTROMYOGRAPHY (EMG):** This test is used to **diagnose nerve disease or nerve injuries** and is useful in the work-up of a patient that comes in complaining of **numbness, tingling or muscle weakness**. First electrodes are placed on the skin of extremities, then the test begins with **mild electrical shocks** applied to the muscles (this is the nerve conduction part of the test) after which **needles** are introduced into the muscles (this is the electromyography per se). It's **commonly referred to as a "needle test"**.
5) **ELECTROENCEPHALOGRAPHY (EEG):** is like an EKG of the brain. For this study, electrodes placed on the patient's scalp pick up the brain's electrical activity which is then printed on paper strips (ELECTROENCEPHALOGRAM). EEG is useful diagnostic tool for epilepsy or brain tumors. There are changes in the brainwaves when disease is present.

6) **CT SCAN OF THE BRAIN:** a CT scan of the brain is very useful to diagnose
   - strokes
   - cerebral hemorrhage
   - or to do CT-GUIDED BIOPSY of the brain.

7) **MRI:** is especially useful to study the spinal cord and the deep structures of the brain like the brain stem and hypophysis or to diagnose brain tumors. The arteries of the brain (and other arteries like the aorta) can be also be studied by doing MAGNETIC RESONANCE ANGIOGRAPHY (MRA) which is done using a contrast called gadolinium which enhances the image making the blood vessels visible.

8) **SPINAL TAP aka LUMBAR PUNCTURE:** is an invasive procedure where a needle is placed into the spine to obtain a sample of cerebrospinal fluid. When there's meningitis or a cerebral aneurysm bleeds, that shows up in the cerebrospinal fluid so spinal tap is useful to diagnose these conditions.

9) **POLYSOMNOGRAPHY aka SLEEP STUDY:** this study monitors a patient's sleep stages and cycles to identify if they are disrupted and why. This study is done at a sleep center where the patient stays overnight and sleeps hooked up to a monitor. It is especially useful to diagnose SLEEP APNEA which is a sleep disorder in which the patient snores and makes hundreds of brief pauses in their breathing every night causing "micro-awakenings" which disturbs their sleep leaving the patient tired and sleepy during the day.

**SOME TREATMENTS:**

1) **FOR HEADACHES:**
   - NON-STEROIDAL ANTI-INFLAMMATORYS aka NSAIDs are taken for headaches but may not work for migraines and in that case there are other specific medications given like:
     - SUMATRIPTAN or ERGOTAMINE.
     - TOPIRAMATE and BETA BLOCKERS: are used to prevent migraines

2) **ANTICONVULSANTS aka ANTIEPILEPTICS:** are prescribed to prevent seizures. A couple of widely used drugs that belong to this group are
   - CARBAMAZEPINE
   - PHENYTOIN
   There are many others.

3) **ANTIPARKINSONIAN DRUGS:** these drugs make up for the lost dopamine in Parkinson’s. They do not cure the disease but reduce the symptoms.
   Examples are:
   - CARBIDOPA/ LEVODOPA
   - BROMOCRIPTINE
4) **DONEPEZIL**: this drug is prescribed for Alzheimer’s. Improves cognition, does not cure disease.

5) **SPINAL INJECTIONS**: injections to the spine can be used to treat pain or to diagnose where the pain is coming from. When a procedure is used to treat something then we say it is being used for therapeutic purposes. If the procedure is done to get a diagnosis then it is a diagnostic procedure. Spinal injections can be therapeutic or diagnostic because if a certain nerve is "blocked" by injecting an anesthetic next to it, it will numb out the pain which tells the doctor that that particular nerve was the source of the pain. We have different types of spinal injections:

- **EPIDURAL INJECTION**: corticosteroids are injected into the space around the spinal cord. Epidurals are done to calm pain due to a pinched nerve in the back or neck.

- **FACET BLOCKS**: in this injection what changes is where needle is placed. The small joints between the vertebrae are called "facets" and they are the ones getting the shot here! Facet blocks are usually done to alleviate pain in the spine caused by arthritis in the facet joints.

6) **RHIZOTOMY**: this procedure is also done to alleviate pain in the spine by disrupting the nerve root-burning it- so that it can't transmit the pain to the brain. Unfortunately the nerve regenerates (grows back) and over time the pain reappears.

All these injections are generally done by a PAIN MANAGEMENT specialist. So when you hear a provider tell a patient: “we're going to refer you for pain management, 9 out of 10 times this means that the patient is going to be sent to get a shot to the spine.

7) **SPINAL CORD STIMULATOR**: is a device which is implanted in the body and sends electrical signals to the spinal cord to control chronic pain. It is indicated in patients with failed back surgery which are those patients who after one or more back surgeries continue to have severe back pain.

8) **CPAP MACHINE**: CPAP stands for Continuous Positive Airway Pressure

In patients with obstructive sleep apnea, their airway gets blocked by their soft palate and/or the backs of their tongues. The constant stream of air under slight pressure that they receive from the CPAP machine keeps the airway open. A MOUTHPIECE is usually also provided for the patient to use during sleep which pushes the jaw and tongue forward so the back of tongue does not block the airway.

9) **TOTAL PARENTERAL NUTRITION**: total parenteral nutrition is a form of IV therapy that may be used in patients in coma who can't eat or patients with bowel obstruction who can't absorb food, for example.

10) **LANGUAGE THERAPY**: is the rehabilitation of patients with language disorders. The professionals who work in the field of speech and language disorders are known as SPEECH-LANGUAGE PATHOLOGISTS. A patient who develops an aphasia after a stroke is now also a patient with a language disorder who may have difficulty putting words together to communicate ideas. He will need the services of a Speech-language pathologist.
11) SURGICAL PROCEDURES

- **ENDARTERECTOMY**: when a carotid ultrasound shows severe narrowing of the carotid then an endarterectomy can be performed to clean out the carotid and remove the obstruction. Another possibility is

- **CAROTID ANGIOPLASTY**: where a stent is placed in the carotid to improve the blood flow through the area of stenosis.

- **TREPIANATION**: is the name of the surgical procedure in which a hole (called a burr hole) is made in a patient's skull. Used to remove a blood clot.

- **CRANIOTOMY**: a flap of bone is removed from the skull to be able to operate the brain or to reduce pressure on the brain.

- **CRANIECTOMY**: same as above but the flap of skull is not immediately put back on after the procedure. The flap will be stored and put back on several weeks later or replaced by a titanium plate in which case it's called a CRANIOPLASTY.

- **SURGICAL CLIPPING**: a surgical clip is placed around the neck of the aneurysm to prevent it from rebleeding. The other option is to do:

- **ENDOVASCULAR COILING**: where under fluoroscopy a catheter is inserted in the groin and pushed up until it reaches the aneurysm. Coils of platinum are inserted into the aneurysm which will cause it to clot and dry up (embolization).

- There is a surgical procedure where a brain pacemaker called a DEEP BRAIN STIMULATOR is implanted in the brain. This device sends electrical signals to the brain and is used to mitigate symptoms in cases of Parkinson's disease and epilepsy when the medications are not helping.

The specialists who treat diseases of the nervous system are called NEUROLOGISTS. Their specialty is NEUROLOGY. Some neurologists do PAIN MANAGEMENT which is a subspecialty that seeks to alleviate the suffering of patients with chronic incurable pain. Because neurologists don't operate they refer their patients to a NEUROSURGEON when surgery is needed.

TERMINOLOGY REVIEW. Now it's time for review so let's go over the terminology mentioned in this presentation in English and in the target language.

1) NEURODEGENERATIVE DISEASES: enfermedades neurodegenerativas
2) DOPAMINE: dopamina
3) DYSKINESIA: discinesia
4) ATHETOSIS: atetosis
5) CHOREA: corea
6) HEMIBALLISMUS: hemibalismo
7) AMYOTROPHIC LATERAL SCLEROSIS (ALS): (ELA) esclerosis lateral amiotrófica
8) MULTIPLE SCLEROSIS (MS): esclerosis múltiple
9) DEMYELINATION: desmielinización
10) GUILLAIN-BARRÉ SYNDROME: síndrome de Guillain Barré
11) SUPPORTIVE MEASURES: medidas de sostén, tratamiento de apoyo
12) PERIPHERAL NEURITIS: neuritis periférica
13) BELL'S PALSY: parálisis facial
14) COMPLEX REGIONAL PAIN SYNDROME (CRPS)/ REFLEX SYMPATHETIC DYSTROPHY (RSD): síndrome de dolor regional complejo, distrofia simpática refleja, causalgia
15) SENSITIVE: sensible
16) ENCEPHALITIS: encefalitis
17) MENINGITIS: meningitis
18) BRAIN CANCER: cáncer de cerebro
19) INTRACRANIAL HYPERTENSION: hipertensión endocraneana
20) GLIOMA: glioma
21) ASTROCYTOMA: astrocitoma
22) GLIOBLASTOMA: glioblastoma
23) BRAIN HERNIATION: hernia cerebral
24) REFLEX HAMMER: martillo de los reflejos
25) PINWHEEL: rueda de agujas
26) SKULL X-RAY: radiografía de cráneo
27) CAROTID ULTRASOUND: ecografía/ultrasonido de la carótida
28) NERVE CONDUCTION TEST: estudio de la conducción nerviosa
29) ELECTROMYOGRAPHY (EMG): (EMG) electromiografía
30) ELECTROENCEPHALOGRAM (EEG): (EEG) electroencefalograma
31) CT-GUIDED BIOPSY: biopsia guiada por Tomografía Computarizada
32) MAGNETIC RESONANCE ANGIOGRAPHY (MRA): angiografía por resonancia magnética, angiorrresonancia
33) SPINAL TAP/ LUMBAR PUNCTURE: punción lumbar
34) POLYSOMNOGRAPHY/ SLEEP STUDY: polisomnografía, estudio del sueño
35) SNORE: roncar
36) SLEEP APNEA: apnea del sueño
37) SUMATRIPTAN: sumatriptán
38) ERGOTAMINE: ergotamina
39) TOPIRAMATE: topiramato
40) ANTICONVULSANTS: anticonvulsivos, anticonvulsivantes
41) ANTIIEPILEPTICS: antiepilépticos
42) CARBAMAZEPINE: carbamazepina
43) PHENYTOIN: fenitoína
44) ANTIPARKINSONIAN DRUGS: antiparkinsonianos
45) CARBIDOPA/ LEVODOPA: carbidopa/levodopa
46) DONEPEZIL: donepezilo
47) SPINAL INJECTIONS: infiltraciones de columna, inyecciones de columna
48) EPIDURAL INJECTION: inyección epidural
49) FACET BLOCKS: bloqueo facetario
50) RHIZOTOMY: rizotomía
51) PAIN MANAGEMENT: tratamiento de dolor
52) SPINAL CORD STIMULATOR: estimulador de la médula espinal
53) CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP): presión positiva continua de la vía respiratoria
54) MOUTHPIECE: boquilla
55) TOTAL PARENTERAL NUTRITION: alimentación parenteral total
56) LANGUAGE THERAPY: fonoaudiología, terapia del lenguaje
57) SPEECH-LANGUAGE PATHOLOGIST: fonoaudiólogo
58) SURGICAL PROCEDURE: procedimiento quirúrgico
59) ENDARTERECTOMY: endarterectomía
60) CAROTID ANGIOPLASTY: angioplastia carotidea
61) TREPHINATION: trepanación
62) CRANIOTOMY: craneotomía
63) CRANIECTOMY: craneectomía
64) CRANIOPLASTY: craneoplastia
65) DEEP BRAIN STIMULATOR: marcapasos cerebral
66) SURGICAL CLIPPING: clipaje quirúrgico
67) ENDOVASCULAR COILING: embolización endovascular
68) NEUROLOGIST: neurólogo
69) NEUROLOGY: neurología
70) NEUROSURGEON: neurocirujano

In this presentation we have gone over many terms related to NEUROLOGY AND NEUROSURGERY while we discussed the some diseases, diagnostic procedures and treatments used in these fields of medicine. At the end of the presentation a list of 70 related terms were provided in English and the target language for you to review. I hope you've enjoyed this lesson and come away with a better understanding of the field of NEUROLOGY AND NEUROSURGERY and the terms related to this field of medicine.

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