DOWNLOAD PDF TECHNIQUE OF THE NEUROLOGICAL EXAMINATION

Chapter 1 : Neurological History and Examination. Neuro History Info | Patient

Plus you'll learn how to tailor the neurologic examination to different clinical needs: the screening exam, the complete exam, special application to hysteria, the elderly patient, coma, brain death, gait analysis, and much more.

A Simplified Scheme of Cerebellar Anatomy. The cerebellum can be divided into three longitudinal zones on the basis of afferent connections: These three subdivisions do not exactly correspond to the anatomical divisions; there is considerable overlap. DeMyer has put the function of the cerebellum lucidly by pointing out that the cerebellum probably evolved out of the vestibular nuclei. Using information provided by the vestibular system and other areas, the cerebellum equilibrates the contractions of axial musculature so that the eyes and head are properly positioned. In higher animals the cerebellum takes on the additional role of seeing to the smooth performance of voluntary movements by the limbs, working closely with the cerebrum. Thus the cerebellum, "sitting astride the vestibular nuclei," receives on the one hand information from the proprioceptive system, and on the other, information about commands the cerebral cortex is sending to muscles. The cerebellum sees to it that the movements are performed in a smooth, coordinated fashion, receiving constant feedback about what is actually happening. Information as to what is happening in the muscles comes from muscle spindles, tendon organs, touch and pressure receptors, and from the labyrinth. These afferent impulses converge on the Purkinje cells of the spinocerebellar and vestibulocerebellar portions of the cerebellar cortex see Figure Efferent output from the Purkinje cells goes to the cerebellar nuclei dentate, fastigial, and interpositus and thence to the spinal cord and therefore the lower motor neurons , vestibular nuclei, or cerebral cortex. Interrelationships with the cerebral cortex are complex. Basically each area of the cerebral cortex that sends efferents to the cerebellum in turn gets efferents from that area of the cerebellum. The pathways from the cerebral cortex to the cerebellum can be divided into two groups Brodal, Routes via the inferior olive, pontine nuclei, and red nucleus, which show a precise topical organization. Routes via the reticular nuclei principally. These nuclei are diffusely organized and thus can integrate impulses from many different sources before they reach the cerebellum. Cerebellar efferents to the cortex go from the dentate nucleus mostly to the nucleus ventralis lateralis of the thalamus, thence to the cortex. Efferents from the cerebral cortex to the cerebellum go to the contralateral cerebellar hemisphere. Thus the right cerebellar hemisphere ultimately receives afferents from the right side of the body and the left cerebral cortex, and sends efferents to the same locations. The cerebellum exerts its influence on motor activity via the cerebral cortex. It also directly influences the gamma fiber systems at the spinal cord level, thus influencing postural tone and reflexes. The nature of the cerebellar influence is still incompletely understood. There are many problems with localization of cerebellar symptoms. The generalizations in Table Localization of Cerebellar Symptoms. Clinical Significance Table Stance and gait abnormalities are the most common clinical signs. They reflect disease of the midline zone of the cerebellum. There is a broad-based stance with truncal instability during walking, causing falls to either side. The steps are irregular, and the feet may be lifted too high. Gait ataxia without limb impairment, occurring most commonly with alcohol damage and nutritional deficiency, indicates damage to the anterior superior vermis. Flocculonodular lesions can also produce stance and gait abnormalities. Tandem walking is often the earliest abnormality, and this maneuver is most severely affected. Titubation consists of a rhythmic body or head tremor. There is a rotatory or rocking or bobbing movement. Clinically this has not turned out to have localizing value with respect to the part of the cerebellum involved. The head can be rotated, or tilt to one side or the other. As with titubation, this does not have useful localizing value. Oculomotor disturbances in cerebellar disease have been worked out in detail in the "pure" cerebellar degenerations Leigh and Zee, ; Zee, The most frequent abnormalities include dysmetric saccades, fixation abnormalities, impaired smooth pursuit, postsaccadic drift, gaze-evoked nystagmus, rebound nystagmus, downbeat nystagmus, and positional nystagmus. Saccadic dysmetria most likely indicates dysfunction of the dorsal vermis and fastigial nuclei. The function of these structures is to control saccade amplitude. The vestibulocerebellum flocculus acts to provide stabilization of the retinal image, with dysfunction producing impaired smooth tracking, impaired fixation suppression of caloric nystagmus, and postsaccadic drift. Decomposition of movement occurs with disease of the lateral zones of the cerebellum. This is reflected in difficulty with both simple and compound movements. Movement initiation and termination is affected. Dysmetria is a trajectory disturbance; placement falls short of or extends beyond the initial goal, as in the finger to nose test. The heelâ€"kneeâ€"shin test also demonstrates error in placement, as well as force. The lateral zone of the cerebellum is felt to be responsible for normal placement. Repetitive movements, such as hand patting, are affected with dysfunction of the lateral zone of the cerebellum. The result is dysdiadochokinesis. Disorder of the rhythm of rapid alternating movements is known as dysrhythmokinesis. Disorders of the basal ganglia and corticospinal system can produce similar types of dysfunction. Ataxia is the lack of smoothly coordinated movements. This incoordination is chiefly the combined result of dysmetria and decomposition of movement. Movements are imprecise, halting, awkward, and clumsy. Disease of the lateral cerebellar hemispheres causes limb ataxia. Impaired check and excessive rebound are common signs in cerebellar disease. The patient, with eyes closed, is unable to return a limb that has been tapped and displaced to its original position. A static tremor, originating at the shoulder, can be brought out by having the patient hold outstretched arms parallel to the floor. A kinetic tremor or intention tremor is brought out by the finger to nose and heel to shin tests. It involves the proximal musculature. These tremors usually indicate disease of the lateral zone of the cerebellum on the ipsilateral side. Dysarthria often occurs in severe cerebellar disease. In a sense, it is ataxia of speech. Articulation is uneven, words are slurred, and variations in pitch and loudness occur. Rhythm changes are prominent. Charcot applied the term "scanning speech" to a pattern heard in cerebellar disease; enunciation is difficult, words are produced slowly and in a "measured" fashion. Muscle tone abnormalities in cerebellar disease were first described by Gordon Holmes in the s. Hypotonia and pendular deep tendon reflexes are seen. These abnormalities are seen easily when there is unilateral cerebellar disease. The cerebellum can be involved in a wide variety of systemic diseases, in addition to mass lesions and congenital afflictions. Alcoholism and remote cancer produce a cerebellar syndrome that at least initially begins within the anterior lobe and produces ataxia. Lead, mercury, dilantin, and other toxic or therapeutic agents can cause cerebellar degeneration. Various viral infections and hypoxia can produce prominent cerebellar involvement. Vascular disease can produce involvement of the cerebellum directly or by involvement of the cerebellar peduncles in the brainstem. Examples include the posterior inferior artery syndrome, the superior cerebellar artery syndrome, and the anterior inferior cerebellar artery syndrome. Cerebellar infarction and hemorrhage are other frequent manifestations of cerebrovascular disease. Common neoplasms include metastases, astrocytoma, medulloblastoma, angioblastoma, and acoustic neuroma. Note that this chapter has not been concerned with ataxia due to involvement of the posterior columns of the spinal cord, the functions of which must be tested before considering ataxia to be of cerebellar origin. Oxford University Press, ;â€" Technique of the neurological examination: Dow R, Moruzzi G. The physiology and pathology of the cerebellum. University of Minnesota Press, Cerebellum and motor dysfunction. Diseases of the nervous system. Disorders of the cerebellum. The cerebellum of man. The cerebellum and neural control. The neurology of eye movements. New concepts of cerebellar control of eye movements. Otolaryngol Head Neck Surg.

Chapter 2 : www.nxgvision.com - Deep Tendon Reflexes

This module will instruct medical students and post graduate trainees on how to perform a thorough neurological examination. It stresses examination technique, so that the student may perform the exam in a real clinical setting with authority and confidence.

The patient may be asked to remember objects that had been listed earlier in the course of the exam; repeat sentences; solve simple mathematical problems; copy a three-dimensional drawing; and draw a clock and place the numbers and hands appropriately. Many neurological diseases, such as dementia , cause changes in intellectual status or emotional responsiveness, and specific personality features. These changes and features can be detected during the mental status portion of the neurological exam. The mental status exam is especially important when the other parts of the neurological exam reveal no abnormalities. Sometimes, slight changes in memory or other intellectual resources may be the only indication that something is wrong. Cranial Nerves The cranial nerves are a set of 12 nerves that relay messages between the brain and the head and neck and control motor and sensory functions, including vision, smell, and movement of the tongue and vocal cords. The cranial nerve exam involves testing the function of all 12 sets of cranial nerves. It is an essential part of the neurological exam, and helps localize central nervous system dysfunction and aids in diagnosing systemic disease. Some of the functions that are commonly tested as part of the cranial nerve exam include: Motor System The motor system includes the brain and spinal cord motor pathways, and all the motor nerves and muscles throughout the body. Abnormalities in the motor system can often be detected by assessing muscle strength and tone and by looking for a variety of characteristic signs. The patient is usually asked to undress, so the neurologist can see the muscles and look for atrophy shrinkage , twitching, or abnormal movements. Tests are done to evaluate strength in all the major muscle groups. Evaluating Babinski response is an important part of testing the motor system. The neurologist strokes or scratches, heel-to-toe, the outer side of the sole of the foot and in patients over the age of 2, the toes normally curl downward in response. If the toes fan upward, a brain or spinal cord injury is indicated. A number of neurological disorders can lead to Babinski response. Sensory System Sensation depends on impulses that occur as a result of stimulation of receptors located in the skin, muscles, tendons, and so on, and are sent along nerve fibers to the central nervous system brain and spinal cord. The sensory exam is used to determine areas of abnormal sensation, the quality and type of sensation impairment, and the degree and extent of tissue involvement. A sensory exam involves evaluating different types of sensation, including pain, temperature, pressure and position. A cold or warm object may be used to test the sensation of temperature. To test position, patients may be asked to close their eyes and determine in which direction the examiner is moving a part of their body e. Patients also may be asked to identify objects with their eyes closed or identify numbers or letters traced on their body. The sensory exam should be repeated to provide accurate results. Responses may be affected by how alert, aware, and well-rested the patient is, so this part of the neurological exam is usually performed early in the course of testing. Deep Tendon Reflexes Reflexes are actions performed involuntarily in response to impulses sent to the central nervous system. Alterations in reflexes are often the first sign of neurological dysfunction. Hundreds of reflexes have been identified, but the neurological exam generally involves testing only the deep tendon reflexes. Deep tendon reflexes, also known as muscle stretch reflexes, are reflexes elicited in response to stimuli to tendons. Normally, when a specific area of the muscle tendon is tapped with a soft rubber hammer, the muscle fibers contract. Abnormal responses may indicate injury to the nervous system pathways that produce the deep tendon reflex. Coordination and the Cerebellum The cerebellum is the part of the brain that controls voluntary movement and motor coordination, including posture. Testing coordination provides clues about conditions that affect the cerebellum. Patients also may be asked to tap their fingers together quickly in a coordinated fashion or move their hands one on top of the other, back and forth, as smoothly as they can. Coordination in the lower limbs can be tested by asking patients to rub one heel up and down smoothly over the other shin. Gait Most of us take our ability to walk for granted. But as simple as it may seem, walking is a very intricate physiological process. The body must be held erect; the limbs, head, and trunk must be held in the right position; the person must be oriented to the position of all body parts; parts of motor control involved with moving must be integrated; and so on. Because walking depends on so many different parts of the nervous system, it can be affected by a variety of neurological disorders. By observing gait, the neurologist can gather important clues about what might be wrong. The patient is usually asked to walk in different ways e.

Chapter 3 : Physical Assessment - Chapter 8 Neurological System - Nursing Link

Neurological observations and examination techniques Definitions Neurological observations are those investigations and examination that relate to the assessment of the nervous system.

Assess time, place, person. Organic brain disorders lose time first, then place, rarely person. Impaired in anxiety, fatigue, intoxication. Ask for 24 hour diet recall and other easily verifiable information. Ask for past health, birthdays, anniversary, relevant history. Assess 4-word recall should be able to recall all four at 10 minutes and three words at 30 minutes. Judgement is impaired in mental retardation, emotional dysfunction, schizophrenia, and organic brain disease. Visual hallucinations are often associated with medications and organic syndromes. Auditory hallucinations are associated more with psychiatric disorders. Cranial Nerve Assessment Techniques Cranial Nerve I Olfactory After assessing patency of both nares, have client close eyes, obstruct one nare, and sniff. Use common, easily identifiable substances such as coffee, toothpaste, orange, vanilla, soap, or peppermint. Use different substances for each side. Bilateral decreased sense of smell occurs with age, tobacco smoking, allergic rhinitis, cocaine use. Unilateral loss of sense of smell neurologic anosmia can indicate a frontal lobe lesion. Cranial Nerve II Optic Check visual acuity have the patient read newspaper print and visual fields for each eye. Unilateral blindness can indicate a lesion or pressure in the globe or optic nerve. Loss of the same half of the visual field in both eyes homonymous hemianopsia can indicate a lesion of the opposite side optic tract as in a CVA. If the eyes will not do this the patient may have a fracture of the eye orbit or a brain stem tumor. Sensory â€” Have patient close eyes, touch cotton ball to all areas of face. Unilateral deficit seen with trauma and tumors. Cranial Nerve VII Facial Motor Check symmetry and mobility of face by having patient frown, close eyes, lift eyebrows, and puff cheeks. Impairment indicates inflammation or occlusion of the ear canal, drug toxicity, or a possible tumor. Uvula and soft palate should rise. Gag reflex should be present and the voice should sound smooth. Deficits can indicate a brain stem tumor or neck injury. If the patient is unable to do this it may indicate a neck injury. Wasting of the tongue, deviation to one side, tremors, and an inability to distinctly say l,t,d,n sounds can indicate a lower or upper motor neuron lesion. Reflex Testing When you strike a slightly stretched tendon with a reflex hammer, a simple muscle contraction occurs. What kind of information do deep tendon reflexes DTRs give the examiner? DTRs assist with evaluation of lower motor neurons and fibers. There are five reflexes to check which include: With the patient sitting, flex his arm at the elbow and rest his forearm on his thigh with the palm up. Place your thumb firmly on the biceps tendon in the antecubital fossa. Strike your thumb with the hammer. The elbow and forearm should flex, and the biceps muscle should contract. Supporting the arm with your hand, strike the triceps tendon on the posterior arm just above the elbow. The tendon should contract and the elbow extend. Have the patient rest his slightly flexed arm on his lap with the palm facing downward. Strike the posterior arm about two inches above the wrist on the thumb side. The forearm should rotate laterally and the palm turn upward. The normal response is contraction of the quadriceps muscle with extension of the knee. A slight jerking of the foot should be seen. To assess deep tendon reflexes: Encourage the patient to relax the arm or leg being tested. Position the arm or leg so the appropriate tendon is slightly stretched. Hold the reflex hammer lightly and swing it freely in an arc. Strike the tendon with a brisk downward stroke, then lift up on the hammer immediately. When learning to perform DTRs, many people either tap too lightly or they strike firmly but leave the hammer on the tendon which reduces the response. Be sure to compare responses from one side to the other. Grade the reflexes in the following manner: A patient with multiple sclerosis might have hyperactive reflexes, while areflexia absence of reflexes can appear in Guillain-Barr? Depressed or hyperactive reflexes can also signal an electrolyte imbalance. Motor System Assessment Assessment of the motor system includes evaluation of bilateral muscle strength and coordination and balance tests. Be sure to assess bilaterally and compare findings. Muscle Strength Examine the arm and leg muscles looking for atrophy and abnormal movements such as tremors. For a quick check of muscle tone, perform passive range of motion exercises and note any resistance. This tests the strength of the biceps. Then test the triceps by having the patient extend his arm while you push against his wrist. Hand grasps should also be assessed. Ensure that the patient follows instructions to release the hand when assessing grip strength. Assess upper leg muscle strength of a bed patient by having him flex his hip and knee so that the knee is about 8 inches off the bed. Tell the patient to maintain this position while you attempt to push down against the thigh. Standing at the foot of the bed, test lower leg and foot muscle strength by having the patient push his foot against your hand, then have him pull it up against your hand. Coordination and Balance Tests Coordination can be checked by having the patient close the eyes and touch the finger to the nose. Coordination can also be assessed by having the patient perform rapid alternating movements RAMs. The patient is instructed to pat his upper thigh with the same side hand, alternately patting with the palm and the back of the hand as quickly as possible. Repeat with both hands. These tests will help you evaluate coordination and detect intentional tremors. However, if he can stand beside the bed, you can perform the Romberg test for balance. With the feet together and arms to the sides as if standing at attention, have the patient maintain this position for about 30 seconds with the eyes open then another 30 seconds with his eyes closed. Stay close to the patient in case he starts to fall. It is normal to see minimal swaying. In some illnesses, vision compensates for a sensory loss. If the patient has a cerebellar disease, he may be able to maintain his balance with the eyes open, but not with them closed. The assessment of the sensory system includes the evaluation of Cranial Nerve V, the trigeminal nerve see facial evaluation. If the pain sensation is present, you do not have to test for temperature. To test for pain, have the patient close his eyes and let you know when you are touching a sterile needle to his skin. Lightly touch the proximal and distal aspects of the arms and legs with the needle. Age Related Changes of the Neurological System Decreased sensitivity to outside stimuli slows response time. Older people may not realize the air temperature is too cold or too warm. Vision is affected by aging as the lens of the eye begins to stiffen and lose water, compromising its ability to change shape for focus. Pupils become smaller, decreasing the amount of light reaching the retina, so an older person may find it hard to see in dim light. Hearing decreases because of natural or mechanical means.

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Chapter 4 : What Is a Neurological Exam? - Brain and Nerve Tests - www.nxgvision.com

The goals of the neurological examination are several: For patients presenting with symptoms suggestive of a neurological problem, the examination should: Determine, on the basis of an organized and thorough examination, whether in fact neurological dysfunction exists.

Head Oriented Vertically Technique: The muscle group to be tested must be in a neutral position i. The extremity should be positioned such that the tendon can be easily struck with the reflex hammer. If you are having trouble locating the tendon, ask the patient to contract the muscle to which it is attached. When the muscle shortens, you should be able to both see and feel the cord like tendon, confirming its precise location. You may, for example, have some difficulty identifying the Biceps tendon within the Antecubital Fossa. Ask the patient to flex their forearm i. The Biceps tendon should become taut and thus readily apparent. Strike the tendon with a single, brisk, stroke. While this is done firmly, it should not elicit pain. Occasionally, due to other medical problems e. If this occurs, do not cause the patient discomfort. Simply move on to another aspect of the exam. This grading system is rather subjective. Specifics of Reflex Testing - The peripheral nerves and contributing spinal nerve roots that form each reflex arc are listed in parentheses: Achilles S1, S2 - Sciatic Nerve: This is most easily done with the patient seated, feet dangling over the edge of the exam table. If they cannot maintain this position, have them lie supine, crossing one leg over the other in a figure 4. Or, failing that, arrange the legs in a frog-type position. Identify the Achilles tendon, a taut, discrete, cord-like structure running from the heel to the muscles of the calf. If you are unsure, ask the patient to plantar flex i. Tendon is outlined in pen on left, grasped by forceps gross dissection on right. Position the foot so that it forms a right angle with the rest of the lower leg. You will probably need to support the bottom of the foot with your hand. Strike the tendon directly with your reflex hammer. Be sure that the calf if exposed so that you can see the muscle contract. A normal reflex will cause the foot to plantar flex i. Positions for Checking Achilles Reflex To see a video of the normal achilles reflex exam, click on the movie icon. To see a video of the achilles reflex exam comparing normal with hyperreflexia, click on the movie icon. Patellar L3, L4 -Femoral Nerve: This is most easily done with the patient seated, feet dangling over the edge the exam table. If they cannot maintain this position, have them lie supine i. Identify the patellar tendon, a thick, broad band of tissue extending down from the lower aspect of the patella knee cap. This causes the quadriceps thigh muscles to contract and makes the attached tendon more apparent. Outlined in pen on left, grasped by forceps gross dissection on right. If you are having trouble identifying the exact location of the tendon e. Strike your finger, which should then transmit the impulse. Patellar Reflex Testing, seated patient For the supine patient, support the back of their thigh with your hands such that the knee is flexed and the quadriceps muscles relaxed. Then strike the tendon as described above. Patellar Reflex, supine patient Make sure that the quadriceps are exposed so that you can see muscle contraction. In the normal reflex, the lower leg will extend at the knee. To see a video of the normal patellar reflex exam, click on the movie icon. To see a video of the patellar reflex exam comparing normal with hyperreflexia, click on the movie icon. Biceps C5, C6 - Musculocutaneous Nerve: This is most easily done with the patient seated. Identify the location of the biceps tendon. To do this, have the patient flex at the elbow while you observe and palpate the antecubital fossa. The tendon will look and feel like a thick cord. Biceps Reflex Testing Support the arm in yours, such that your thumb is resting directly over the biceps tendon hold their right arm with your right; and vice versa. Biceps Reflex Testing,arm supported Make sure that the biceps muscle is completely relaxed. It may be difficult to direct your hammer strike such that the force is transmitted directly on to the biceps tendon, and not dissipated amongst the rest of the soft tissue in the area. If the arm is unsupported, place your index or middle fingers firmly against the tendon and strike them with the hammer. A normal response will cause the biceps to contract, drawing the lower arm upwards. To see a video of the normal biceps reflex exam, click on the movie icon. To see a video of the biceps reflex exam comparing normal with hyperreflexia, click on the movie icon. Brachioradialis C5, C6 - Radial Nerve: The tendon of the Brachioradialis muscle cannot be seen or well palpated, which makes this reflex a bit tricky to elicit. The tendon crosses the radius thumb side of the lower arm approximately 10 cm proximal to the wrist. Strike this area with your reflex hammer. Usually, hitting anywhere in the right vicinity will generate the reflex. Brachioradialis Reflex Observe the lower arm and body of the Brachioradialis for a response. A normal reflex will cause the lower arm to flex at the elbow and the hand to supinate turn palm upward. To see a video of the normal brachial radialis reflex exam, click on the movie icon. To see a video of the brachial radialis reflex exam comparing normal with hyperreflexia, click on the movie icon. Triceps C7, C8 - Radial Nerve: Identify the triceps tendon, a discrete, broad structure that can be palpated and often seen as it extends across the elbow to the body of the muscle, located on the back of the upper arm. If you are having trouble clearly identifying the tendon, ask the patient to extend their lower arm at the elbow while you observe and palpate in the appropriate region. The arm can be placed in either of 2 positions: The lower arm should dangle directly downward at the elbow. Triceps Reflex, arm supported Have the patient place their hands on their hips. Triceps Reflex, arm unsupported Either of these techniques will allow the triceps to completely relax. If you are certain as to the precise location of the tendon, strike this area directly with your hammer. If the target is not clearly apparent or the tendon is surrounded by an excessive amount of subcutaneous fat which might dissipate the force of your strike , place your index or middle finger firmly against the structure. Then strike your finger. Make sure that the triceps is uncovered, so that you can observe the response. The normal reflex will cause the lower arm to extend at the elbow and swing away from the body. To see a video of the triceps reflex exam comparing normal with hyperreflexia, click on the movie icon. Making Clinical Sense of Reflexes: Normal reflexes require that every aspect of the system function normally. Breakdowns cause specific patterns of dysfunction. These are interpreted as follows: Disorders in the sensory limb will prevent or delay the transmission of the impulse to the spinal cord. This causes the resulting reflex to be diminished or completely absent. Diabetes induced peripheral neuropathy the most common sensory neuropathy seen in developed countries , for example, is a relatively common reason for loss of reflexes. Abnormal lower motor neuron LMN function will result in decreased or absent reflexes. If, for example, a peripheral motor neuron is transected as a result of trauma, the reflex dependent on this nerve will be absent. If the upper motor neuron UMN is completely transected, as might occur in traumatic spinal cord injury, the arc receiving input from this nerve becomes disinhibited, resulting in hyperactive reflexes. Of note, immediately following such an injury, the reflexes are actually diminished, with hyper-reflexia developing several weeks later. A similar pattern is seen with the death of the cell body of the UMN located in the brain , as occurs with a stroke affecting the motor cortex of the brain. Primary disease of the neuro-muscular junction or the muscle itself will result in a loss of reflexes, as disease at the target organ i. A number of systemic disease states can affect reflexes. Some have their impact through direct toxicity to a specific limb of the system. Poorly controlled diabetes, as described above, can result in a peripheral sensory neuropathy. Extremes of thyroid disorder can also affect reflexes, though the precise mechanisms through which this occurs are not clear. Hyperthyroidisim is associated with hyperreflexia, and hypothyroidism with hyporeflexia. Detection of abnormal reflexes either increased or decreased does not necessarily tell you which limb of the system is broken, nor what might be causing the dysfunction. Decreased reflexes could be due to impaired sensory input or abnormal motor nerve function. Only by considering all of the findings, together with their rate of progression, pattern of distribution bilateral v unilateral, etc. Trouble Shooting If you are unable to elicit a reflex, stop and consider the following:

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Chapter 5 : Technique of the Neurological Examination by DeMyer, William | eBay

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Where can I get more information Diagnostic tests and procedures are vital tools that help physicians confirm or rule out the presence of a neurological disorder or other medical condition. A century ago, the only way to make a positive diagnosis for many neurological disorders was by performing an autopsy after a patient had died. But decades of basic research into the characteristics of disease, and the development of techniques that allow scientists to see inside the living brain and monitor nervous system activity as it occurs, have given doctors powerful and accurate tools to diagnose disease and to test how well a particular therapy may be working. Perhaps the most significant changes in diagnostic imaging over the past 20 years are improvements in spatial resolution size, intensity, and clarity of anatomical images and reductions in the time needed to send signals to and receive data from the area being imaged. These advances allow physicians to simultaneously see the structure of the brain and the changes in brain activity as they occur. Scientists continue to improve methods that will provide sharper anatomical images and more detailed functional information. Researchers and physicians use a variety of diagnostic imaging techniques and chemical and metabolic analyses to detect, manage, and treat neurological disease. Some procedures are performed in specialized settings, conducted to determine the presence of a particular disorder or abnormality. Depending on the type of procedure, results are either immediate or may take several hours to process. Certain tests, ordered by the physician as part of a regular check-up, provide general information, while others are used to identify specific health concerns. Blood tests are also used to monitor levels of therapeutic drugs used to treat epilepsy and other neurological disorders. Analysis of the fluid that surrounds the brain and spinal cord can detect meningitis, acute and chronic inflammation, rare infections, and some cases of multiple sclerosis. Chemical and metabolic testing of the blood can indicate protein disorders, some forms of muscular dystrophy and other muscle disorders, and diabetes. Urinalysis can reveal abnormal substances in the urine or the presence or absence of certain proteins that cause diseases including the mucopolysaccharidoses. Genetic tests include the following: Amniocentesis, usually done at weeks of pregnancy, tests a sample of the amniotic fluid in the womb for genetic defects the fluid and the fetus have the same DNA. About 20 milliliters of fluid roughly 4 teaspoons is withdrawn and sent to a lab for evaluation. Test results often take weeks. Chorionic villus sampling, or CVS, is performed by removing and testing a very small sample of the placenta during early pregnancy. The sample, which contains the same DNA as the fetus, is removed by catheter or fine needle inserted through the cervix or by a fine needle inserted through the abdomen. It is tested for genetic abnormalities and results are usually available within 2 weeks. CVS should not be performed after the tenth week of pregnancy. This noninvasive test can suggest the diagnosis of conditions such as chromosomal disorders see ultrasound imaging, below. Some tests require the services of a specialist to perform and analyze results. X-rays can be used to view any part of the body, such as a joint or major organ system. Since calcium in bones absorbs x-rays more easily than soft tissue or muscle, the bony structure appears white on the film. Any vertebral misalignment or fractures can be seen within minutes. Tissue masses such as injured ligaments or a bulging disc are not visible on conventional x-rays. The fluoroscope x-ray tube is focused on the area of interest and pictures are either videotaped or sent to a monitor for viewing. A contrast medium may be used to highlight the images. Fluoroscopy can be used to evaluate the flow of blood through arteries. The following list of available proceduresâ€"in alphabetical rather than sequential orderâ€"includes some of the more common tests used to help diagnose a neurological condition. It is used to diagnose stroke and to determine the location and size of a brain tumor, aneurysm, or vascular malformation. This test is usually performed in a hospital outpatient setting and takes up to 3 hours, followed by a 6- to 8-hour resting period. The patient, wearing a hospital or imaging gown, lies on a table that is wheeled into the imaging area. While the patient is awake, a physician anesthetizes a small area of the leg near the groin and then inserts a catheter into a major artery located there. The catheter is threaded through the body and into an artery in the neck. Once the catheter is in place, the needle is removed and a guide wire is inserted. A small capsule containing a radiopaque dye one that is highlighted on x-rays is passed over the guide wire to the site of release. The dye is released and travels through the bloodstream into the head and neck. A series of x-rays is taken and any obstruction is noted. Patients may feel a warm to hot sensation or slight discomfort as the dye is released. A small sample of muscle or nerve is removed under local anesthetic and studied under a microscope. The sample may be removed either surgically, through a slit made in the skin, or by needle biopsy, in which a thin hollow needle is inserted through the skin and into the muscle. A small piece of muscle or nerve remains in the hollow needle when it is removed from the body. The biopsy is usually performed at an outpatient testing facility. Performed in a hospital, this operation is riskier than a muscle biopsy and involves a longer recovery period. These scans are used to study organ function or injury or disease to tissue or muscle. Types of brain scans include computed tomography, magnetic resonance imaging, and positron emission tomography see descriptions, below. The procedure is usually done in a hospital. The patient is asked to either lie on one side, in a ball position with knees close to the chest, or lean forward while sitting on a table or bed. The doctor will locate a puncture site in the lower back, between two vertebrate, then clean the area and inject a local anesthetic. The patient may feel a slight stinging sensation from this injection. Once the anesthetic has taken effect, the doctor will insert a special needle into the spinal sac and remove a small amount of fluid usually about three teaspoons for testing. Most patients will feel a sensation of pressure only as the needle is inserted. A common after-effect of a lumbar puncture is headache, which can be lessened by having the patient lie flat. Risk of nerve root injury or infection from the puncture can occur but it is rare. The entire procedure takes about 45 minutes. Computed tomography, also known as a CT scan, is a noninvasive, painless process used to produce rapid, clear two-dimensional images of organs, bones, and tissues. Neurological CT scans are used to view the brain and spine. They can detect bone and vascular irregularities, certain brain tumors and cysts, herniated discs, epilepsy, encephalitis, spinal stenosis narrowing of the spinal canal , a blood clot or intracranial bleeding in patients with stroke, brain damage from head injury, and other disorders. Many neurological disorders share certain characteristics and a CT scan can aid in proper diagnosis by differentiating the area of the brain affected by the disorder. Scanning takes about 20 minutes a CT of the brain or head may take slightly longer and is usually done at an imaging center or hospital on an outpatient basis. The patient lies on a special table that slides into a narrow chamber. A sound system built into the chamber allows the patient to communicate with the physician or technician. As the patient lies still, x-rays are passed through the body at various angles and are detected by a computerized scanner. A light sedative may be given to patients who are unable to lie still and pillows may be used to support and stabilize the head and body. Persons who are claustrophobic may have difficulty taking this imaging test. Occasionally a contrast dye is injected into the bloodstream to highlight the different tissues in the brain. Patients may feel a warm or cool sensation as the dye circulates through the bloodstream or they may experience a slight metallic taste. Although very little radiation is used in CT, pregnant women should avoid the test because of potential harm to the fetus from ionizing radiation. This outpatient procedure is usually performed at a testing facility or a hospital. The patient is asked to put on a metal-free hospital gown and lie on an imaging table. The physician numbs the skin with anesthetic and inserts a thin needle, using x-ray guidance, into the spinal disc. Once the needle is in place, a small amount of contrast dye is injected and CT scans are taken. The contrast dye outlines any damaged areas. More than one disc may be imaged at the same time. Patient recovery usually takes about an hour. Pain medicine may be prescribed for any resulting discomfort. This test is most often performed at an imaging center. The patient is asked to put on a hospital or imaging gown. Following application of a topical anesthetic, the physician removes a small sample of the spinal fluid via lumbar puncture. The sample is mixed with a contrast dye and injected into the spinal sac located at the base of the lower back. The patient is then asked to move to a position that will allow the contrast fluid to travel to the area to be studied. The dye allows the spinal canal and nerve roots to be seen more clearly on a CT scan. The scan may take up to an hour to complete. Electroencephalography, or EEG, monitors brain activity through the skull. EEGs are also used to evaluate sleep disorders, monitor brain activity when a patient has been fully anesthetized or loses consciousness, and confirm brain death. Prior to taking an EEG, the person must avoid caffeine intake and prescription drugs that affect the nervous system. The electrodes also called leads are small devices that are attached to wires and carry the electrical energy of the brain to a machine for reading. A very low electrical current is sent through the electrodes and the baseline brain energy is recorded. Patients are then exposed to a variety of external stimuliâ€"including bright or flashing light, noise or certain drugsâ€"or are asked to open and close the eyes, or to change breathing patterns. The electrodes transmit the resulting changes in brain wave patterns. Since movement and nervousness can change brain wave patterns, patients usually recline in a chair or on a bed during the test, which takes up to an hour. Testing for certain disorders requires performing an EEG during sleep, which takes at least 3 hours. In order to learn more about brain wave activity, electrodes may be inserted through a surgical opening in the skull and into the brain to reduce signal interference from the skull. Electromyography, or EMG, is used to diagnose nerve and muscle dysfunction and spinal cord disease. During an EMG, very fine wire electrodes are inserted into a muscle to assess changes in electrical voltage that occur during movement and when the muscle is at rest. The electrodes are attached through a series of wires to a recording instrument.

DOWNLOAD PDF TECHNIQUE OF THE NEUROLOGICAL EXAMINATION

Chapter 6 : Neurological observations and examination techniques | Nurse Key

What is a neurological exam? A neurological exam, also called a neuro exam, is an evaluation of a person's nervous system that can be done in the healthcare provider's office. It may be done with instruments, such as lights and reflex hammers.

Dilated pupils Fear, anxiety, anti-cholinergic drug overdose, brainstem CVA mid brain , pain, mydriatic eye drops. Unequal dilated pupils unreactive IIIrd nerve palsy, mydriatic eye drops. There are numerous causes of abnormal pupil size, these are just some of the common causes that may be found. Pupils are generally round in shape and equal. However certain conditions such as glaucoma oval pupil and ocular trauma grossly irregular pupil can alter the shape of both or an individual pupil. It is therefore important in the presence of an abnormal pupil size or shape to ask the patient or relative whether this is new to the patient. Pupil response In the presence of a bright light the pupils should constrict to reduce the amount of light that enters the eye. With a light stimulus to one eye there should be experienced a direct response constriction of the pupil and consensual light reflex constriction of the other pupil. This response should occur in both light and dark conditions, although the response may be more difficult to spot in very light conditions. Pupil response to a light source should be relatively swift, therefore sluggish or slow responses should be noted, as should exceptionally brisk response as they can suggest neurological injury. Assessing light response21 Rationale 1. Gain informed consent from the patient to undertake the procedure. This will help to reduce anxiety and make the patient easier to examine. It is also a basic requirement for professional practice. Reduce the light from ambient sources wherever possible. This enables a better view of the pupil and makes any response easier to view. Wash the hands thoroughly. As manual opening of the eye may be required this can reduce cross infection. With the eyes open review the size and shape of the pupil. See section upon pupil size and shape. Using a bright pen torch move a light source from the outer aspect of the eye toward the pupil. This should cause pupil constriction direct light reflex. The light only needs to be shone into the pupil for a very brief period to elicit a response. Assess the level of constriction and the speed of response. This will assess the sensory and motor pathways. Repeat the process, this time watch the other eye to assess consensual light reflex. This will assess the motor pathway for the opposing eye. Repeat the previous two steps shining the light into the opposing eye. This will assess the sensory and motor pathways of the opposing eye. To assess patient motor function an evaluation of the following areas should be undertaken: Inspection and palpation of muscle mass Assessment of tone Assessment of movement and power Assessment of co-ordination Assessment of abnormal movements. Diseases such as motor neurone or stroke are common causes of such signs. Increased resistance suggests increased tone whereas decreased resistance suggests decreased tone. These tests are not routinely undertaken in prehospital care. Assessment of reflexes There are a variety of reflexes that can be tested. Typically these require great skill and experience to undertake and are not commonly used in prehospital care, examples include the deep tendon reflexes such as the knee jerk. However there are some reflexes that may be assessed within the community environment. These include the blink, gag, swallow, oculocephalic and plantar reflexes. This is a protective reflex that can be affected by damage to the trigeminal and facial cranial nerves. These may be noted by a lack of blinking to stimulation of the cornea. Gag and swallow reflex: These are not routinely tested however history and clinical examination may suggest a loss of gag or swallow function. For example aspiration of foodstuffs. Altered responses suggest damage to the glossopharyngeal or vagus cranial nerves. This reflex is an eye movement that occurs in patients with severely decreased level of consciousness. When the reflex is present if the head is moved to one side the eyes will move in the opposite direction. However in patients with absent brain stem reflexes the eyes will appear to remain stationary in the centre. An abnormal plantar reflex is evident upon the stimulation upon the lateral border of the underside of the foot. A normal response is the flexion of the great toe and adduction of the other toes. An abnormal response is noted when the great toe extends or dorsiflexes and the other toes abduct. This is a sign of upper motor neurone damage, however may be normal in babies under the age of one year.

Chapter 7 : Neurological examination - Wikipedia

Without abandoning classic concepts and science, this definitive source on neurologic examination techniques has been streamlined and updated. The text integrates details of neuroanatomy and clinical diagnosis in an easy-to-read format.

Testing of motor and sensory function requires a basic understanding of normal anatomy and physiology. Voluntary movement begins with an impulse generated by cell bodies located in the brain. Signals travel from these cells down their respective axons, forming the Cortiospinal a. At the level of the brain stem, this motor pathway crosses over to the opposite side of the body and continue downward on that side of the spinal cord. A discussion of these tracts can be found in other Neurology reference texts. For more information about motor pathways, see the following link: The precise location of the synapse depends upon where the lower motor neuron is destined to travel. If, for example, the LMN terminates in the hand, the synapse occurs in the cervical spine i. The axons of the PNS travel to and from the periphery, connecting the organs of action e. Nerves which carry impulses away from the CNS are referred to Efferents i. Axons that exit and enter the spine at any given level generally connect to the same distal anatomic area. These bundles of axons, referred to as spinal nerve roots, contain both afferent and efferent nerves. For more information about spinal cord anatomy, see the following link: Review of Spinal Anatomy As the efferent neurons travels peripherally, components from different roots commingle and branch, following a highly programmed pattern. Ultimately, contributions from several roots may combine to form a named peripheral nerve, which then follows a precise anatomic route on its way to innervating a specific muscle. The Radial Nerve, for example, travels around the Humerus bone of the upper arm , contains contributions from Cervical Nerve Roots 6, 7 and 8 and innervates muscles that extend the wrist and supinate the forearm. It may help to think of a nerve root as an electrical cable composed of many different colored wires, each wire representing an axon. As the cable moves away from the spinal cord, wires split off and head to different destinations. Prior to reaching their targets, they combine with wires originating from other cables. The group of wires that ultimately ends at a target muscle group may therefore have contributions from several different roots. For more information about radial nerve anatomy and function, see below. Afferents carry impulses in the opposite direction of the motor nerves. That is, they bring information from the periphery to the spinal cord and brain. Sensory nerves begin in the periphery, receiving input from specialized receptor organs. The axons then move proximally, joining in a precise fashion with other axons to form the afferent component of a named peripheral nerve. The Radial Nerve, for example, not only has a motor function described previously but also carries sensory information from discrete parts of the hand and forearm. As the sensory neurons approach the spinal cord, they join specific spinal nerve roots. Each root carries sensory information from a discrete area of the body. The area of skin innervated by a particular nerve root is referred to as a dermatome. Dermatome maps describe the precise areas of the body innervated by each nerve root. These distributions are more or less the same for all people, which is clinically important. In the setting of nerve root dysfunction, the specific area supplied by that root will be affected. This can be mapped out during a careful exam see below , identifying which root s is dysfunctional. To view a dermatomal map, see the following link: Dermatome Map University of Scranton Sensory input travels up through the spinal cord along specific paths, with the precise route defined by the type of sensation being transmitted. Nerves carrying pain impulses, for example, cross to the opposite side of the spinal cord soon after entering, and travel up to the brain on that side of the cord. Vibratory sensations, on the other hand, enter the cord and travel up the same side, crossing over only when they reach the brain stem see following sections for detailed descriptions. For more information about sensory pathways, see the following link: University of Washington Review of Sensory Pathways Ultimately, the sensory nerves terminate in the brain, where the impulses are integrated and perception occurs. Understanding the above neruo-anatomic relationships and patterns of innervation has important clinical implications when trying to determine the precise site of neurological dysfunction. Injury at the spinal nerve root level, for example, will produce a characteristic loss of sensory and motor function. This will differ from that caused by a problem at the level of the peripheral nerve. An approach to localizing lesions on the basis of motor and sensory findings is described in the sections which follow. Realize that there is a fair amount of inter-individual variation with regards to the specifics of innervation. Also, recognize that often only parts of nerves may become dysfunctional, leading to partial motor or sensory deficits. As such, the patterns of loss are rarely as "pure" as might be suggested by the precise descriptions of nerves and their innervations. Sensory Testing Sensory testing of the face is discussed in the section on Cranial Nerves. Testing of the extremities focuses on the two main afferent pathways: Spinothalamics and Dorsal Columns. These nerves detect pain, temperature and crude touch. They travel from the periphery, enter the spinal cord and then cross to the other side of the cord within one or two vertebral levels of their entry point They then continue up that side to the brain, terminating in the cerebral hemisphere on the opposite side of the body from where they began. These nerves detect position a. They travel from the periphery, entering the spinal cord and then moving up to the base of the brain on the same side of the cord as where they started. Upon reaching the brain stem they cross to the opposite side, terminating in the cerebral hemisphere on the opposite side of the body from where they began. A screening evaluation of these pathways can be performed as follows: To do this, break a Q-tip or tongue depressor in half, such that you create a sharp, pointy end. Alternatively, you can use a disposable needle or the sharp and blunt ends of a safety pin. I would discourage the use of the pointy, metal spikes that accompany some reflex hammers. Better to use a disposable implement. Ask the patient to close their eyes so that they are not able to get visual clues. Start at the top of the foot. Orient the patient by informing them that you are going to first touch them with the sharp implement. Then do the same with a non-sharp object e. This clarifies for the patient what you are defining as sharp and dull. Now, touch the lateral aspect of the foot with either the sharp or dull tool, asking them to report their response. If they give accurate responses, do the same on the other foot. The same test can be repeated for the upper extremities i. As such, it contributes to balance. Similar to the Spinothalamic tracts, disorders which affect this system tend to first occur at the most distal aspects of the body. Thus, proprioception is checked first in the feet and then, if abnormal, more proximally e. Ask the patient to close their eyes so that they do not receive any visual cues. With one hand, grasp either side of great toe at the interphalangeal IP joint. Place your other hand on the lateral and medial aspects of the great toe distal to the IP. Orient patient to up and down as follows: Testing Proprioception Alternately deflect the toe up or down without telling the patient in which direction you are moving it. They should be able to correctly identify the movement and direction. Both great toes should be checked in the same fashion. If normal, no further testing need be done in the screening exam. Similar testing can be done on the fingers. Vibratory sensation travels to the brain via the dorsal columns. Thus, the findings generated from testing this system should corroborate those of proprioception see above. Start at the toes with the patient seated. You will need a hz tuning fork. Grasp the tuning fork by the stem and strike the forked ends against the floor, causing it to vibrate. Place the stem on top of the interphalangeal joint of the great toe. Put a few fingers of your other hand on the bottom-side of this joint. Testing vibratory sensation Ask the patient if they can feel the vibration. You should be able to feel the same sensation with your fingers on the bottom side of the joint. The patient should be able to determine when the vibration stops, which will correlate with when you are no longer able to feel it transmitted through the joint. It sometimes takes a while before the fork stops vibrating. If you want to move things along, rub the index finger of the hand holding the fork along the tines, rapidly dampening the vibration. Repeat testing on the other foot. Patients should normally be able to distinguish simultaneous touch with 2 objects which are separated by at least 5mm. These stimuli are carried via the Dorsal Columns. While not checked routinely, it is useful test if a discrete peripheral neruropathy is suspected e. Testing can be done with a paperclip, opened such that the ends are 5mm apart. The patient should be able to correctly identify whether you are touching them with one or both ends simultaneously, along the entire distribution of the specific nerve which is being assessed. Special Testing for Early Diabetic Neuropathy: A careful foot examination should be performed on all patients with symptoms suggestive of sensory neuropathy or at particular risk for this disorder e.

Chapter 8 : A Practical Guide to Clinical Medicine

The neurologic examination is one of the most unique exercises in all of clinical medicine. Whereas the history is the most important element in defining the clinical problem, neurologic examination is performed to localize a lesion in the central nervous system (CNS) or peripheral nervous system (PNS).

Tremor What is done during a neurological exam? The nervous system is very complex and controls many parts of the body. The nervous system consists of the brain, spinal cord, 12 nerves that come from the brain, and the nerves that come from the spinal cord. The circulation to the brain, arising from the arteries in the neck, is also frequently examined. In infants and younger children, a neurological exam includes the measurement of the head circumference. The following is an overview of some of the areas that may be tested and evaluated during a neurological exam: The person will also be observed for clear speech and making sense while talking. Motor function and balance. Balance may be checked by assessing how the person stands and walks or having the patient stand with his or her eyes closed while being gently pushed to one side or the other. This may be done by using different instruments: Newborn and infant reflexes. There are different types of reflexes that may be tested. In newborns and infants, reflexes called infant reflexes or primitive reflexes are evaluated. Each of these reflexes disappears at a certain age as the infant grows. An infant will close his or her eyes in response to bright lights. If the infant is placed on his or her stomach, he or she will make crawling motions. Palmar and plantar grasp. Reflexes in the older child and adult. These are usually examined with the use of a reflex hammer. The reflex hammer is used at different points on the body to test numerous reflexes, which are noted by the movement that the hammer causes. Evaluation of the nerves of the brain. There are 12 main nerves of the brain, called the cranial nerves. During a complete neurological exam, most of these nerves are evaluated to help determine the functioning of the brain: Cranial nerve I olfactory nerve. This is the nerve of smell. The patient may be asked to identify different smells with his or her eyes closed. Cranial nerve II optic nerve. This nerve carries vision to the brain. Cranial nerve III oculomotor. This nerve is responsible for pupil size and certain movements of the eye. Cranial nerve IV trochlear nerve. This nerve also helps with the movement of the eyes. Cranial nerve V trigeminal nerve. This nerve allows for many functions, including the ability to feel the face, inside the mouth, and move the muscles involved with chewing. Cranial nerve VI abducens nerve. This nerve helps with the movement of the eyes. The patient may be asked to follow a light or finger to move the eyes. Cranial nerve VII facial nerve. This nerve is responsible for various functions, including the movement of the face muscle and taste. The patient may be asked to identify different tastes sweet, sour, bitter , asked to smile, move the cheeks, or show the teeth. Cranial nerve VIII acoustic nerve. This nerve is the nerve of hearing. A hearing test may be performed on the patient. Cranial nerve IX glossopharyngeal nerve. This nerve is involved with taste and swallowing. Once again, the patient may be asked to identify different tastes on the back of the tongue. The gag reflex may be tested. Cranial nerve X vagus nerve. This nerve is mainly responsible for the ability to swallow, the gag reflex, some taste, and part of speech. The patient may be asked to swallow and a tongue blade may be used to elicit the gag response. Cranial nerve XI accessory nerve. This nerve is involved in the movement of the shoulders and neck. The patient may be asked to turn his or her head from side to side against mild resistance, or to shrug the shoulders. Cranial nerve XII hypoglossal nerve. The final cranial nerve is mainly responsible for movement of the tongue. The patient may be instructed to stick out his or her tongue and speak. The patient may be asked to walk normally or on a line on the floor. The patient may be instructed to tap his or her fingers or foot quickly or touch something, such as his or her nose with eyes closed.

Chapter 9 : Romberg's test - Wikipedia

A neurological examination is the assessment of sensory neuron and motor responses, especially reflexes, to determine whether the nervous system is impaired. This typically includes a physical examination and a review of the patient's medical history, [1] but not deeper investigation such as neuroimaging.