CHAPTER 1

HISTORY AND EXAMINATION

Introduction

Neurology relies on the fundamental skills of history taking and physical examination. The aim of this section is to help the medical student to learn the basic clinical skills necessary to carry out a neurological history and examination and interpret the findings. Most students find neurology difficult to remember and in particular what to do, how to do it and what it all means. The history is the most important part of neurological evaluation because it is a guide to the underlying disease and also determines which part of the examination needs to be focused on. Indeed many neurological diseases like migraine have symptoms but no abnormal signs. The neurological examination determines abnormal neurological findings and helps to localize the site of the disease (Chapters 2 & 12). The history, examination and localization all together help to determine which disease has occurred at that site. The necessary competence required to carry out these tasks is formed by a combination of knowledge, skills and experience. Neurological knowledge is mostly self learned while clinical skills are taught at the bedside and experience gained over time. The nervous system by its nature is complex but its assessment can be learned with patience, plenty of practice and time.

HISTORY TAKING

Introduction

The history is the most important part of the neurological assessment. The student should aim to be a good listener showing interest and sympathy as the patient's story unfolds. It is important to get the patient's trust and confidence. First introduce yourself to the patient, explain who you are and ask permission to take a history and to carry out an examination. Find out the patient's name, age, address, occupation. Determine handedness by asking which hand do you write with or use more often. Some clinical findings are apparent to the examiner during history taking; these include general state of health and obvious neurological deficits and disabilities. If there is alteration in the level of consciousness or the patient is unable to give a history then it may be necessary to obtain a history and witnessed account from a relative or friend before proceeding directly to neurological examination. The patient's history reveals his personality, intelligence, memory and speech and his body language his attitude and mood. The questions should aim to learn the character, severity, time course and the particular circumstances of each main symptom. The order of history taking is summarized below under

key points. While the history is being taken the level of alertness, mental well being and higher cerebral function becomes apparent to the examiner.

Key points in a neurological history

- age, sex, occupation, handedness
- presenting complaints
- history of presenting complaints
- neurology system review questions
- past history
- family history and social history
- drug history
- gynaecological and obstetrical history

Presenting complaint

Start the formal history by asking the patient to state what the problems are and the reason for hospital admission or referral. This could begin with open questions such as "what is the main problem or "tell me about it from the start". Try to let the patient tell the story of the illness as it has happened without any interruption. Make certain that you understand clearly what the patient is describing by their complaints. Determine the order of the presenting complaints, these should ideally not number more than three or four and be in order of importance. For each complaint determine the main site, character, onset, time course, exacerbating and relieving factors, associated symptoms and previous investigations and treatments.

Key points

- what are the problems
- what is the main problem
- when did it start
- site, character, time course, exacerbating & relieving factors, associated symptoms
- previous investigations and treatments

Time course

The time course of symptoms is essential to understanding the underlying cause. Ask the patient to describe the onset, progress, duration, recovery and frequency of each main complaint. In particular ask if the onset was sudden over seconds or minutes as occurs in stroke or more slowly over weeks or months as occurs in mass lesion e.g. tumour. Describe progress whether it was stationary as in a stroke or worsening as in an infection or intermittent as in epilepsy. If the symptoms are intermittent enquire about their frequency and the interval between them. Ask about precipitating or relieving factors, associated neurological symptoms and any particular circumstances in which the symptoms occur.

Key points

- onset
- progress
- duration
- frequency
- recovery

Systems review

A systematic enquiry may reveal symptoms related to the patient's illness. This may include a general medical review in addition to neurological systems review. Carry out a neurological systems review by asking the patient specific screening questions concerning symptoms

affecting the various levels of higher cerebral and nervous system functioning. Finally ask if there is anything else that the patient would like to tell you.

Neurology systems review key questions

- change in mood, memory, concentration or sleep
- pain, headache, face or limbs
- loss of consciousness or dizzy spells
- loss of vision or double vision
- loss of hearing or balance
- difficulty speaking or swallowing
- weakness or heaviness in limbs
- difficulty walking
- pins and needles or numbness in arms, legs or body
- difficulty with passing urine, bowels and sexual function

Interpretation

As the history unfolds the examiner begins to hypothesize about the meaning of the history and the cause of the disorder. To reinforce this information it may be necessary to rephrase the questions in different ways or ask some direct questions. The main potential sites of disease are the brain, spinal cord, cranial and peripheral nerves, neuromuscular junction and muscles. It is helpful to attempt to anatomically localize the main site of the disease. Defining an anatomical limit to main symptoms is also helpful e.g. the upper limit of a sensory level in paraplegia, or the motor loss on one side in hemiplegia, or the glove and stocking sensory loss in a polyneuropathy. If the amount of time is limited then it is better to spend time on the history and be selective about the examination concentrating it on the main areas of interest.

Past medical history (PMH)

Enquire about past medical illnesses and accidents including hospitalizations and operations, and record their details in the notes. Where relevant ask specifically about a history of infections, seizures, head injuries, birth and childhood development, diabetes, hypertension and stroke. Enquire if there is a past history of neurological episodes similar to the presenting complaint and outline any investigations, their results and treatments received, and any persisting disabilities.

Family history

Document the patient's first degree relatives i.e. parents, siblings and children including their ages, sex and health. Enquire if there is anyone else in the family with the same illness, if so record the full family tree with their names and ages and indicating any affected family members and any deaths and their causes if known.

Personal & social history

Ask concerning occupation, employment, travel, alcohol intake in number of units per week and smoking in pack years (packs per day times years smoked); if relevant ask concerning the use of recreational drugs. Enquire how the current illness has affected work and social life including time lost from work over the last 6 months. Have a neurological patient describe the home environment, caregivers, community and financial circumstances if relevant.

Drugs, allergies

List the medications the patient is taking including names, duration and dosages. Describe any problems with medications and known allergies.

Menses

Record whether menses are normal and if the patient is pregnant or on the pill.

Key points

- allow the patient time to tell the story of their illness
- listen to the patient
- if patient is unable to give a history obtain it from family or friends
- ask if there "is anything else you wish to tell me"
- history determines the site of interest for neurological examination

General examination

The neurological examination must be performed in the context of a general physical examination. This includes recording the vital signs and examination of the cardiovascular system including listening for carotid bruits, and the respiratory, abdominal, and musculoskeletal systems.

NEUROLOGICAL EXAMINATION

Neurological examination is often considered by the student to be the most difficult part of neurological evaluation. This arises mainly because of technique and uncertainty over what is normal or abnormal. The best way to overcome this is to spend time early on learning the basic neurologic skills and then to practise on colleagues and patients until confident. The main aim is to become familiar with the routine of neurological examination and range of normal findings. The student will then gradually be introduced to abnormal findings in patients with neurological disorders and to what are termed neurological signs. In general, neurological signs are objective, reproducible and cannot be altered by the patient whereas less reliable findings tend to be variable, subjective and less reproducible. The neurological examination may involve an assessment of the level of consciousness, cognitive and mental function, cranial nerves, limbs and gait. Details concerning the clinical examination of level of consciousness and cognitive function are at the end of this chapter. In summary it is wise to listen attentively to the patient's complaints, stick to the routine of a basic neurological examination and to concentrate the neurological exam on the problem area highlighted by the history.

General observations

Observe the patient's general appearance, for any obvious neurological deficit and level of consciousness. The patient's level of consciousness, alertness, higher cerebral function, mental state and ability to give a history become apparent during the history taking. Neurological disorders affecting speech, posture, movement and gait may also become apparent at this stage.

CRANIAL NERVE EXAMINATION

These are tested with the patient in the sitting position.

Olfactory nerve (cranial nerve 1)

The olfactory nerve is responsible for smell. In a routine neurological examination it is sufficient to ask the patient if there is any loss of smell (anosmia). If anosmia is suspected then it should be tested at the bedside. This can be done by simply asking the patient to identify up to four familiar bedside items: e.g. orange peel, cloves, coffee, and soap. Before the test the nasal airway

should be shown to be clear by getting the patient to sniff. Explain to the patient to close both eyes and block off one nostril by applying pressure with a finger. In the manner shown in the diagram the item to be identified is then presented to the other open nostril and the patient tries to identify the smell and its source. The procedure is then repeated for each item and on the other side. Patients may only become aware of the loss of smell whilst eating when the perception is often a loss of taste. The most common cause of loss of smell is local disease in the nose or sinuses e.g. head cold, hay fever and smoking.

Figure 1.1 Testing smell

Optic nerve (cranial nerve 2)

Visual acuity

Ask if the patient has any difficulty seeing. Visual acuity (VA) is tested and measured routinely by using a Snellen chart. The patient should stand 6 metres away from the chart and correct for any known refractive error by wearing appropriate glasses. Ask the patient to cover each eye in turn with his hand and find the smallest line that he can read fully without difficulty. VA is expressed as the distance between the chart and the patient over the smallest line completely visible to the patient. The numbers on the chart (below the line) correspond to the distance at which a person with normal vision should be able to see and identify the appropriate line. Below the age of 40 years most should see 6/6 or better. If 6/6 is normal and 36 represents the line that the patient can comfortably read at 6 metres with both eyes then visual acuity for that patient should be recorded as 6/36 in the right (VAR) and left eye (VAL). If VA is 6/60 or less then you can assess the patient's ability to see at 1 meter distance by counting fingers (CF), VA = CF, or seeing hand movements (HM), VA = HM or perceiving light (PL) VA = PL, if unable to perceive light then the patient is blind (NPL). At the bedside setting crude levels of visual acuity can be established by using a small hand held chart e.g. Jaeger chart or by using ordinary newspaper print. Colour vision is not tested routinely, however it can be tested by a using a book of Ishihara plates where at least 15/17 coloured plates identified correctly is considered normal. The most common causes of decreased visual acuity are optical problems, mainly refractive errors in lens, followed by cataracts and lastly diseases involving the retina, macula and optic nerve.

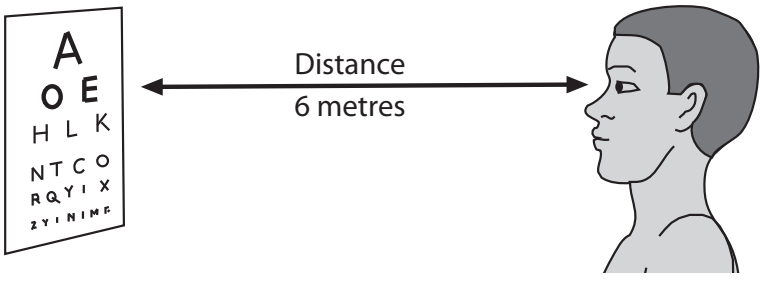

Figure 1.2 Testing visual acuity

Key points

- VA is measured standing 6 metres from a Snellen chart
- VA is distance between patient and chart over the smallest line identified correctly
- VA can be tested at bedside using a small hand held chart or newspaper
- most common causes of decreased VA are refractive errors and cataracts

Visual fields

The organization of the visual pathways means that the pattern of visual field loss varies at different sites along its way. This means that testing for the pattern of visual field loss is useful for localization of lesions along the visual pathway. Visual fields are always described and recorded from the perspective of the patient looking outwards with the fields divided into nasal and temporal halves. At the bedside visual fields are examined by confrontation. The main patterns of loss are homonymous & bitemporal hemianopia, & monocular blindness.

Confrontation

This involves sitting about 1 meter in front of the patient with your eyes at the same horizontal level. Ask the patient to look with both eyes at your eyes (the bridge of your nose). Hold your hands upright halfway between you and the patient held approximately half a meter apart and at about 30 cm above the horizontal. While looking at the patient's eyes first move the index finger tip of one hand (or a 5-7 mm red pin head) and ask the patient to correctly identify which finger moved. The patient should immediately point or indicate the hand on which the finger moved. Do the same with the other hand. Repeat the manoeuvre with the hands held about 30 cm below the horizontal. To examine the visual fields in each eye separately, ask the patient to cover one eye e.g. patient's right eye and the examiner covers the eye opposite, in this case his own left eye. Ask the patient to focus on your uncovered eye. Move your index finger in each of the four quadrants starting in the temporal field followed by the nasal field in same manner as you did on confrontation for both eyes. Repeat for the other eye. Remember that the nose and prominent eyebrows may partially block vision and mistakenly give a field deficit.

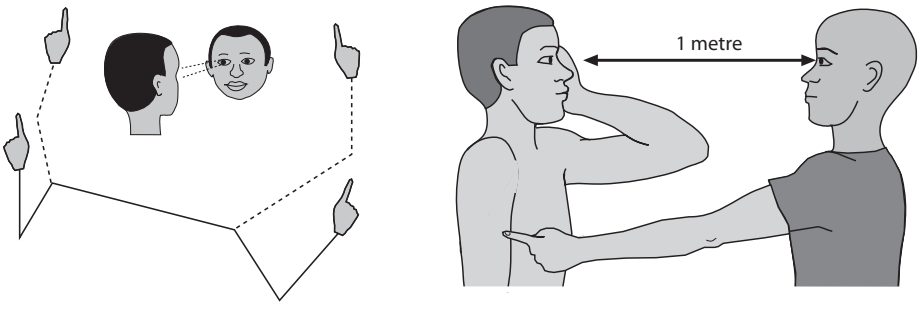

Figure 1.3 Examining visual fields. Testing for visual defects by confrontation.

Field perimetry

Field perimetry can be tested in the same manner using a moving finger tip or a white pin head 5-7 mm target. Start behind the patient's visual field coming forward diagonally in a convex plane from all four quadrants at a 45 degree angle, northeast to southwest and northwest

to southeast and the same in reverse asking the patient to indicate as soon as he sees the movement. This establishes the posterior limit of the patient's visual field. The blind spot (optic nerve head) and any central field defects can be easily identified using red pin head moving in the horizontal plane from outside.

Key points

- patients are often unaware of loss of visual fields
- major visual field loss is identified by confrontation
- peripheral visual fields are tested by perimetry examination
- main patterns of loss are homonymous & bitemporal hemianopia & monocular blindness

Ocular fundi

Ocular fundi are tested by fundoscopy. The aim of fundoscopy is to inspect the optic nerve head, arterioles, veins and retina. This is an important part of the neurological examination and is used mainly to exclude papilloedema or swelling of the optic nerve. The main cause of papilloedema in Africa is raised intracranial pressure secondary to CNS infections and mass lesions. Swelling of the optic disc may also be caused by inflammation of the optic nerve and this is called papillitis. The main cause of papillitis is optic neuritis.

How to use an ophthalmoscope

Students and young doctors at first find fundoscopy difficult but the skill comes with training and practice. The most important thing to understand is the position of the optic nerve head within the field of vision you are testing. The optic nerve head lays 15-20 degrees lateral to the point of fixation of the patient's eyes and slightly below the horizontal and corresponds to the blind spot.

The following instructions should be helpful. The patient should fix his gaze straight ahead. Check the focus on the ophthalmoscope is set at zero and the light is bright, then sit opposite the patient and examine the right eye. With the ophthalmoscope in the right hand approach from the patient's right side, look at the patient's right eye from 30 cm away with the ophthalmoscope level or slightly below the patient's eye about 15-20 degrees outside or lateral to the patient's line of fixation or direction of gaze. Aim at the centre of the back of head and keep out of the line of sight of the other eye. You should be able to see the pupil as pink in colour; this is the normal retinal or red reflex. Gradually move in towards the eye, encourage patient to continue to look or fixate at a point behind you straight ahead and bring ophthalmoscope to within 1-2 cm of the patient's right eye. It's important to keep patient's eye, point of fixation and ophthalmoscope all on the same plane. Adjust the lens for focus so that you can see the blood vessels clearly and follow blood vessels as they get larger and converge on the disc. Look at the optic disc, blood vessels, retinal background and repeat for the other eye.

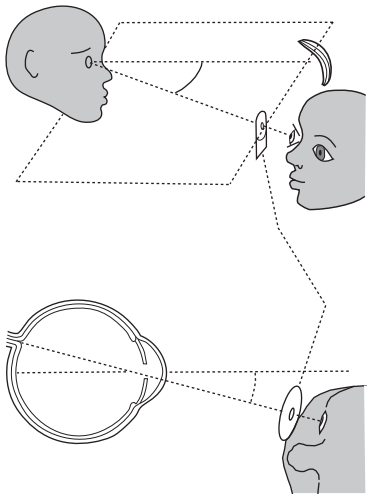

Figure 1.4 Fundoscopy

What you find

The normal disc is circular and pale pink in colour, the edge of the disc is clear although not as well demarcated on the nasal side as the temporal side (Chapter 12). The temporal half of the disc is normally paler than the nasal half. The physiological optic cup from which the blood vessels emerge is a well defined depression in the centre of the nerve head. It is pale and occupies about 40-50% of size of the optic disc. The rest of the fundus has an even red background because of blood in the choroid layer. The retina may be darkly pigmented depending on racial background. The macula with a central darker area called fovea lies about one and a half disc spaces from the disc on its temporal side and is free of blood vessels. It can easily be found by asking the patient to look directly at the light of the ophthalmoscope. The arterioles are normally two thirds the sizes of veins and appear a brighter shade of red than veins. The veins on the disc appear to pulsate in 70-80% of normal people in the sitting position, and the absence of pulsation may be an early sign of papilloedema. In papilloedema the whole disc is usually pink red and the veins become distended and lose their pulsation. The optic cup is lost and the edge of the disc and the vessels emerging may appear elevated. Later the whole disc itself becomes indistinct and blurred especially on the nasal side which is normally less distinct and haemorrhages and exudates may be seen on or near its margins and vessels disappearing without an obvious optic disc (Chapter 12). In chronic papilloedema the disc becomes pale as occurs in optic atrophy.

Key points

- approach patient's right eye at same eye level from 30 cm out & 15-20 degrees laterally
- identify red reflex and follow beam of light into eye looking for a normal pale pink disc
- main sign of papilloedema is swelling of the optic disc with blurring of the disc margins
- main sign of optic atrophy is a pale white optic disc
- practise on colleagues and patients with normal eyes

Pupillary reactions

These are examined after the optic nerve and before eye movements. The normal pupillary reactions include the light reflex, the accommodation reflex and the consensual reflex.

Assessing the pupils

Inspect the pupils at rest for size and shape and whether they are equal, central and circular and react to light. It's not always easy to assess pupillary size in a darkened room or in patients with a darkened iris. A difference in pupil size is called anisocoria. It helps to inspect the pupils at rest by shining a torch on the bridge of the patient's nose allowing light to scatter but not affecting the pupils.

Figure 1.5 Testing the light reflex

The light reflex

To test the pupillary light reflex, ask the patient to look in the distance and not into direct light. It may help to block off the other eye in the manner shown in the diagram**.**

Then bring a bright light in from behind or from the side into the patient's field of vision and observe the eye for direct or ipsilateral pupillary constriction. This is called the direct light reflex. Then repeat this again in the same eye now looking for the same response in the other eye. This is called *the consensual reflex.* Check for the same reflexes in the other eye.

The accommodation reflex

The accommodation reflex has two components and is much less clinically important than the light reflex. To test this reflex ask the patient to look in the distance and then at the examiner's finger held 10 cm in front of the patient's nose. As the gaze is shifted from a distant to near object the eyes adduct and pupils constrict. The first component is convergence which requires adduction of both eyes at the same time. The other component involves bilateral simultaneous constriction of the pupils; this combined with adduction is the normal accommodation reflex.

Pupillary disorders

Large and small pupils which react to light and accommodation can occur normally in young and old persons respectively. Pupillary disorders are generally categorized as those resulting in large dilated non or slowly reacting pupils and those resulting in small constricted reacting or non reacting pupils. The main causes of these are to be found in disorders affecting the optic nerve and the iris and its autonomic parasympathetic and sympathetic nerve supply.

Key points

- inspect pupils for size, shape and whether they are equal or not
- **light reflex:** shine a bright light into the eye and watch for pupillary constriction
- **consensual reflex:** inspect the other eye at the same time for pupillary constriction
- **accommodation reflex**: watch eyes adduct & pupils constrict as gaze is shifted to a near object

Oculomotor, Trochlear and Abducens (cranial nerves 3, 4 & 6)

Eye movements

The 3rd 4th and 6th cranial nerves are tested together by examining eye movements. Eye movements are generated in two main ways each of which should be tested separately. Firstly voluntary movements are generated from the frontal lobe; they are also called saccadic because of the rapid jumping movement from one point of fixation to another. These are tested by asking the patient to look rapidly from one side to the other or right and left and are impaired in cortical brain disease. Secondly and more important clinically are pursuit eye or tracking movements which are generated from the occipital lobe when the eyes stay on and follow the point of fixation. These are tested by asking the patient to follow the examiner's moving finger and are impaired in brain stem and cranial nerve disorders. Lastly the cerebellum also plays a main role in controlling eye movements in response to body movements in order to keep the point of fixation. All eye movements are integrated in the brain stem so that the eyes can move together conjugately in all directions. Eye movement abnormalities are usually noted because the patient complains of double vision or diplopia and because the eyes appear to the observer be looking in different directions. When this happens it is called a squint or strabismus. The

main causes of diplopia are disorders affecting the function of the 3rd 4th and 6th cranial nerves. The main sites for these disorders are eye muscles, the neuromuscular junction, or the individual nerves and their central connections in the brain stem. The most common causes are vascular and inflammatory disorders affecting the individual nerves and neuromuscular junction respectively.

Testing for pursuit eye movements

Pursuit eye movements are routinely examined during the neurological examination. The examiner tests for horizontal and vertical eye movements by instructing the patient "to follow my finger with your eyes" whilst keeping the patient's head steady. The examiner holds a finger about half a meter away from the patient's face and makes horizontal and vertical movements in the shape of a cross sign being careful not to move the hand too rapidly. The movement is carried out with the index finger held vertically moving horizontally 30-45 degrees right and left from mid point and then repeated in the same way moving vertically with the finger held horizontally. The trochlear nerve is tested by repeating the same movements but this time in the shape of H sign. This should be carried out in each eye field separately to confirm any weakness. Any loss or impairment of normal eye movement or jerkiness (nystagmus) should be noted.

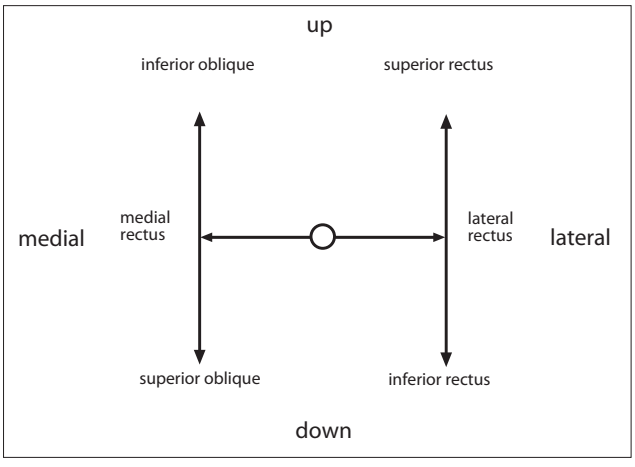

Figure 1.6 Testing eye movements

Nystagmus

Nystagmus is an involuntary rhythmic oscillatory movement of the eyes. Nystagmus is usually asymptomatic. To test for nystagmus ask the patient to follow the examiner's fingers using the same method as when testing for normal eye movements. Nystagmus should be examined in three main positions, at rest, looking right and left horizontally and looking up and down vertically. Be careful not to move the eyes too quickly or too far laterally (not beyond 30 degrees from midline) and note the presence of any nystagmus. Nystagmus is only considered pathological when it is sustained. The characteristics of nystagmus help to localize the site of neurological disease. The main causes of nystagmus are disorders affecting the vestibular system and its central connections, the brain stem, cerebellum and the eye including early onset blindness. It can also rarely be congenital, and then is pendular and multidirectional.