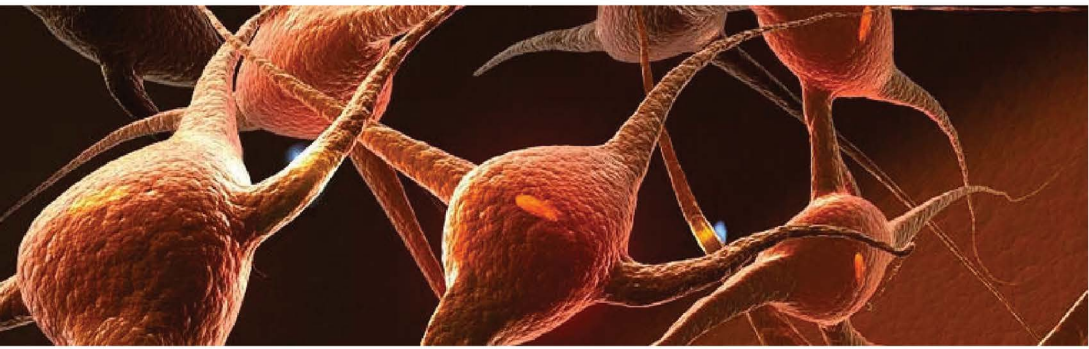

NEUROLOGICAL EXAMINATION FOR PHYSIOTHERAPISTS

Chaitali Shah

Foreword
Nilima Patel

JAYPEE

Contents

2 Speech

BACKGROUND

Language: All modes of expression (spoken speech, gestures).

Abnormality of speech needs to be considered first as this may interfere with history taking and subsequent ability to assess the higher function and perform rest of the examination.

Preliminary Information

Physiotherapist should first know the patient's nationality, native language and educational level, his previous ability to read, write, spell and calculate his handedness.

Therapist must find if there is any mental deterioration, hemianopia or hemiparesis, which might confuse the tests.

Abnormality of speech can reflect abnormalities anywhere along the following chain.

Process	*Abnormality*
Hearing	Deafness
Understanding thoughts and word findings	Aphasia
Voice production	Dysphonia
Articulation	Dysarthria

APHASIA

- All disorders of understanding thoughts and word findings.
- Aphasia means absence of speech.

Types of Aphasia

- *Broca's/expressive/motor aphasia*:
  - Speech is nonfluent
  - Preserved comprehension

  - Poor repetition
  - Poor naming ability
  - Distinct breakdown of correct syntax (grammar)
  - Repeated and incorrect use of words.

Usual cause: An infarct in territory of anterior part of left middle cerebral artery.

- *Wernicke's/receptive/sensory aphasia*:
  - Comprehension affected
  - Repetition impaired
  - Poor naming
  - Patient fails to produce correct words or syntax

Usual cause: Posterior left middle cerebral artery infarction with damage to posterior third of superior temporal gyrus.

- *Conductive aphasia*:
  - Loss of repetition
  - Preserved comprehension and output
  - Grammatical confrontation defective
- *Transcortical sensory aphasia*:
  - As in Wernicke's aphasia but preserved repetition
  - Poor comprehension
  - Fluent but meaningless speech
  - Preserved repetition
- *Transcortical motor aphasia*:
  - As in Broca's aphasia but preserved repetition
  - Preserved comprehension
  - Nonfluent speech
  - Preserved repetition
- *Global aphasia*:
  - Lesion affecting both Broca's and Wernicke's area
  - Nonfluent, mute
  - Impaired repetition
  - Automatic emotional speech intact
- *Nominal aphasia*:
  - Lesion in angular gyrus
  - Fluent spontaneous speech
  - Normal verbal output
  - Normal auditory comprehension
  - Impaired naming
  - Normal reading
  - Normal writing

Assessment of Aphasia

Spontaneous Speech

Most information is gained from just listening to the patient.

Let the patient try to tell his story without his relative interrupting.

Is the speech fluent or nonfluent? Listen carefully to construction of each word and sentence. Are they correct? Is he making sense?

Is he using wrong words or words which are nearly normal but not exactly right (paraphasia)? Is he repatriating same words after having once used them (preservation)?

Same time, the examiner has to find if he understands the question, ask to him and the instruction given during course of the examination.

- *Observe grammar*:
  - *Telegraphic*: Unable to produce grammatically correct sentences but able to convey thoughts and ideas well.
  - *Jargon*: Able to construct sentences but unable to convey thoughts and ideas meaningfully.
  - *Paraphasia*: Use of wrong words.
  - *Neologism*: Use of nonexistent words.
- *Observe prosody (emotional component of speech)*:
  - *Normal prosody*: Quality of speech, rate of speech, length of phrases, pauses in between.
  - *Dysprosodic speech*: Prosodic excess or prosodic insufficiency.

Comprehension

[*Note*: Patients reaction and answer to ordinary conversation are normal and appropriate. Exception of some patients with conductive aphasia most severely affected patients should be able to answer questions designed to require an answer yes or no. for example, it is true that it is raining outside?]

Give series of verbal command and observe for comprehension.

Naming Object

Patient is asked about names of common objects such as watch, comb, key, pen, pencil. Then go to component part of object such as strap, buckle and second hand of watch. If he fails to give a name, can he choose right one from a list?

Repetition

Ability to repeat word or phrases is important. Ask patient to repeat complex phrase and if fails simpler phrases or even single words.

Reading

Assess patient's normal capacity in relation to age, education and visual acuity. Give individual word to read out first then sentences, then longer passages and finally instruction to perform certain action. This will link motor and sensory side.

Writing

Dysphasia is disorder of language, not just speech. Patient may be able to write his name and address but not construct linguistic correct sentences.

Calculation

Ask patient to perform simple sums. Start simply by easy addition, subtractions.

DYSARTHRIA

- Voice production requires coordination of breathing, vocal cords, larynx, palate, tongue and lips. Dysarthria can reflect difficulty at different levels.
- Lesion of upper motor neuron type, of extra-pyramidal system and cerebellar lesion disturb the integration process of speech production and tend to disturb rhythm of speech.
- Lesion of one or several of cranial nerves tend to produce characteristic distortion of certain parts of speech but the rhythm is normal.

Types of Dysarthria

- *Spastic dysarthria*:
  - Caused by bilateral upper motor neuron disease
  - The tongue is small and spastic
  - The speech is slurred
  - Excursion of mouth limited

  - The letter p, b, d and t suffer particularly
  - The impression is that patient is trying to talk from back of mouth
  - Jaw jerk exaggerated
  - *Phonation*: Strained voice tremor
  - *Prosody*: Excess or insufficient
  - *Nasality*: Hypo or hyper
  - *Loudness*: Harsh or monotonus
  - *Rate*: Slow.
    - *Common causes*
      - Pseudo-bulbar palsy
      - Motor neuron disease
      - Upper brainstem tumor
- *Rigid dysarthria*:
  - Caused by lesion of extra-pyramidal system producing rigidity of face or tongue muscle without wasting and exaggeration of reflexes
  - Speech is monotonous
  - Excursion of tongue and lips are greatly reduced
  - In severe case the phenomenon of palilalia, i.e. repetition of a particular syllable, may be heard.
    - *Common cause:* Parkinsonism
- *Ataxic dysarthria*:
  - Incoordination of muscle of speech including respiratory muscle
  - Speech is irregular, slurred and drunken
  - Sometimes too loud or too soft
  - Words run into each other
    - *Common causes*
      - Multiple sclerosis
      - Cerebellar disease or tumors
      - Hereditary ataxia
      - Chorea
      - Anticonvulsant and other drug toxicity

Dysarthria due to Lesion of Lower Motor Neuron or Muscle

Speech well preserved, but individual words and sounds cause difficulty, the distribution and extent of muscle weakness governing the particular variety of defect produced.

- Facial paralysis causes difficulty with labials such as p, b, m, and w.
- Tongue paralysis affects a large number of sounds, particularly those involving the letters l, d, n, s, t, x, z and speech is distorted.
- Palatal paralysis produces nasal speech. B and d become m, n and g become rh and k sounds like ng. The patient's speech being worse when the head is bent forward.

Myasthenic Dysarthria

- Voice may be normal at beginning of each sentence but abnormality develops as sentence progresses.
- Hoarseness of voice due to palatal weakness.
- After few minutes of rest voice will become normal.
- The abnormality temporarily cures by injection of neostigmine or edrophonium chloride.

Dysarthria in Dysphasic States

A combination of dysphasia and dysarthria may accompany internal carotid artery thrombosis or other vessels of the neck are diseased as well.

Dysphasia occurs due to lesion of dominant hemisphere, whereas dysarthria occur due to any site.

Examination

- Listen to clarity of patient's enunciation during history taking.
- Ask patient to repeat certain phrases. Many tongue twisters are used. Start with easy words.
- Ask person to read a paragraph from a simple book.
- Ask patient to count successively to 30 or above to test for muscle fatigue.

Listen to the words, heather they slur into one another whether the rhythm is jerky, explosive, monotonous whether speech is too loud or too soft whether particular letters present particular difficulty, and which they are, whether there is a nasal tone to speech, whether the disturbance is constant throughout, variable or increasing towards end of each sentence or on prolong continuing.

DYSPHONIA

This is disturbance of voice production and may reflect either local vocal cord pathology, an abnormality of nerve supply via the vagus, or occasionally a psychological disturbance.

Examination

If the patient is able to give his name and address but unable to produce normal volume of sound or speaks in whisper, this is dysphonia.

- Ask patient to cough and listen quality of cough.
- Ask patient to say a sustained e..e..e does it fatigue?

Findings

- *Normal cough*: Motor supply to vocal cord is intact.
- *Dysphonia with normal cough*: Local laryngeal problem or hysteria.
- *Cough lacks explosive start-bovine cough*: Vocal cord palsy.
- *The note cannot be sustained and fatigues*: Consider myasthenia.

METHOD OF DIFFERENTIATION

- Patient is conscious but making no attempt to speak or make sound, this is mutism.
- If the patient though speaking fails to produce any volume of sound or merely whispers, this is aphonia due to disorder of larynx or vocal cord.
- If volume of sound and content of speech is normal but articulation and enunciation of individual word and phrase is distorted this is dysarthria.
- If patient is failing to put into properly constructed words or phrases the thoughts he wishes to express even if articulation is adequate this is dysarthria.

Disorder of Speech

- *Lesion in central mechanism*:
  - *Slurred speech*: Diffuse cerebral speech.
  - *Scanning speech*: Cerebellar disease.

  - *Staccato speech*: Cerebellar disease.
  - *Monotonus speech*: Parkinsonism.
  - *Hiccup speech*: Chorea, myoclonus.
  - In multiple sclerosis speech is ataxic there are explosive and staccato elements with slowness, stumbling, slurring and cerebellar type of speech ataxia.
  - In Friedrich's ataxia the ataxic, staccato and explosive elements predominates. Speech is clumsy often scanning and pitch may suddenly change in the middle of sentence.
- *Lesion in peripheral mechanism*:
  - *Palatal*: Nasal speech as with a bad cold.
  - *Tongue*: Distorted speech specially letters t, s, and d.
  - *Facial*: Difficulty with b, p, m, w.
  - *Dysphonia*: Disorder of function of larynx in which phonation is low even though articulation is preserved.
  - Ask patient to cough listen quality of cough.
  - Ask patient to say sustain e..e..e. Does it fatigue?
  - *Dysarthria*: Symbolic formulation of word is normal, phonation is preserved. Lesion in cranial nerve related to articulation or in its central regulation of nerve leads to interference with clear enunciation.

Neurological Examination
For Physiotherapists

Salient Features

- Presents the subject matter in self-explanatory manner with diagrams and tables at appropriate places to enable the effective understanding among students
- Discusses every topic with adequate content
- Provides a firm foundation in understanding and remembering the techniques of neurological examination
- Covers case-wise assessment of common neurological conditions treated
- Includes common scales used for neurological examination
- Encloses disease-specific scales
- Helpful for physiotherapy students and practitioners.

Chaitali Shah is the Incharge Principal, Parul Institute of Physiotherapy, Parul University, Vadodara, Gujarat, India. She has been teaching subjects such as electrotherapy, physical and functional diagnosis, physiotherapy in neurological and psychosomatic conditions since more than 7 years. She has also extended her duties as a postgraduate guide for the Specialization Master of Physiotherapy in Neurological Disorders and Psychosomatic Conditions. She has vast experience of teaching undergraduate and postgraduate students.

Besides this book, she has published a number of papers in various scientific journals. She has been honored with best teacher award (2013). She is an active member of Board of Studies, Faculty of Physiotherapy, Parul University. She has attended many national and international conferences also. She is an effective communicator with excellent relationship, management skills and strong analytical, leadership, decision-making, problem-solving and organizational abilities.

Available at all medical bookstores
or buy online at www.jaypeebrothers.com

JAYPEE BROTHERS
Medical Publishers (P) Ltd.
www.jaypeebrothers.com

Join us on facebook.com/JaypeeMedicalPublishers

Shelving Recommendation
PHYSIOTHERAPY