JHARKHAND RAI UNIVERSITY

RANCHI

LAB MANUAL

PHYSIOTHERAPY IN NEUROLOGICAL CONDITIONS I

(23A702P)

BPT VII

Physiotherapy in Neurological conditions-I (23A702P)

Practical 1

Aim:
To systematically evaluate the neurological, sensory, motor, and functional status of the patient using both subjective and objective assessment tools.

Theory

Neurological physiotherapy is a specialized domain focused on the assessment and rehabilitation of individuals with movement and functional impairments arising from disorders of the nervous system. These conditions may include, but are not limited to, stroke, traumatic brain injury, spinal cord injury, multiple sclerosis, Parkinson's disease, cerebral palsy, and peripheral neuropathies. The primary aim of neurological assessment is to systematically identify physical impairments, activity limitations, and participation restrictions in order to formulate an evidence-based and patient-centered treatment plan.

A comprehensive evaluation involves both subjective (patient-reported) and objective (clinician-observed) components, enabling a holistic understanding of the patient's condition. The subjective assessment gathers critical background information, such as medical history, lifestyle, presenting complaints, and personal goals. The objective examination focuses on detailed analysis of the central and peripheral nervous systems through a range of clinical tools and observations.

The assessment covers several key domains:

1. Higher Mental Functions
   Cognitive evaluation—including memory, attention, orientation, language, and perception—is essential to determine the patient's mental status and capacity for active participation in therapy.
2. Cranial Nerve Examination
   Testing of the twelve cranial nerves provides valuable information regarding brainstem and cortical integrity, influencing functions such as vision, hearing, swallowing, and facial motor control.
3. Sensory and Motor Function
   A detailed sensory assessment evaluates superficial, deep, and cortical sensations, while motor examination assesses muscle tone, strength, voluntary control, and coordination. These findings help map neurological deficits and guide therapeutic interventions.

4. Reflex Testing

   Evaluation of superficial, deep tendon, and pathological reflexes aids in differentiating upper and lower motor neuron lesions and determining the level of neurological involvement.
5. Functional Assessment

   Tools such as the Functional Independence Measure (FIM) are employed to assess the patient's ability to perform activities of daily living (ADLs). These standardized measures provide objective data to track progress and define rehabilitation goals.
6. Gait and Balance Evaluation

   Gait analysis and postural assessments are critical for identifying neuromuscular or biomechanical abnormalities and for evaluating fall risk and ambulatory capacity.
7. Hand Function Evaluation

   Detailed assessment of reaching, grasping, and fine motor control is essential, especially in patients with upper limb involvement, to restore functional independence.

The results of this comprehensive evaluation inform the formulation of short-term and long- term goals, facilitating the development of an individualized, goal-driven rehabilitation program. Periodic reassessments allow for monitoring progress, modifying treatment strategies, and ensuring optimal recovery and functional outcomes.

Assessment

I. SUBJECTIVE ASSESSMENT

- Name:
- Age:
- Gender: **M / F**
- IP/OP:
- Occupation:
- Handedness: **R / L**
- Referred by:
- Address:

Chief Complaints:

Past Medical History: Personal History: Family History: Socioeconomic History:

History of Present Illness:

- Side:
- Site:
- Onset:
- Duration:
- Type:
- Severity:
- Aggravating Factors:
- Relieving Factors: Vital Signs:

- Temperature:
- Heart Rate:
- Blood Pressure:
- Respiratory Rate:

II. OBJECTIVE EXAMINATION

a) **Observation**

- Attitude of Limbs
- Built
- Posture
- Gait
- Pattern of Movement
- Mode of Ventilation
- Type/Pattern of Respiration
- Edema
- Muscle Wasting
- Pressure Sores
- Deformity
- Wounds
- External Appliances

b) **Palpation**

- Warmth
- Tenderness
- Tone
- Swelling

c) **Examination**

➢ Higher mental functions

- Level of Consciousness
- Orientation: Person / Place / Time
- Memory: Immediate / Recent / Remote / Verbal / Visual
- Communication
- Cognition
- Fund of Knowledge
- Calculation
- Proverb Interpretation
- Attention
- Emotional Status
- Perception
- Body Scheme / Imaging
- Agnosias / Apraxias

➢ Cranial nerves

Nerve	**Comments**	**Nerve**	**Comments**
I - Olfactory		VII - Facial	
II - Optic		VIII - VestibuloCochlear	
III - Oculomotor		IX - Glossopharyngeal	
IV - Trochlear		X - Vagus	
V - Trigeminal		XI - Accessory	
VI - Abducens		XII - Hypoglossal	

- Sensory system

Sensation	**Upper Extremity**	**Lower Extremity**	**Trunk**
	Rt. / Lt.	Rt. / Lt.	Rt. / Lt.
Superficial Pain			
Temperature			

Sensation	**Upper Extremity**	**Lower Extremity**	**Trunk**
Touch			
Pressure			
Movement Sense			
Position Sense			
Vibration			
Tactile Localization			
Two-point discrimination			
Stereognosis			
Barognosis			
Graphesthesia			
Texture Recognition			
Double Simultaneous Stimulation			

- Motor system

Muscle Girth (cm)

Area	**Rt.**	**Lt.**
Arm		
Forearm		
Thigh		
Calf		

- Voluntary Control

Side	Upper Limb	Lower Limb
Rt.		
Lt.		

- Range of Motion

Joint	Side	Movement	Limitation	Limiting Factor
Shoulder				
Elbow				
Forearm				
Wrist				
Hand/Fingers				
Hip				
Knee				
Ankle/Foot				
Cervical Spine				
Thoracic Spine				
Lumbar Spine				

- Limb Length (cm)

Side	True	Apparent
Rt.		
Lt.		

- Muscle Tone / Muscle Power

- Include groups from Upper Limb, Lower Limb, and Trunk with grading for each muscle group as shown earlier.

- Reflexes

Reflex	Left	Right
Superficial Abdominal		
Plantar		
Biceps		
Brachioradialis		
Triceps		
Knee		
Ankle		

Pathological Reflexes

Coordination Tests

- Non-equilibrium Tests: Finger to nose, Finger opposition, Mass grasp, Pronation/Supination, Rebound test, Tapping (hand/foot), Heel to knee, Drawing a circle (hand/foot)
- Equilibrium Tests: Tandem walk, Standing with eyes closed, one leg standing, Trunk lateral flexion, etc.

- Balance and Posture

- Sitting / Standing balance
- Balance reactions
- Posture in different positions

- Gait Parameters

- Step length, Stride length, Base width, Cadence

- Biomechanical deviations

➢ Hand Functions

- Reaching
- Grasping
- Releasing

➢ Assistive Devices

III. FUNCTIONAL ASSESSMENT: FIM (Functional Independence Measure)

Self-care

1. Feeding
2. Grooming
3. Bathing
4. Dressing - Upper Body
5. Dressing - Lower Body

Sphincter Control

6. Bowel
7. Bladder

Mobility

8. Bed to chair transfer
9. Toilet transfer
10. Tub/Shower transfer

Locomotion

11. Walk/Wheelchair
12. Stairs

Communication

13. Comprehension
14. Expression

Social Cognition

15. Social Interaction

16. Problem Solving
17. Memory

Investigation Findings:

Problem List:

Functional Diagnosis:

IV. MANAGEMENT

Goals:

Short-Term:
Long-Term:

Treatment Plan:

Conclusion

Following a comprehensive neurological physiotherapy evaluation, the patient's impairments, functional limitations, and participation restrictions have been identified. The findings provide a clinical basis for developing targeted short-term and long-term goals and implementing a tailored rehabilitation program.

Practical 2

Aim:

To understand and apply Rood's neurophysiological approach for facilitating or inhibiting motor responses in individuals with central nervous system (CNS) dysfunctions, thereby enhancing motor control and functional abilities.

Materials Required

- Ice cubes or cold packs
- Soft blankets
- Vibratory tools (e.g., handheld massagers)
- Water bottles
- Therapy couch or mat
- Pillows
- Battery-operated brushes
- Cotton swabs

Theory

Rood's approach, developed by Margaret Rood in the 1940s, is a sensorimotor technique based on the premise that appropriate sensory stimulation can elicit desired motor responses. It emphasizes the use of controlled sensory inputs to either facilitate or inhibit motor activity, aiding in the normalization of muscle tone and the development of purposeful movement patterns.

Key Principles:

1. Normalization of Muscle Tone: Utilizing sensory stimuli to adjust muscle tone to optimal levels for function.
2. Ontogenic Developmental Sequence: Following the natural progression of motor development from reflexive movements to voluntary control.
3. Purposeful Movement: Encouraging movements that are goal-directed and meaningful to the individual.

4. Repetition: Reinforcing motor patterns through repeated practice to enhance motor learning.

Physiotherapy Technique

Facilitatory Techniques (Used to enhance muscle activation in hypotonic or flaccid muscles)

1. Tapping: Rhythmic tapping over the muscle belly to stimulate contraction.
2. Fast Brushing: Applying quick strokes with a battery-operated brush over the skin corresponding to the target muscle's dermatome for approximately 30 seconds.
3. Quick Icing: Applying ice in quick swipes over the target muscle area, followed by immediate drying to stimulate muscle activity.
4. Vibration: Using a vibratory tool over the muscle belly to facilitate contraction.
5. Joint Compression: Applying quick compressive forces through the long axis of the limb to activate joint receptors and facilitate muscle co-contraction.

Inhibitory Techniques (Used to reduce excessive muscle tone or spasticity)

1. Slow Stroking: Gentle, rhythmic stroking over the muscle belly to promote relaxation.
2. Prolonged Stretching: Maintaining a stretch on the spastic muscle to inhibit overactivity.
3. Neutral Warmth: Wrapping the individual in a warm blanket for 5–20 minutes to reduce muscle tone.
4. Slow Rolling: Gently rolling the individual from side to side in a rhythmic manner to decrease hypertonicity.
5. Maintained Pressure: Applying steady pressure over tendinous insertions to inhibit muscle activity.

Precautions

- Sensory Tolerance: Always assess the individual's response to sensory stimuli to prevent overstimulation or discomfort.
- Skin Integrity: Ensure that the skin is intact before applying any sensory techniques, especially thermal or mechanical stimuli.
- Monitoring: Continuously observe for adverse reactions such as increased spasticity, discomfort, or fatigue.

- Individualization: Tailor techniques to the individual's specific needs, preferences, and responses.

Observations

- Muscle Tone Changes**:** Note any alterations in muscle tone post-intervention.
- Movement Patterns: Observe improvements or changes in voluntary movement execution.
- Functional Abilities: Assess enhancements in performing daily activities or specific tasks.
- Patient Feedback: Consider subjective reports of ease of movement or comfort.

Conclusion

Rood’s approach offers a structured method for modulating muscle tone and facilitating motor control through specific sensory stimuli. By adhering to the principles of normalization of tone, developmental sequencing, purposeful activity, and repetition, therapists can effectively address motor deficits in individuals with neurological impairments. The approach's adaptability allows for individualized interventions, promoting functional recovery and enhancing quality of life

Practical 3

Aim: To learn and understand the cranial nerve examination process.

Materials required

- Non-noxious essence (e.g., vanilla, rose)
- Torch
- Ishihara chart
- Snellen chart
- Reflex hammer
- Pin
- Cotton
- Different flavored solutions (sweet, salty, sour, etc.)
- Cotton bud
- Tuning fork (256 Hz, 512 Hz)
- Ice cream stick

Theory

Description of Cranial Nerves

Cranial nerves are nerves that emerge directly from the brain, including the brainstem, and are traditionally numbered twelve pairs (I to XII). These nerves innervate muscles of the eyeball, face, palate, pharynx, larynx, tongue, neck, lungs, heart, and most of the gastrointestinal tract. They are responsible for special senses such as vision, taste, and smell.

The cranial nerves include both afferent (sensory) and efferent (motor) fibers. Though considered part of the peripheral nervous system (PNS), some, like the olfactory and optic nerves, are structurally part of the central nervous system (CNS).

Cranial Nerves Overview

i. Olfactory (I): Sensory - Smell
ii. Optic (II): Sensory - Vision
iii. Oculomotor (III): Motor - Eye movements, pupillary reaction
iv. Trochlear (IV): Motor - Eye movement
v. Trigeminal (V): Sensory & Motor - Facial sensation, mastication
vi. Abducens (VI): Motor - Eye movement

vii. Facial (VII): Sensory & Motor - Facial expression, taste
viii. Vestibulocochlear (VIII): Sensory - Hearing, balance
ix. Glossopharyngeal (IX): Sensory & Motor - Taste, swallowing
x. Vagus (X): Sensory & Motor - Autonomic functions, swallowing, voice
xi. Spinal Accessory (XI): Motor - Shoulder and neck movement
xii. Hypoglossal (XII): Motor - Tongue movement

Cranial Nerve Examination

Cranial Nerve I **(**Olfactory Nerve)

- Function: Smell
- Test: Assess each nostril with common odorants separately.
- Abnormal: Anosmia (loss of smell), often seen with frontal lobe lesions.

Cranial Nerve II **(**Optic Nerve)

- Function: Vision
- Tests:
  - Visual acuity using Snellen chart
  - Peripheral vision by confrontation
- Abnormal: Blindness, myopia, presbyopia

Cranial Nerve III **(**Oculomotor Nerve)

- Function: Pupillary reflex, eye movement
- Tests:
  - Light reaction test
  - Assess pupil size and shape (e.g., anisocoria)
- Abnormal: Absence of constriction, unequal pupils

Cranial Nerve III, IV, VI **(** Oculomotor, Trochlear, Abducens Nerves)

- Function: Extraocular movements
- Test: Follow finger in H-pattern
  - Abnormal: Strabismus, double vision, impaired eye movements Cranial Nerve V

(Trigeminal Nerve)

- Function:
  - Sensory: Light touch and pain on face, corneal reflex
  - Motor: Muscles of mastication
- Tests: Facial sensation, corneal reflex, muscle palpation during clenching
  - Abnormal: Trigeminal neuralgia, muscle weakness Cranial Nerve VII (Facial Nerve)

- Function:
  - Motor: Facial expressions
  - Sensory: Taste (anterior 2/3 of tongue)
- Tests: Facial movements, taste tests
  - Abnormal: Facial paralysis, taste impairment Cranial Nerve VIII (Vestibulocochlear Nerve)

- Function:
  - Vestibular: Balance (VOR test)
  - Cochlear: Hearing (Weber and Rinne tests)
- Abnormal: Vertigo, hearing loss, nystagmus

Cranial Nerve IX and X (Glossopharyngeal and Vagus Nerve)

- Function:
  - Phonation, swallowing, gag reflex
  - Palatal movement
- Tests: Voice quality, soft palate elevation, gag reflex
  - Abnormal: Hoarseness, dysphagia, absent gag reflex Cranial Nerve XI (Spinal Accessory Nerve)

- Function: Shoulder and neck movements
- Tests: Shrug shoulders, turn head against resistance
  - Abnormal: Shoulder droop, weakness in head rotation Cranial Nerve XI (Hypoglossal Nerve)

- Function: Tongue movements
- Tests: Tongue protrusion and movements
- Abnormal: Deviation of tongue, dysarthria

Conclusion

The cranial nerve examination is a vital component of neurological assessment, allowing clinicians to evaluate the functional integrity of the brainstem and other central nervous system structures. Each nerve has specific sensory or motor roles (or both), and systematic examination helps detect early signs of neurological disease.

Practical 4

Aim: To assess and categorize a patient's level of consciousness using clinical observation and standardized assessment tools.

Theory

Consciousness refers to a person's awareness of self and the environment. It is a vital neurological indicator in conditions such as head injury, stroke, coma, or metabolic encephalopathy. Levels of consciousness range from full alertness to deep coma, and are assessed using both observational methods and standardized tools like the Glasgow Coma Scale (GCS) and Rancho Los Amigos Scale (RLA).

Levels of Consciousness

1. Alert: Fully awake, responsive, and oriented.
2. Lethargic: Drowsy, opens eyes to stimuli, responds slowly, easily falls asleep.
3. Obtunded**:** Difficult to arouse, confused when awakened, poor environmental interaction.
4. Stupor**:** Requires vigorous or painful stimuli for arousal; minimal verbal or motor response.
5. Comatose**:** No response to any stimuli; eyes closed; no sleep-wake cycle; may require ventilator support.

Assessment Tools

A. Glasgow Coma Scale (GCS)

Response	Score
Eye Opening	
Spontaneous	4
To Speech	3
To Pain	2
No Response	1
Motor Response	
Obeys Commands	6

Localizes Pain	5
Withdraws	4
Abnormal Flexion (Decorticate)	3
Extension (Decerebrate)	2
No Response	1

Verbal Response

Oriented	5
Confused	4
Inappropriate Words	3

Response	Score
Incomprehensible Sounds	2
No Response	1

Total Score: 3–15

- Mild: 13–15, Moderate: 9–12, Severe: ≤8

B. Rancho Los Amigos Levels of Cognitive Functioning (RLA/LOCF)

Level	Description
I	No Response – Unresponsive to any stimuli.
II	Generalized Response – Non-purposeful, inconsistent reaction.
III	Localized Response – Specific but inconsistent responses.
IV	Confused-Agitated – Bizarre, non-purposeful behaviour.
V	Confused-Inappropriate – Follows simple commands inconsistently.

VI Confused-Appropriate – Goal-directed behaviour with assistance.

VII Automatic-Appropriate – Performs daily routine automatically.

VIII Purposeful-Appropriate – Responsive, oriented, and independent in routine tasks.

Conclusion

Assessing the level of consciousness is essential for diagnosing and managing neurological conditions. The GCS and RLA scales provide a structured framework for understanding patient responsiveness and cognitive recovery, enabling targeted clinical interventions.

Practical 5

Aim: To assess the different components of attention in individuals to determine cognitive functioning, identify deficits in attention processing, and guide appropriate therapeutic or rehabilitation interventions.

Theory

Attention is a fundamental cognitive function that allows individuals to focus selectively on specific information while ignoring distractions. It is crucial for goal-directed behaviour, learning, memory, and safe interaction with the environment.

There are several distinct types of attention, each serving different cognitive purposes:

- Selective Attention – The ability to focus on a relevant stimulus while ignoring irrelevant stimuli.
- Sustained Attention (Vigilance) – The ability to maintain attention over a prolonged period of time.
- Alternating Attention – The ability to shift focus between tasks with different cognitive demands.
- Divided Attention – The capacity to respond simultaneously to multiple tasks or stimuli.

Attention impairments are common in patients with neurological disorders such as stroke, traumatic brain injury, dementia, and ADHD. Comprehensive assessment of attention helps in diagnosis, planning cognitive retraining, and improving functional outcomes.

Materials Required

- Stopwatch
- List of digit sequences
- Pen and paper (for trail-making test)
- Stimulus cards (for sustained attention)
- Everyday objects (e.g., grocery items for dual-task testing)

Examination Procedure

1. Selective Attention

Definition:

The ability to focus on one task or stimulus while suppressing distraction from competing stimuli.

Test:
Digit Span Test (Forward and Backward)

- The therapist reads a list of numbers at a rate of one digit per second.
- The patient is asked to repeat the digits in the same order (forward) and in reverse order

(backward).

- Start with 3-digit sequences and increase progressively.
  Scoring:
- Document the maximum number of digits the patient can accurately recall.
- Norms: Average span is 5–7 digits for healthy adults.

2. Sustained Attention (Vigilance)

   Definition:
   The ability to maintain focus and remain attentive over an extended duration.
   Test:
   Time-on-Task Observation

- Ask the patient to perform a simple but repetitive task (e.g., pressing a button every time a certain letter is read out) for a few minutes.
- Alternatively, observe performance consistency during a functional task like sorting cards or folding towels.

  Scoring:

- Duration for which the patient maintains attention without distraction or errors.
- Note lapses in focus, missed cues, or signs of mental fatigue.

3. Alternating Attention (Cognitive Flexibility)

   Definition:

   The ability to switch attention back and forth between two tasks or cognitive sets.

   Test:

   Number Operation Task

- Instruct the patient to add the first two numbers in a sequence, then subtract the next two, and continue alternating.
    - Example: For the series 4, 2, 7, 3 → "4+2, 7−3" Trail Making Test – Part B

- A paper-pencil task where the patient alternates between numbers and letters (1-A-2- B-3-C...).

  Scoring:
- Record time taken and number of errors.
- Longer times or frequent switching errors indicate impaired alternating attention.

4. Divided Attention

Definition:
The ability to process two or more responses or react to multiple demands simultaneously.

Tests:

a. Walkie-Talkie Test

- Ask the patient to walk while simultaneously engaging in a conversation or answering questions.

b. Simulated Grocery Shopping Task

- Patient is asked to walk through a simulated shopping aisle while locating objects on a list, combining navigation and object identification.

Scoring:

- Observe balance, gait, and task performance.
- Note any decline in motor or cognitive performance when dual-tasking.

Precautions

- Ensure the patient is comfortable and alert.
- Avoid noisy or visually cluttered environments during testing.
- Adapt tasks for age, cognitive level, and any physical limitations.

Conclusion

Assessment of attention is a crucial component of neurological and cognitive evaluations. By examining different types of attention—selective, sustained, alternating, and divided— therapists can identify specific deficits that impact daily functioning. Accurate assessment informs intervention planning, including attention training programs and compensatory strategies to improve quality of life and safety.

Practical 6

Aim:
To assess various types of memory (immediate, recent, remote, verbal, and visual) to detect cognitive impairments and guide treatment.

Theory

Memory is the cognitive ability to encode, store, and retrieve information. It is a key function affected in many neurological conditions such as dementia, traumatic brain injury, and stroke. Memory is divided into types based on timing (immediate, recent, remote) and modality (verbal, visual). Proper assessment helps in planning rehabilitation and tracking cognitive recovery.

Materials Required

- Pen and paper
- Stopwatch or timer
- Tray and small familiar objects (keys, coin, pen, etc.)
- List of number sequences for digit span

Examination

1. Immediate Memory
   - Test**:** Digit Span Test (forward & backward)
   - Procedure**:** Examiner reads a sequence of numbers; the patient repeats it.
   - Normal span**:** 5–7 digits.
2. Recent Memory
   - Test**:** Ask about events in the last few hours or days (e.g., last meal, recent news).
3. Remote Memory
   - Test: Ask about personal history or distant past (e.g., name of school, old address).
4. Verbal Memory

- Test**:** Read a sentence or short story; ask for recall after 15 minutes.

5. Visual Memory

- Test**:** Show 5 objects on a tray; hide them and ask the patient to recall them after 15 minutes.

Conclusion

Memory assessment is a key part of the neurological exam. By evaluating multiple types of memory, clinicians can localize cognitive deficits and monitor progression or improvement. This aids in setting realistic goals and customizing therapeutic approaches.

Practical 7

Aim: To assess the coordination abilities by evaluating vestibulocerebellar and cerebrocerebellar functions.

Theory

Coordination refers to the ability to execute smooth, accurate, controlled motor responses. It depends on the integration of sensory input (vestibular, visual, and proprioceptive) and proper functioning of the cerebellum and motor cortex. The cerebellum is divided into two functional regions:

- Vestibulocerebellum**:** Responsible for balance, posture, and spatial orientation.
- Cerebrocerebellum: Controls fine motor skills, timing, and coordination of voluntary movements.

Impairments in these areas result in signs such as ataxia, dysmetria, and intention tremors.

SECTION A: VESTIBULOCEREBELLAR FUNCTION TESTS

1. Stationary Standing (Romberg Test)

- Purpose**:** Tests static balance and proprioception.
- Procedure**:**
  Ask the patient to stand with feet together, heels and toes touching, and arms by the sides. Then instruct them to close their eyes and maintain the position for 30 seconds.
- Observation**:**
  Look for sway, loss of balance, stepping, or opening eyes.

Walking Test

- Purpose**:** Assesses gait, dynamic balance, and vestibular function.
- Procedure**:**
  Ask the patient to walk in a straight line (10–15 steps) while maintaining upright posture and balance.
- Observation**:**
  Note any unsteadiness, veering, stepping irregularities, or arm swing abnormalities.

2. Tandem Gait

- Purpose**:** Tests more challenging dynamic balance.

- Procedure**:**

  Ask the patient to walk heel-to-toe in a straight line for 10–15 feet.
- Observation**:**

  Observe for balance loss, wide base, irregular stepping, or deviation from line.

SECTION B: CEREBROCEREBELLAR FUNCTION TESTS

1. Rapid Alternating Movements (Dysdiadochokinesia)

a) Alternate Nose-to-Finger

- Procedure**:**

  Patient alternately touches their nose and the examiner's finger, with changes in finger position.
- Observation**:**

  Look for irregular timing, inaccuracy, tremor, or overshooting.

b) Finger-to-Nose Test

- Procedure**:**

  With arms extended, the patient touches their nose with the index finger. Can be done in various planes.
- Observation**:**

  Look for dysmetria (overshoot/undershoot), tremor, or slowness.

c) Toe-to-Finger Test

- Procedure**:**

  In supine position, the patient uses the great toe to touch the examiner's finger.
- Observation**:**

  Check for incoordination, directional inaccuracy, or tremors.

d) Heel-to-Shin Test

- Procedure**:**

  In supine position, the patient slides one heel along the opposite shin.
- Observation**:**

  Look for tremor, slipping off the shin, or inability to perform the movement smoothly.

2. Rebound and Check Reflex

- Procedure**:**

With elbow flexed, resistance is applied to the forearm to contract the biceps. Resistance is suddenly released.

- Observation**:**
  A normal response involves activation of antagonistic muscles (e.g., triceps) to "check" the movement. In cerebellar lesion, the limb may swing uncontrolled.

3. Drawing a Circle or Figure-Eight

- Procedure**:**
  Patient is asked to draw an imaginary circle in the air or on a surface using the upper or lower limb.
- Observation**:**
  Note smoothness, symmetry, and control of motion.

Conclusion

Coordination testing provides vital information on cerebellar and vestibular system function. Deficits observed through these simple bedside tests help in identifying neurological impairments, differentiating between central and peripheral disorders, and guiding rehabilitation strategies.

Practical No.8

Aim: To observe, identify, and classify different types of gait abnormalities in order to assess underlying neurological or musculoskeletal dysfunction.

Gait Abnormalities

Types of Gait Abnormalities

I. Hemiplegic Gait

- Cause**:** Stroke or cerebrovascular accident (CVA)
- Features**:**
  - Unilateral weakness with arm flexed, adducted, internally rotated.
  - Leg extended and foot plantar flexed.
  - Circumduction of affected limb due to spasticity and weakness.

II. Diplegic Gait (Spastic Gait)

- Cause: Cerebral palsy or bilateral periventricular lesions
- Features**:**
  - Bilateral lower limb spasticity.
  - Narrow base, toe dragging, and scissoring from hip adductor spasticity.

III. Neuropathic Gait (Steppage or Equine Gait)

- Cause**:** Peripheral nerve palsy (e.g., peroneal nerve), L5 radiculopathy
- Features**:**
  - Foot drop due to dorsiflexor weakness.
  - High-stepping gait to clear the foot.
  - Seen in diabetic neuropathy, Charcot-Marie-Tooth disease.

IV. Myopathic Gait (Waddling Gait)

- Cause**:** Muscular dystrophy, proximal myopathies
- Features**:**
  - Pelvic drop on contralateral side (Trendelenberg sign).
  - Bilateral weakness results in waddling gait.

V. Choreiform Gait (Hyperkinetic Gait)

- Cause**:** Huntington's disease, Sydenham's chorea, basal ganglia disorders
- Features**:**
  - Involuntary, jerky, unpredictable movements.
  - Exaggerated during walking.

VI. Ataxic Gait (Cerebellar Gait)

- Cause**:** Cerebellar lesions or acute alcohol intoxication
- Features**:**
  - Wide-based, unsteady gait.
  - Difficulty with heel-to-toe walking.
  - Truncal instability (titubation).

VII. Parkinsonian Gait (Festinating or Propulsive Gait)

- Cause**:** Parkinson's disease or drug-induced parkinsonism
- Features**:**
  - Stooped posture, reduced arm swing.
  - Short shuffling steps, difficulty initiating movement.
  - Festination: involuntary acceleration of steps.

VIII. Sensory Ataxic Gait

- Cause**:** Dorsal column dysfunction (e.g., B12 deficiency, tabes dorsalis), diabetic neuropathy
- Features**:**
  - High-stepping, foot-slapping gait.
  - Worsens with eyes closed or in the dark.
  - Compensatory stomping due to loss of proprioception.

Conclusion

Observation of gait provides critical insights into the integrity of the neuromuscular and central nervous systems. Identifying abnormal gait patterns helps in the early diagnosis and targeted management of neurological, muscular, or systemic disorders. A thorough gait analysis should always be part of the comprehensive neurological examination.

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