
PHYSIOTHERAPY MANAGEMENT IN CRANIAL NERVE III (OCULOMOTOR NERVE) PALSY: A REVIEW ARTICLE

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ABSTRACT

Cranial nerve III palsy, commonly referred to as oculomotor nerve palsy, is a neurological disorder characterized by ptosis, diplopia, impaired ocular motility, and pupillary dysfunction. The condition may result from vascular, traumatic, compressive, inflammatory, or congenital causes. Oculomotor dysfunction significantly affects visual coordination, balance, mobility, and quality of life. Physiotherapy and neuro-rehabilitation interventions play an important role in improving ocular motor control, reducing disability, and promoting neuroplastic recovery. This review article discusses the anatomy, etiology, clinical features, assessment, and evidence-based physiotherapy management of cranial nerve III palsy.

KEYWORDS: Cranial nerve III palsy, Oculomotor nerve palsy, Physiotherapy, Neurorehabilitation, Diplopia, Vestibular rehabilitation, Ocular motor exercises.

INTRODUCTION

The oculomotor nerve (cranial nerve III) supplies most of the extraocular muscles including the superior rectus, inferior rectus, medial rectus, inferior oblique, and levator palpebrae superioris muscles [1]. It also carries parasympathetic fibers responsible for pupillary constriction and accommodation [2]. Dysfunction of this nerve leads to ptosis, ophthalmoplegia, diplopia, pupillary abnormalities, and impaired visual coordination [3].

Cranial nerve III palsy can severely affect activities of daily living such as reading, walking, driving, and maintaining balance [4]. Rehabilitation interventions including ocular motor

retraining, vestibular rehabilitation, balance training, and neuromuscular re-education are increasingly recognized as essential components of patient management [5].

Anatomy and Physiology of Cranial Nerve III

The oculomotor nerve originates from the oculomotor nucleus located in the midbrain at the level of the superior colliculus [1]. The nerve exits the brainstem through the interpeduncular fossa and enters the orbit via the superior orbital fissure [2].

The nerve innervates:

- Superior rectus
- Inferior rectus
- Medial rectus
- Inferior oblique
- Levator palpebrae superioris
- Sphincter pupillae
- Ciliary muscles [3]

The major functions include:

- Eye elevation
- Eye depression
- Eye adduction
- Eyelid elevation
- Pupillary constriction
- Accommodation [2]

Damage to the nerve results in a characteristic “down and out” eye position due to the unopposed action of the lateral rectus and superior oblique muscles [4].

Etiology

Cranial nerve III palsy may arise from several etiological factors including:

- Diabetes mellitus
- Hypertension
- Posterior communicating artery aneurysm
- Traumatic brain injury
- Brain tumors

- Stroke
- Multiple sclerosis
- Infections
- Inflammatory disorders
- Congenital abnormalities [5,6]

Microvascular ischemia is a common cause among elderly individuals, whereas compressive aneurysms are considered neurological emergencies because of the risk of rupture [6]. Traumatic oculomotor nerve palsy is frequently associated with head injuries and skull base fractures [7].

Clinical Features

The clinical manifestations of cranial nerve III palsy depend upon the extent and location of the lesion [3].

Common symptoms include:

- Ptosis
- Diplopia
- Blurred vision
- Ophthalmoplegia
- Dilated pupil
- Loss of accommodation
- Eye deviated downward and outward
- Difficulty focusing
- Headache and dizziness [4,6]

Patients frequently develop impaired postural control and gait instability because visual disturbances alter vestibulo-ocular integration [8].

Diagnosis and Assessment

Medical Assessment

Diagnosis involves:

- Cranial nerve examination
- Extraocular movement testing
- Pupillary reflex assessment

- Visual acuity testing
- Diplopia charting
- MRI or CT scan
- CT angiography for aneurysm detection [6]

Physiotherapy Assessment

Physiotherapy evaluation should include:

- Balance assessment
- Vestibulo-ocular reflex testing
- Coordination assessment
- Gait analysis
- Functional mobility evaluation
- Activities of daily living assessment [8]

Functional outcome measures such as the Berg Balance Scale and Dynamic Gait Index may also be used to evaluate rehabilitation progress [9].

Physiotherapy Management

Goals of Physiotherapy

The primary goals include:

- Improving ocular motor control
- Reducing diplopia
- Enhancing visual tracking
- Improving balance and coordination
- Facilitating neuroplasticity
- Restoring functional independence [5]

Ocular Motor Rehabilitation

Saccadic Eye Movement Exercises

Saccadic exercises involve rapid eye movement between two stationary targets [10].

Procedure

- Two targets are positioned horizontally or vertically.
- The patient shifts gaze rapidly between targets.
- Exercises are repeated for 1–2 minutes.

Benefits

- Improves gaze accuracy
- Enhances visual attention
- Improves ocular motor coordination [10]

Saccadic retraining has been shown to improve visual scanning efficiency and gaze stabilization in neurological disorders [11].

Smooth Pursuit Exercises

Smooth pursuit exercises involve following a moving target slowly in different directions [5].

Examples

- Horizontal tracking
- Vertical tracking
- Circular tracking
- Figure-of-eight movements

Benefits

- Improves visual tracking
- Enhances eye movement coordination
- Improves visual stability [11]

Neuro-optometric rehabilitation programs have demonstrated improvements in ocular motility and visual efficiency in adults with oculomotor dysfunction [12].

Convergence Training

Convergence exercises improve binocular coordination and reduce diplopia [13].

Common Exercises

- Pencil push-up exercise
- Brock string exercises
- Near-far focusing exercises

Benefits

- Enhances convergence ability
- Improves fixation
- Reduces visual fatigue [13]

Diplopia Management

Diplopia is one of the most disabling symptoms of cranial nerve III palsy [4].

Conservative management includes:

- Eye patching
- Alternate occlusion
- Fresnel prisms
- Blurred lens application [13]

Occlusion therapy helps reduce visual confusion and improve comfort during recovery [14].

Vestibular Rehabilitation

Visual impairment may produce dizziness and impaired balance because of altered vestibulo-ocular interaction [8].

Vestibular Rehabilitation Exercises

- Gaze stabilization exercises
- Head-eye coordination training
- Dynamic balance exercises
- Habituation exercises

Benefits

- Improves vestibulo-ocular reflex function
- Enhances balance
- Reduces dizziness [5]

Vestibular rehabilitation is effective in improving gaze stability and postural control in patients with neuro-ophthalmological deficits [15].

Balance and Gait Training

Visual deficits increase the risk of falls and mobility limitations [8].

Interventions

- Static standing exercises
- Tandem standing and walking
- Single-leg balance exercises
- Proprioceptive training
- Functional gait training [9]

Balance rehabilitation helps improve postural alignment, gait confidence, and dynamic stability [8].

Neuromuscular Re-education

Neuromuscular re-education focuses on restoring coordinated eye, head, and body movements [5].

Techniques

- Visual feedback training
- Sensorimotor integration exercises
- Functional reaching activities
- Task-oriented training [11]

These interventions facilitate motor learning and neuroplastic adaptation [10].

Functional Rehabilitation

Functional rehabilitation aims to improve daily activities affected by visual dysfunction such as:

- Reading
- Computer work
- Stair climbing
- Environmental scanning
- Walking in crowded environments [9]

Occupational therapy may assist with adaptive strategies and environmental modifications [8].

Patient Education

Patient education is essential for long-term management.

Patients should be educated regarding:

- Fall prevention
- Importance of exercise compliance
- Eye protection
- Safe mobility strategies
- Warning signs requiring urgent medical attention [6]

Home exercise programs are important for maintaining visual and vestibular rehabilitation outcomes [5].

Multidisciplinary Approach

Management of cranial nerve III palsy requires coordination among:

- Neurologists
- Ophthalmologists
- Physiotherapists
- Occupational therapists
- Neurosurgeons
- Neuro-optometrists [4]

Persistent cases may require surgical interventions such as strabismus correction surgery or ptosis repair [14].

Prognosis

The prognosis depends on:

- Underlying cause
- Severity of nerve damage
- Early diagnosis
- Patient age
- Associated neurological disorders [6]

Microvascular palsies often recover within 3–6 months, whereas traumatic or compressive lesions may require prolonged rehabilitation [7].

Recent Advances in Rehabilitation

Recent advances include:

- Virtual reality-based visual rehabilitation
- Computer-assisted eye tracking systems
- Biofeedback-assisted ocular training
- Neuro-optometric rehabilitation programs [12]

Emerging evidence supports the effectiveness of structured rehabilitation in improving ocular motility and functional visual outcomes [12,15].

CONCLUSION

Cranial nerve III palsy significantly impairs ocular function, balance, mobility, and quality of life. Physiotherapy plays a vital role in improving ocular motor coordination, reducing disability, and restoring functional independence. Ocular motor exercises, vestibular rehabilitation, balance training, and neuromuscular re-education form the cornerstone of

rehabilitation. Early multidisciplinary intervention provides the best functional outcomes. Further research is required to establish standardized physiotherapy protocols for cranial nerve III palsy rehabilitation.

Declarations

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