



## Ocular Movement Nerve Palsy After Mild Head Trauma

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■ **BACKGROUND:** Ocular movement nerve (cranial nerve III, IV and VI) palsy (OMNP) is rarely encountered after mild head trauma. As a result of the inconsistent definition of this specific entity in published studies, it is difficult to offer an accurate management strategy and prognosis assessment to affected patients.

■ **METHODS:** A retrospective review of the medical records of the patients at the First Hospital of Jilin University combined with a systematic review of published studies was conducted.

■ **RESULTS:** Thirty-one patients (17 females, 55%), including 6 cases in our institution, were identified in this systematic review. Cranial nerves III, IV, and VI were involved in 54.8%, 3.2%, and 45.2% of the patients, respectively. Although all the patients in our case series experienced complete resolution, only 54.6% experienced complete resolution in a time course of 10 days to 13 months. Additional intracranial findings other than traumatic brain injury on imaging modalities that might predispose to OMNP after mild head trauma were identified in 25.8% of the patients.

■ **CONCLUSIONS:** OMNP after mild head trauma is a rare entity in neurosurgical practice. In patients with no positive intracranial finding, observation and follow-up are the mainstay of management. If any underlying intracranial lesions are identified, the management should be focused on the underlying lesions. From the data available, mild trauma does not mean mild injury or favorable recovery in OMNP after mild head trauma.

### INTRODUCTION

Ocular movement nerve (cranial nerve [CN] III, IV, and V) palsy (OMNP) is a common complication of severe head trauma, but is rarely encountered after mild head trauma.<sup>1,2</sup> Although not fatal, OMNP is troublesome to the affected patients because of the advanced economic and social conditions they live in. Because of its rarity, most of the studies on OMNP after mild head trauma are case reports. Large case series and comprehensive reviews on this issue are scarce.<sup>1-7</sup> Furthermore, as a result of the inconsistent definition of this issue in published studies, it is difficult to offer an accurate management strategy and prognosis assessment to patients.<sup>1,2,4,8</sup> In this study, we present a case series of patients with OMNP after mild head trauma. The definition of OMNP after mild head trauma in our study was based not only on Glasgow Coma Scale (GCS) score but also on imaging data. Patients with positive imaging findings (skull fracture and intracranial traumatic lesions) were excluded. To better illustrate this specific entity, a comprehensive review of the literature was also performed.

### METHODS

#### Definition of OMNP After Mild Head Trauma

When OMNP after mild head trauma is considered, the following criteria should be fulfilled:

- 1) Immediate or delayed occurrence of OMNP after recent head injury

#### Key words

- Abducens nerve
- Cranial nerve palsy
- Mild head trauma
- Ocular movement nerve
- Oculomotor nerve
- Trochlear nerve

#### Abbreviations and Acronyms

- CN:** Cranial nerve
- CR:** Complete resolution
- CT:** Computed tomography
- CTA:** CT angiography
- GCS:** Glasgow Coma Scale
- MRI:** Magnetic resonance imaging
- OMNP:** Ocular movement nerve palsy
- PComA:** Posterior communicating artery

**PR:** Partial resolution

**UR:** Unresolution

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- 2) GCS score after impact of 14–15 regardless of the history of transient consciousness disturbance
- 3) No definite skull fracture and intracranial traumatic lesions (hemorrhage, cerebral contusion, and laceration) identified by computed tomography (CT) or magnetic resonance imaging (MRI)
- 4) No other definite cause responsible for the genesis of OMNP identified by the radiologic, laboratory, and clinical investigations.

### Definition of the Degree of CN III Palsy on Admission and Recovery Outcome

- Ptosis with no or little increase on exertion
- Fixed ipsilateral mydriasis
- Diplopia and evident restriction on adduction and downward and upward gaze of the ipsilateral eye

Patients presenting with all of the symptoms above were deemed as having complete CN III palsy, whereas those presenting with 1 or 2 symptoms or incomplete presentation of the symptoms were deemed as having incomplete CN III palsy. Complete resolution (CR) was defined as complete recovery of the symptoms. Partial resolution (PR) was defined as partial recovery from 1 or more of the symptoms.

### Case Series in Our Institution

A retrospective review was performed of the medical records of patients admitted for head trauma at the Department of Neurosurgery, The First Hospital of Jilin University (Eastern division) from January 2010 to April 2016. Clinical data including CN affected, demographic information, imaging investigations, accompanying chronic diseases such as diabetes or hypertension, management, outcome, and follow-up information were collected for interpretation.

### Literature Search

A systematic PubMed search of published studies written in English for patients developing OMNP after mild head trauma from

January 1980 to 6 April 2016 was conducted. The following key words were used in relevant combinations: CN palsy, third nerve palsy, oculomotor nerve palsy, fourth nerve palsy, trochlear nerve palsy, sixth nerve palsy, abducens nerve palsy, head injury, and head trauma. The reference lists of the identified articles were also manually searched for additional studies. Studies without definite CT or MRI investigations were excluded.

## RESULTS

### Current Series

From January 2010 to April 2016, 2437 consecutive patients were admitted to our institution for head trauma. Among them, 1074 patients were identified as having mild head trauma according to the inclusion criteria, 6 of whom (3 female) (0.56%) were diagnosed with OMNP (Table 1). The inflicted CNs were CN III (3), and VI (4). All the patients recovered completely in a time course of 10 days to 2 months after OMNP onset. Accompanying chronic diseases such as diabetes or hypertension were identified in only 1 patient.

### Illustrative Cases

**Patient 1.** A previously healthy 19-year-old man was admitted to our center with diplopia after a motorcycle accident 3 hours previously. He denied any loss of consciousness through the accident. He had no previous history of head trauma. On examination, his vital signs were normal and he had a GCS score of 15. There was some bruising on the right side of his face and forehead. Ophthalmologic examination showed that he was unable to abduct his right eye. Further head CT, high-resolution CT of the skull base, CT angiography (CTA), and MRI showed no abnormality. After discussion with an ophthalmologist, no special management was proposed. He was discharged and followed up in the outpatient department. He experienced a stable recovery after discharge. Two months later, his diplopia disappeared and his right eye could abduct with no limitation.

**Patient 6.** A 50-year-old woman with a history of diabetes mellitus was admitted complaining of progressive diplopia after accidentally slipping down 1 day previously. She denied any loss of consciousness through the accident and recalled that the force-

**Table 1.** Clinical Data of the Patients with Ocular Movement Nerve Palsy After Mild Head Trauma in Current Case Series

Patient Number (Sex, Age, Years)	Glasgow Coma Scale Score	Accompanying Diseases	Findings on Imaging Modalities	Degree and Side	Cranial Nerve Inflicted	Time Interval to Palsy	Management	Outcome	Time Interval to Resolution
1 (M, 19)	15	No	Negative	Right	VI	0 day	Observation	CR	2 months
2 (M, 50)	14	No	Negative	Incomplete, left III	Left III, right VI	0 day	Observation	CR	2 months
3 (F, 50)	14	No	Negative	Incomplete, right	III	0 day	Observation	CR	1 month
4 (F, 38)	15	No	Negative	Left	VI	0 day	Observation	CR	1 month
5 (M, 13)	15	No	Negative	Left	VI	0 day	Observation	CR	1 month
6 (F, 50)	15	Diabetes	Negative	Incomplete, right	III	0 day	Observation	CR	10 days

M, male; CR, complete resolution, F, female.

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