

LETTER TO THE EDITOR

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# Contralateral pupillary dilatation and hemiparesis: Kernohan's notch revisited

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## Abstract

Intracranial mass lesions can lead to transtentorial uncal herniation, and pupillary asymmetry is a well-recognized sign of impending cerebral herniation. Impending uncal herniation can lead to ipsilateral, bilateral, or uncommonly the contralateral pupillary dilatation. We report a case of a 22-year old, who had contralateral pupillary dilatation due to expanding intracranial mass lesion and recovered well after neurosurgical intervention. This case illustrates contralateral pupillary dilatation ("false-localizing" sign) in a sub-group of patients, and if untreated and ICP continues to rise, this is followed by ipsilateral pupil dilatation.

**Keywords:** Traumatic brain injury, Cerebral herniation, Pupillary asymmetry

## Introduction

Pupillary asymmetry is a well-recognized sign of impending cerebral herniation [1, 2]. Pupillary asymmetry may be ipsilateral, bilateral [1, 2], or uncommonly, the contralateral pupil dilates first [3, 4].

## Case report

A 22-year-old male skid and fell from a motorbike. He was unconscious since the time of the incident and had multiple episodes of vomiting with ear and nasal bleed. There was no history of seizures. On examination, he was afebrile, pulse rate was 87/min, and blood pressure was 120/70 mm/Hg. His Glasgow coma score was E2M2V1. The right pupil was 2 mm reacting to light, and the left pupil was 4 mm sluggishly reacting (Fig. 1a). The patient was spontaneously decerebrating with paucity of movement on the left side. In view of poor GCS, he was intubated and electively ventilated. A CT scan of the brain showed thick right parieto-occipital extradural hematoma with mass effect, underlying contusion, bifrontal patchy contusions (left > right), linear fracture of the right occipital bone with significant cerebral edema, mass effect, distortion, and displacement of the

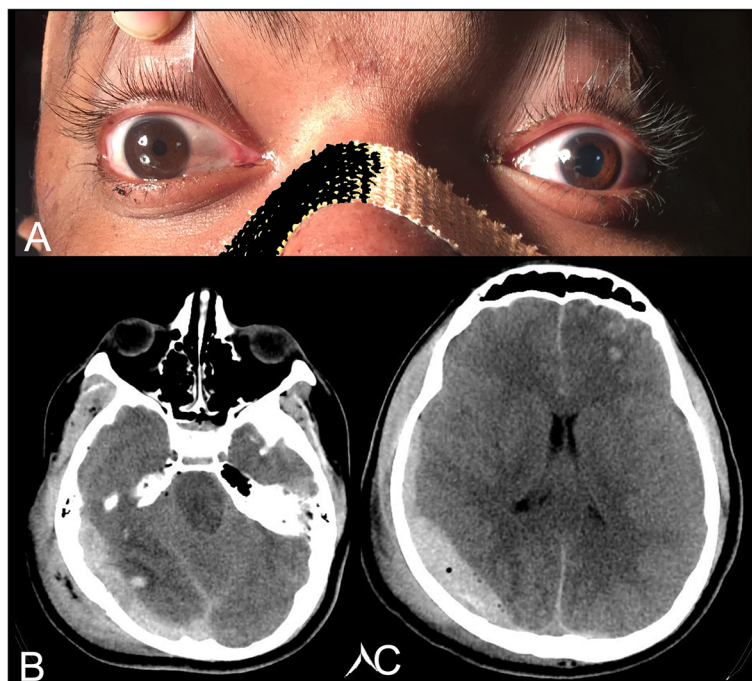
brain stem (Fig. 1b and c). His blood investigations including coagulation profile were within normal range. The patient underwent emergency right parieto-occipital craniotomy and evacuation of extradural hematoma. The patient was electively ventilated. Following the evacuation of the hematoma, the pupillary asymmetry resolved in immediate post-operative period. The patient underwent an early tracheostomy, gradually weaned off from the ventilator, and could be shifted to ward. He received regular chest and limb physiotherapy. He could be weaned off from tracheostomy and improved to GCS E4V5M6.

## Discussion

Expanding intracranial mass lesions particularly those that involve the temporal lobe can lead to transtentorial uncal herniation causing direct ipsilateral oculomotor nerve compression (or stretching and torsion) and pupillary dysfunction [1, 2]. In contrary to this contralateral pupillary dilatation ("false-localizing" sign) in a sub-group of patients [3, 4], and if untreated and ICP continues to rise, ipsilateral pupil also dilates [3–5]. Herniation of the uncus results in compression of the ipsilateral oculomotor nerve and ipsilateral pupillary dilation [1, 2]; however, if the location of the lesions is higher than the uncus, displacement and distortion of the brainstem follows which results in compression of

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**Fig. 1** **a** Clinical photograph showing pupillary asymmetry (left > right), left pupil was sluggishly reacting to light. **b** CT scan of the brain (plain) showing a large right occipito-parietal extradural hematoma, with underlying contusion (please note the compression and gross distortion of the brainstem). **c** Contrecoup left frontal polar patchy contusion

the contralateral cerebral peduncle and oculomotor nerve leading to opposite side pupillary dilation and hemiparesis (Kernohan's notch) [1–4].

## Conclusions

This case illustrates contralateral pupillary dilatation (“false-localizing” sign) in a sub-group of patients, and if untreated and ICP continue to rise, this is followed by ipsilateral pupil dilatation.

## Abbreviations

ICP: Intracranial pressure; CT: Computerized tomography

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## Authors' contributions

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## Availability of data and materials

Please contact author for data requests.

## Ethics approval and consent to participate

The study was approved by Institutional Ethical Committee. This study was conducted in accordance with the fundamental principles of the Declaration of Helsinki.

## Consent for publication

Written informed consent was obtained from the patient for publication of this letter to the editor and any accompanying images.

## Competing interests

The authors declare that they have no competing interests.

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