

## Bilateral Abducent Nerve Palsy: Not Always a False Localising Sign

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### Introduction

False localising sign is a term coined to indicate a clinical sign which is not in concordance with expected anatomical localisation of pathology. Bilateral abducent nerve palsy is often considered to be false localising sign, a sign of raised intracranial pressure. However bilateral abducent nerve palsy may rarely occur in absence of raised intracranial pressure.

### Case History

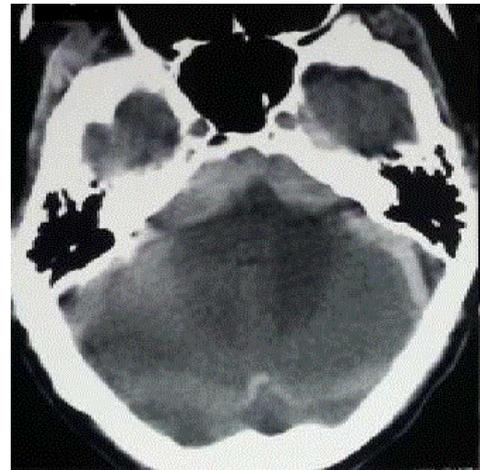
A seventy years old male suffered acute onset holocranial headache and vomiting two days prior to admission to the emergency unit. Over the last one day, he developed diplopia on looking to either side. On examination in the emergency service, his pulse was 84/min, blood pressure was 138/76 mm Hg with respiratory rate of 14/min. He had nuchal rigidity with World Federation of Neurological Society (WFNS) grade of 2. On neurological examination he had bilateral sixth nerve palsy without gaze palsy (Figure 1). On examination of the fundus, there was no evidence of papilledema. His blood parameter reports including coagulation profile were all normal. His past medical history was unremarkable for any systemic disease. Computed Tomography (CT) of the brain revealed extensive thick subarachnoid hemorrhage in the prepontine, perimesencephalic and bilateral cerebellopontine cisterns i.e. Fischer grade 3 subarachnoid hemorrhage (Figure 2A). CT angiogram of the brain revealed normal course of vertebral arteries and basilar arteries with no evidence of fusiform or saccular aneurysm in the posterior circulation (Figure 2B). Digital subtraction cerebral angiogram was performed which did not reveal the cause of subarachnoid hemorrhage. There was no evidence of spasm of the vertebral or basilar artery. He was managed with antiedema measures and best supportive care. Intracranial pressure monitoring was performed which revealed normal intracranial pressure. On the third day after admission, he gradually developed respiratory distress, worsened neurologically and needed ventilatory support. In spite of the best intensive care, he suffered cardiorespiratory arrest on the fifth day after admission.

### Discussion

The occurrence of bilateral abducent nerve palsy is often considered



**Figure 1:** Clinical photograph of the patient demonstrates both eyes are deviated inwards suggestive of bilateral abducent nerve palsy.



**Figure 2A:** Plain CT scan of the brain demonstrates thick subarachnoid hemorrhage in the prepontine cistern.



**Figure 2B:** CT angiogram of the brain does not demonstrate the presence of aneurysm.

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Received July 02, 2015; Accepted July 28, 2015; Published July 31, 2015

Citation: Baldawa S (2015) Bilateral Abducent Nerve Palsy: Not Always a False Localising Sign. J Neurol Disord 3: 243. doi:10.4172/2329-6895.1000243

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as a false localising sign [1]. This false localising sign is evident in the presence of raised intracranial pressure [1]. The most acceptable theory is that downward displacement of the brainstem due to raised intracranial pressure leads to distortion or compression of the long abducent nerve against the petrous temporal bone, thereby resulting in manifestation of this false localising sign [1-3].

Bilateral abducent nerve palsy, however, can occur in the absence of raised intracranial pressure as in the present case. The author has reported the occurrence of bilateral abducent nerve palsy as a clinical manifestation in a six years old girl with medulloblastoma [2]. It has also been reported following evacuation of posterior fossa extradural hematoma and in Chiari 1 malformation [2]. The probable explanation for occurrence of this false localising sign in each of these cases varies. In medulloblastoma, the abducent nerve palsy occurs due to seeding of tumour cells in subarachnoid space thereby resulting in diffuse leptomeningeal metastasis. In posterior fossa hematoma, it occurs due to forward displacement of the abducent nerve. In Chiari 1 malformation, it is due to downward traction on the abducent nerve [2].

The development of bilateral abducent nerve palsy following subarachnoid hemorrhage has been rarely reported in literature [4]. The incidence of abducent nerve palsy following intracranial aneurysm is 3.3% to 3.6% [4,5]. Abducent nerve palsy has been reported following aneurysm of cavernous carotid artery, anterior communicating artery, superior cerebellar artery, vertebral artery and posterior inferior cerebellar artery [1,3-5]. Several theories have been proposed to explain the occurrence of bilateral abducent nerve palsy following subarachnoid hemorrhage in absence of raised intracranial pressure. Bilateral abducent nerve palsy may occur due to direct compression of the nerve either by the aneurysm or by intracisternal clot. Vasospasm of the pontine branches of basilar artery would result in abducent nerve

palsy, gaze palsy and facial palsy due to close association between the sixth, seventh nerve and medial longitudinal fasciculus [1,3-5]. In the present case, as intracranial pressure was normal and no aneurysm was evident on CT and conventional angiogram, the most likely explanation for occurrence of bilateral sixth nerve palsy is direct compression of the nerve by the extensive clot in the prepontine cistern. Also as no gaze palsy or facial palsy was evident in the present case, vasospasm of the pontine branches of basilar artery is unlikely to have caused bilateral abducent nerve palsy. Prognosis in these patients depends on the cause of the abducent nerve palsy as well as the neurological status [1,2].

## Conclusion

It is worthwhile to remember that bilateral abducent nerve palsy can occur following subarachnoid hemorrhage in absence of raised intracranial pressure and is not always a false localising sign.

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