

## Case Report

### An eye emergency at high altitude on the climber: things not to miss

Idrose AM<sup>1</sup>, Fauzi MH<sup>2</sup>, Abdullah AHA<sup>3</sup>, Liang MCH<sup>4</sup>

#### Abstract:

Risk of eye emergencies at high altitude should be noted by Emergency Physicians or expedition doctors for high altitude missions. Early management and understanding the sequelae of the conditions will make a difference in management and decisions at high altitude.

**Key words:** high altitude; eye emergency; HARH

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#### Introduction

High altitude visual disturbance could occur via hemorrhagic phenomenon following hypoxic effect to retinal vessels. This case is based on vision defects at high altitude encountered on the climber during author's experience being the expedition doctor for Everest Expedition in 2011 (from North route). This high altitude eye emergency case would be useful for doctors working at high altitude as expedition doctor to make the right decisions as well as provide accurate management.

#### Case (From North Route during 2011 Mount Everest Expedition via Tibet)

A 68 years-old gentleman attempted to climb Mount Everest via the north route in Tibet. He just came back to the Tibet Everest Base Camp after climbing to an altitude of 7200m during acclimatization exercise. He complained of distortion of vision, claiming that his vision was 'not normal'. He claimed that there was distortion of part of the image of objects that he saw. There was also an area of blind spot over upper lateral part of vision on his right eye. However, there was absolutely no pain. On examination, there was no redness of the eye. The right eye was normal. As for the left eye, he was able to read

alphabets at 40 centimetres' distance. There was eye field defect over the lateral side of the left eye. However, due to logistics problem, fundoscopy was not available at the Medical Base Station to view the retina. A portable ultrasound was available and the scan showed that there was no evidence of vitreous hemorrhage nor retinal detachment. A clinical diagnosis of high altitude retinal hemorrhage was made. At the Base Camp, patient was advised against climbing for fear of risk of rebleeding. Patient was told that if hemorrhage occurs at macula area or over the axis of vision, he could lose his vision. No specific treatment other than advice against climbing could be provided to the patient as there were no definitive treatment available. 2 weeks later, patient arrived in Kuala Lumpur and his eyes were examined at the Eye Clinic of Hospital Kuala Lumpur. The B Jerrum's Screen Chart showed that patient had eye field defect over upper lateral area of the left eye. The Amsler Recording Chart confirmed that patient had metamorphopsia with distortion of shape and size of vision objects (Figure 1). The Intraocular pressure was normal. Fundus Camera showed confirmed retinal Hemorrhage near the optic disc area (Figure 2).

1. Alzamani Mohd Idrose, Department of Emergency Medicine & Trauma, Hospital Kuala Lumpur 50586 Jalan Pahang, Wilayah Persekutuan Kuala Lumpur, Malaysia

2. Mohd Hashairi Fauzi, Department of Emergency Medicine, Hospital Universiti Sains Malaysia 16150 Kubang Kerian, Kelantan, Malaysia

3. Abu Hassan Asaari Abdullah, Department of Emergency Medicine & Trauma, Hospital Kuala Lumpur 50586 Jalan Pahang, Wilayah Persekutuan Kuala Lumpur, Malaysia

4. Michael Cheng Heng Liang, Department of Ophthalmology, Hospital Kuala Lumpur 50586 Jalan Pahang, Wilayah Persekutuan Kuala Lumpur, Malaysia

**Correspond to:** Mohd Hashairi Fauzi, Department of Emergency Medicine, Hospital Universiti Sains Malaysia 16150 Kubang Kerian, Kelantan, Malaysia. Email: hashairi@kk.usm.my

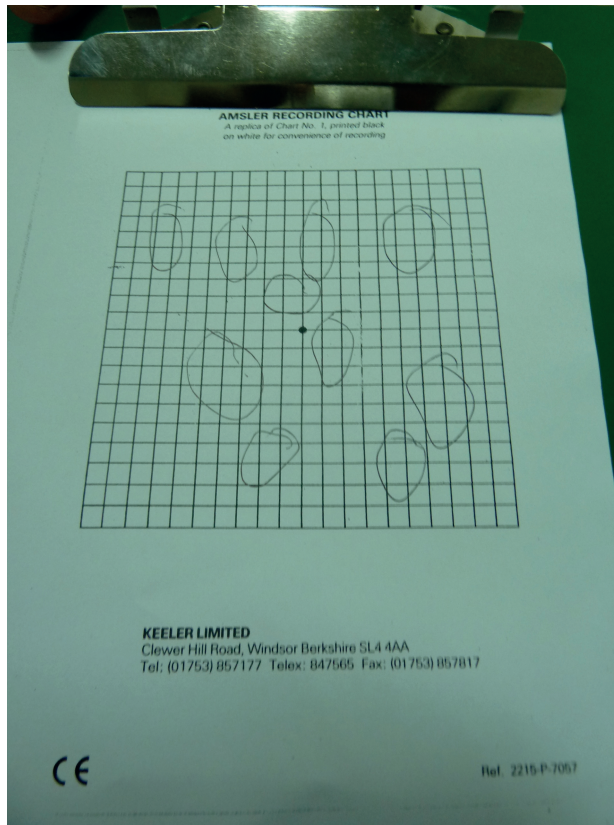


Figure 1 : Amsler Recording Chart: distortions of shape and size

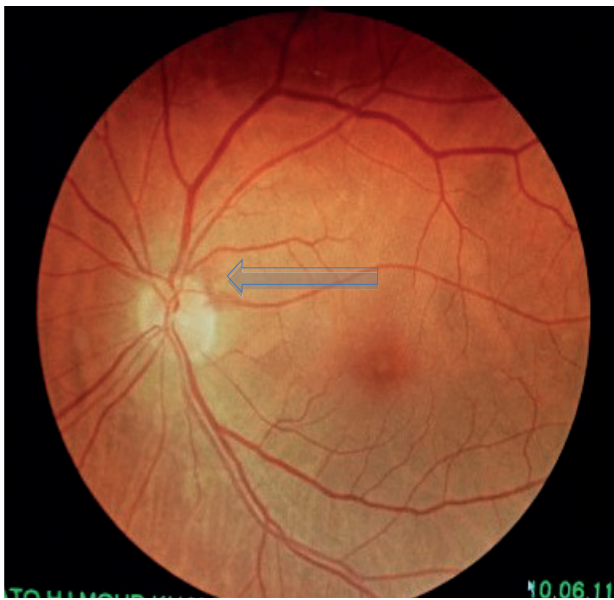


Figure 2 : Fundus Camera; Hemorrhage at periphery of optic disc (arrow)

### Discussions

High altitude retinal hemorrhage (HARH) is a rare condition which arises from rupture of retinal capillaries at high altitude. HARH had been discovered in 4% of 140 trekkers examined at 4243 m (13,917 feet) at Pheriche in the Himalayas<sup>1</sup>.

HARH develops following hypoxia at high altitude causing vasodilatation of retinal vessels. On top of that, increased sodium resorption in the kidney due to dehydration, increases atrial natriuretic peptide and aldosterone which in turn, cause increased intra-capillary pressure. Retinal venous pressure is also increased by extreme physical exertion and valsalva maneuvers during mountain climbing. A hypoxic retinal capillary bed exposed to increased retinal venous pressure predisposes to intraretinal hemorrhage. In a small study among experienced Mount Aconcagua climbers, retinal vascular engorgement and tortuosity were present in varying degrees in both eyes among all subject climbers<sup>1</sup>. One of the climbers had both retinal hemorrhage and pulmonary edema. Of the two subjects who had visual field defects, one had severe nerve fiber layer defects of both eyes. Optical Coherence Tomography done on this patient done 2 weeks upon returning to Malaysia showed minor defect of the nerve fiber layer<sup>2</sup>. Although HARHs are often not associated with acute visual symptoms, they may result in a loss of visual acuity or paracentral scotomas. Consequences for ocular health depend greatly on the extent and localization of retinal bleedings, but are generally mild and reversible in healthy eyes<sup>3</sup>. The intra or preretinal hemorrhages often spare the macular area, as in this patient. These patients do not experience debilitating symptoms unless vitreous hemorrhage occurs. HARH that results in decreased visual acuity should be a contraindication for further ascent. A significant correlation between retinal hemorrhages and symptoms of acute mountain sickness (AMS) was noted.

High altitude retinopathy is both a significant component of and a predictor of progressive altitude illness. However, evacuation of individuals with decreases in visual function resulting from HARH (in the absence of high-altitude cerebral edema (HACE) or high-altitude pulmonary edema (HAPE)) should be considered non-emergent unless reexamination indicates a progressive deterioration of vision or increasingly severe retinopathy. Moreover, most retinal hemorrhages were detected after return to base camp from a high altitude. No post-expedition ophthalmic sequelae were detected. The incidence of retinal hemorrhages may be greater than previously appreciated as a definite time lag was observed between highest altitude reached and development of retinal bleeding. Retinal hemorrhages should not

be considered warning signs of impending severe altitude illness due to their delayed appearance<sup>3</sup>. HARH usually resolves over a period of 2 to 8 weeks after the altitude exposure is terminated. Nevertheless, in this patient, the metamorphosis lasted for 10 months. Although, ascending slowly and use of supplemental oxygen is thought to prevent high altitude retinopathy, there is no certainty that it would not occur.

### Conclusion

Any patients developing metamorphopsia and scotoma at high altitude which is painless should be sus-

pected of HARH. Depending on the site of bleeding, a patient may lose his vision if it occurs within the axis of vision in the macula. Patients sustaining HARH should be advised to abandon climbing as there is a risk of rebleeding or further bleeding. They should understand that the time taken to heal may take months. Patients sustaining HARH should undergo *Optical Coherence Tomography* of the Macula as they have high risk of developing nerve layer damage. No definitive treatment other than supportive treatment is available for these patients. Patients need to be counseled to understand this condition.

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