



# Retinal Changes in a Case of High Altitude Retinopathy (HAR)

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## Abstract

High Altitude Retinopathy (HAR) refers to retinal changes that occur in individuals travelling to higher altitudes. It is not a common condition and is usually reversible so early detection and diagnosis is very much important for timely management. It is usually characterized by sudden blurring of vision and on fundus examination, retinal hemorrhages may be present which may be associated with disc edema as well in some cases.

## Introduction

High Altitude Retinopathy (HAR) refers to retinal changes seen in unacclimatized individuals. It is one of the components of high altitude sickness which comprises of Acute Mountain Sickness (AMS), High Altitude Cerebral Edema (HACE) and high altitude retinopathy [1]. All these changes occur as a response to acute hypoxia on travelling to higher altitudes resulting in sudden vasodilatation. This then leads to engorgement of retinal vessels causing retinal hemorrhages, optic disc hyperemia and edema, nerve fiber layer infarction and even vitreous hemorrhages in severe cases [2]. The patient usually presents with sudden diminution of vision on exposure to higher altitudes which then regresses on travelling down to lower altitudes. However, other causes must be ruled out before formulating the diagnosis as high altitude retinopathy may be misdiagnosed as many other conditions have similar presentation.

## Case Presentation

A 30 years young female with history of recent travel to high mountains (6400 m from sea level) presented with complaints of nausea, headache and blurring of vision in both eyes. She is a mountaineer by profession but this was the first time that she had travelled to such a higher altitude within a short duration of 2 days. She doesn't give any history of loss of consciousness, fever, vomiting or trauma.

On examination, unaided visual acuity in right and left eye were +0.6 logMAR and +0.3 logMAR units respectively. Relative Afferent Pupillary Defect (RAPD) was absent.

On fundus examination, bilateral disc edema was present and hemorrhages were seen  $\frac{1}{2}$  disc diameter above the macula and below the disc in right fundus (Figure 1 and 2).

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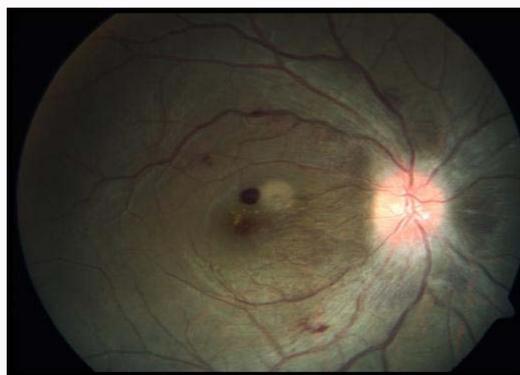


Figure 1: Right fundus showing disc swelling and retinal hemorrhages,  $\frac{1}{2}$  disc diameter above macula and other around the inferior arcade.

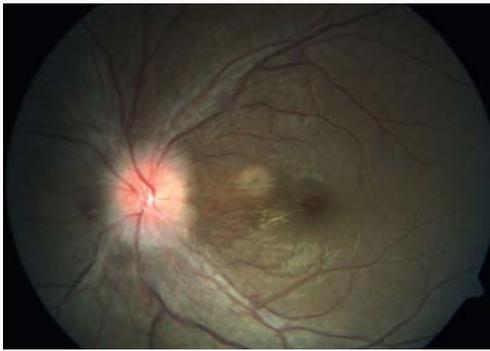


Figure 2: Showing disc swelling in left eye.



Figure 3: Right fundus angiography showing active disc hyperfluorescence with area of hyperfluorescence over the areas of hemorrhages.



Figure 4: Left fundus angiography showing disc hyperfluorescence.

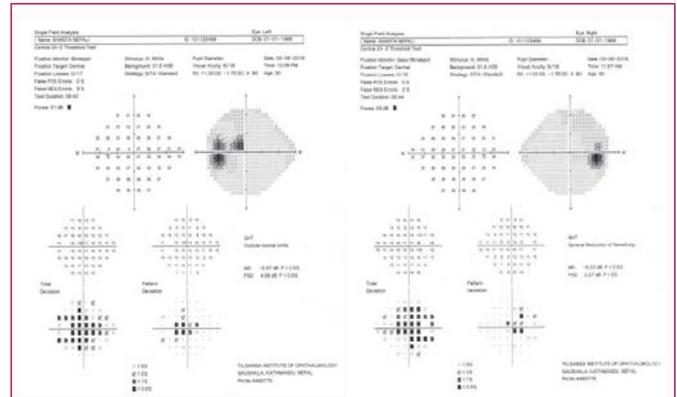


Figure 5: Automated visual field of left and right eye respectively.

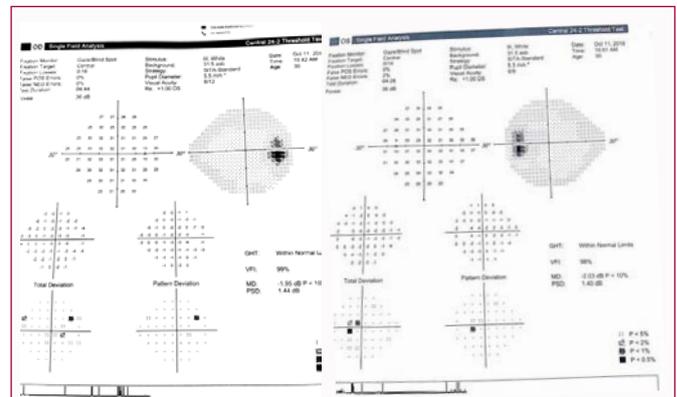


Figure 6: Automated visual field reports at 1 month visit.

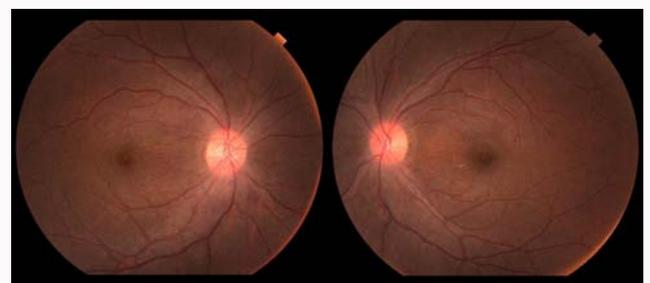


Figure 7: Fundus images of right and left eye at 1 month visit.

Fundus Fluorescent Angiography (FFA) showed B/L early and late disc hyper fluorescence with hypo fluorescence over the areas of hemorrhages in right fundus (Figure 3 and 4).

Automated Visual field showed central scotoma in the left eye while right eye was normal (Figure 5).

The patient was then started on a short course of oral steroids on tapering dose for about 2 weeks. Following which improvement was noted in visual acuity.

Best corrected visual acuity noted on following visit after 1 months was +0.3 logMAR and +0 logMAR units respectively. On automated visual field no scotoma was seen (Figure 6) and on fundus examination, disc edema and retinal hemorrhages had subsided as well (Figure 7) in both the eyes.

### Discussion

High altitude retinopathy though being a component of high altitude sickness is often unknown to many of the high altitude climbers which require immediate descent to lower altitudes on appearance of symptoms. It is often accompanied by features such as nausea, vomiting, and blurring of vision on sudden ascent to a higher altitude. Some persons show symptoms even at a lower altitude such as 2440 meters while most show some symptoms at 4575 m [3]. The symptoms usually appear on 8 h to 24 h of ascent to high altitude and disappear after 4 to 8 days period of decent [4].

Many theories have been proposed regarding the pathogenesis however the exact mechanism being still unknown. Hemoconcentration due to excessive loss of moisture from humidifying cold air and hypoxia are thought to be the main factors leading to these changes [3]. Younger people and people who have previously experienced altitude sickness have higher chances of high altitude retinopathy

[5]. Slow ascent and allowing adequate time for acclimatization is the best preventive method. However, acetazolamide taken 48 h prior to climbing have shown to be beneficial [6].

Retinal hemorrhages are one of the most common presentations of high altitude retinopathy [7]. Hemorrhages occur due to rupture of capillaries or leakage due to increased blood rate and volume of blood flow as a response to hypoxia [7]. Presence of auto regulatory mechanism at the retinal circulation but not at choroidal circulation explains why the retinal hemorrhages are present more frequently over the superficial retina [8].

Swelling of optic disc and hyperfluorescence is present in about 40% of the patients which suggests breach of the blood retinal barrier by the combined stress of hypoxia and exertion [2]. Cotton wool spots may also be a component of high altitude retinopathy which represents areas of nerve fiber layer necrosis due to hypoxia and hypo perfusion [2].

Changes similar to the retinal changes due to High Altitude Retinopathy (HAR) may also occur in patients with hypoxemia from other illnesses that may lead to mistaken diagnosis and improper management [2]. So proper history, taking and detailed fundus examination is very much important for correct diagnosis. Most of the cases do not require any treatment though timely descent to the lower altitudes immediately on appearance of symptoms is very much important.

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