Short communication

High-altitude retinopathy

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A B S T R A C T

Case report: This case report presents a 36-year-old male with a sudden loss of vision while taking part in an expedition in the Daulaghirí (8167 m high peak located in the Himalayan Mountain Range).

Discussion: High altitude retinal hemorrhage is a common condition in those mountaineers who reach altitudes over 5500 m. Depending on its location it may not present any symptoms and the condition improves with no further complications. However, in case of macular involvement the vision decreases dramatically and the consequences are uncertain.

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Retinopatía de gran altura

R E S U M E N

Caso clínico: Varón de 36 años que presenta pérdida súbita de visión central, durante una expedición al Daulaghirí (cordillera del Himalaya), de 8.167 m de altitud.

Discusión: Las hemorragias retinianas de la altura son una manifestación frecuente en montañeros que superan los 5.500 m de altitud. Según su localización puede cursar de forma asintomática y suele evolucionar favorablemente. En caso de afectación macular, la visión disminuye de forma drástica y el pronóstico es incierto.

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Introduction

High-altitude retinopathy was described for the first time in 1969 although the literature had described retinal changes in two workers who were working at an altitude of 5334 m (Mount Logan, Canada) and in soldiers posted in the Himalaya region in 1968.

At present, we know that approximately 50% of mountaineers who go above 5500 m present some sign of the syndrome, characterized by congestion and vascular tortuosity, retinal hemorrhages and in some cases optic disc edema. However, the said percentage varies in different studies. Recently, Barthelmes et al. have found retinal hemorrhages in 79% of mountaineers who took part in an expedition to Mount Muztagh Ata (7546 m).1

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The etiology of high-altitude retinopathy is unknown and there is no consensus between different authors about the risk factors although it has been related to quick ascents, insufficient adaptation and exerting physical exercise. This is not the case with other variables such as the maximum altitude reached in previous expeditions or the number of days spent at extreme altitudes.

The pathogeny is not clear either. Recent studies refer to alterations in the self-regulation of the retinal blood flow in this type of patients in the presence of hypobaric hypoxia.

In addition, it can develop without symptoms or express diminished visual acuity depending on the location of the hemorrhages. Even though the injuries are resolved and visual acuity is recovered in a high percentage of cases, visual function tests revealed in some occasions residual alterations as described by Wiedman. However, this is not constant because Barthelmes has not evidenced campimetric, angiographic or Doppler alterations in any of the 22 mountaineers who were assessed for retinal hemorrhages after ascending up to 7546 m.

Retinal hemorrhages are not the only ophthalmological expression of high altitudes. It has been demonstrated that hypoxia conditions at the said altitudes cause corneal endothelial dysfunctions, which induce increases in pachymetry due to stromal edema. This could cause blurred vision in mountaineers and is more significant in subjects intervened for refractive surgery.

In addition, a statistically significant increase of intraocular pressure has been demonstrated, probably secondary to pachymetry changes, which returns to normal values after the descent. There is no correlation between these 2 findings and the appearance of retinal hemorrhages or acute mountain disorder.

Additional conditions related to high altitudes include acute mountain disorder, non-cardiogenic pulmonary edema and high altitude cerebral edema.

Anatomic and functional studies of the internal hemoretinal and hematoencephalic area exhibit several similarities including the existence in both cases of vascular flow self-regulation. For this reason, some articles ponder whether some degrees of high-altitude retinopathy could be a risk marker for the development of high altitude cerebral edema. Wiedman and Tabin obtained a statistically significant correlation between severe high-altitude retinopathy and cerebral edema, and considered the ophthalmological condition as a risk indicator of an evolution to more severe pathologies. However, neither the observations by Clark nor the recent study by Barthelmes found risk indicators for developing cerebral edema in high altitude retinopathy.

**Clinical case**

Patient, 36, without personal history (case 1). During an expedition to Mount Daulaghiri (8167 m high), sudden loss of vision occurred in the left eye. Despite the clinic, the patient continued the ascent and was assessed for the first time in our service 2 weeks later. Best corrected visual acuity was of 10/10 in right eye and finger counting at 1 m in left eye, direct and consensual photomotor reflexes were normal, and there were no relative afferent pupil defect and normal anterior pole. The right eye ocular fundus did not exhibit any noteworthy alteration while in the left eye a pre-retinal hemorrhage was found in the macular area (Fig. 1).

Within 2 weeks the hemorrhage was reabsorbed almost entirely, leaving fibrin remains. At that time, the visual acuity was 1/10 in said eye (Fig. 2).

Two months later the patient recovered 10/10 vision and the ocular fundus did not exhibit hemorrhage remains apart from residual fibrin. For the first time since diagnostic the fovea was identified and pigmented epithelium mobilization was determined as a sequel (Fig. 3).
At the same time another 37-year-old mountaineer from another expedition without general history was attended to (case 2). This patient completed the ascent despite the symptoms experienced during the expedition. When assessed in our center, the visual acuity of this patient was 0.05 in right eye and 10/10 in left eye. The photos of the first assessment are shown (Figs. 4 and 5). We were unable to follow up the evolution of this case as the patient decided to return to his country to obtain treatment for other injuries caused by freezing.

**Conflict of interests**

No conflict of interest has been declared by the authors.

**References**