潜水後の眼痛や眼前白濁症状は減圧症？

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背　景

減圧症に関する医学的な
知識を系統だって学ぶ
機会は通常の医学部や
消防学校にはほとんど
ないに等しいため、潜水後
に発症した症状は全て
減圧症と考える傾向がある

症例

31歳　男性

【主訴】　潜水後の眼痛

【現病歴】　潜水終了後、眼に砂が入り、
こすった後、激しい疼痛あるため
119コール。

【消防からの連絡】　減圧症疑い

【眼科診察結果】　角膜損傷

【転帰】　点眼薬処方後帰宅

症例

35歳　男性

【主訴】　潜水後の右眼痛

【現病歴】　潜水終了後、右目が痛くなり
119コール。

【消防からの連絡】　減圧症疑い

【眼科診察結果】　紫外線もしくは異物による角結膜炎

【転帰】　点眼薬処方後帰宅

症例

？歳　男性

【主訴】　潜水後に眼前白濁視野出現

【現病歴】　潜水後に主訴出現

病院受診相談電話

【応答医】　減圧症の可能性を考え、高気圧酸素治療施設に治療依頼

適応外

【眼科診察結果】　角膜損傷

【転帰】　点眼薬処方後帰宅

潜水後の眼科関連疾患報告

DOI: 10.4274/tjo.67503
Turk J Ophthalmol 2017;47:296-297

Case Report

A 28-year-old male presented at the outpatient clinic with the complaint of bleeding in his left eye. He reported that he had made repeated breath-hold dives to a depth of approximately 10 to 12 meters. He could equalize his ears

Preventable Diving-related Ocular Barotrauma: A Case Report

息こらえ
or
Mask squeeze

による結膜下出血

Clin Exp Ophthalmol. 2008 Aug;36(6):581-2. doi: 10.1111/j.1442-9071.2008.01835.x.

Barotraumatic ocular haemorrhage sustained while scuba diving.

Yeoh R, Yeoh R, Singh M.

Mask squeeze

Diving Hyperb Med. 2018 Jun 30;48(2):112-113. doi: 10.28920/dhm48.2.112-113.

Acute ophthalmic artery occlusion in decompression illness with underlying anterior cerebral artery A1 segment hypoplasia.

Omar AR[1,2], Ibrahim M[2], Hussein A[2].

Author information

Abstract

A diver presented with total loss of vision in the left eye and right hemiparesis following a routine no-stop scuba dive to 20 metres' depth. A diagnosis of decompression illness (DCI) with acute ophthalmic artery air embolism and left carotid artery insult causing acute anterior circulatory ischaemia was made. He underwent seven hyperbaric treatments leading to a full recovery. Magnetic resonance angiography revealed an underlying left anterior cerebral artery A1 segment hypoplasia. Making a prompt diagnosis and early hyperbaric oxygen treatment are crucial to halt further tissue damage from ischaemia in central nervous system DCI. In this case, the finding of a left A1 anterior cerebral artery segment hypoplasia variant may have increased the severity of DCI due to deficient collateral circulation.

網膜中心動脈塞栓による視力障害

Diving Hyperb Med. 2016 Mar;46(1):50-3.

Hyperbaric oxygen for the treatment of the rare combination of central retinal vein occlusion and cilioretinal artery occlusion.

Celebi AR[1], Kilavuzoglu AE[2], Altiparmak UE[2], Cosar CB[2], Ozkiris A[2].

⊕ Author information

Abstract

A 43-year-old male presented with sudden onset of painless, blurred vision in his left eye. Dilated fundoscopic examination showed signs consistent with the diagnosis of a combination of central retinal vein occlusion (CRVO) and cilioretinal artery occlusion (CLRAO). He received daily 2-h sessions of hyperbaric oxygen treatment (HBOT), 253 kPa for 14 days. At the end of the HBOT course, the patient's left visual acuity had improved from 20/200 to 20/20. Dilated fundoscopic examination showed that the intra-retinal haemorrhages in the entire retina and the retinal whitening along the course of the CLRA seen at presentation had completely resolved. The combination of CLRAO and CRVO comprises a discrete clinical entity. Even though there are many hypotheses concerning this condition, it is most likely the result of elevated intraluminal pressure in the retinal capillaries due to CRVO that exceeds the pressure in the CLRA. HBOT may be an effective treatment for CRVO-associated CLRAO.

網膜中心静脈塞栓による視力障害

Undersea Hyperb Med. 2015 Jul-Aug;42(4):369-73.

A case of bilateral ophthalmoplegia while diving.

Lee BC, Young CR.

Abstract

This case report presents a military diver who became dysphoric and lost consciousness during a routine surface-supplied dive. The patient regained consciousness spontaneously, but the physical exam was notable for bilateral ophthalmoplegia. Full eye movement was regained during hyperbaric oxygen (HBO2) therapy, and the patient subsequently made a full recovery. Equipment and dive profile analysis led to the conclusion of hypercapnia and arterial gas embolism as the probable causes of the diver's symptoms. This is a unique case of isolated bilateral ophthalmoplegia presenting in a diving injury.

潜水後の眼筋麻痺（複視）：動脈塞栓？

Wilderness Environ Med. 2010 Sep;21(3):250-2. doi: 10.1016/j.wem.2010.06.003. Epub 2010 Jun 9.

Orbital subperiosteal hematoma from scuba diving.

Rosenberry C[1], Angelidis M, Devita D.

Author information

Abstract

Only a few cases of nontraumatic orbital subperiosteal hematoma due to scuba diving have been reported, and this is the first of such cases that underwent surgical intervention. This injury results from negative pressure within the face mask, suctioning orbital tissues into the mask after incomplete equilibration of pressure on descent. Valsalva maneuver is a second mechanism implicated in the etiology of this injury. Recognition of this injury is of the utmost importance because vision loss is a possible complication if there is compression of the optic nerve or increased intraocular pressure. In many cases of nontraumatic orbital hematoma, conservative management is adequate; however, this case was an exception due to worsening exam findings. Divers may be able to prevent this injury by frequent and gentle equilibration of mask pressure on descent.

息こらえ
or
Mask squeeze

による眼窩出血

Orbit. 2012 Oct;31(5):347-9. doi: 10.3109/01676830.2012.694555. Epub 2012 Jun 13.

Non-traumatic subperiosteal orbital hemorrhage secondary to barotrauma.

Woo D[1], Rogers S, Leong J, Clement CI, Kourt G.

⊕ Author information

Abstract

PURPOSE: To report a case of non-traumatic subperiosteal hemorrhage (NTSOH) secondary to barotrauma.

MATERIAL AND METHODS: Observational case report.

RESULTS: A 42-year-old female presented with right proptosis with bilateral petechial lid hemorrhages, chemosis and diplopia following scuba diving. This occurred in the context of a tight facemask resulting in 'mask squeeze', and performance of Valsalva maneuver to equalize ear pressure. Clinically, there were no signs of optic nerve involvement. Computed tomography (CT) demonstrated signs consistent with right subperiosteal hematoma adjacent to the orbital roof with inferolateral displacement of the superior rectus. Patient recovered well after being admitted for intravenous dexamethasone without surgical intervention.

CONCLUSION: NTSOH from barotrauma can result from 'mask squeeze' under a tight-fitting mask and exacerbated by use of Valsalva maneuvers. This may be prevented with frequent pressure equalization during diving.

眼球充血、複視：mask squeeze による眼球、眼窩出血

BMJ Case Rep. 2013 Aug 20;2013. pii: bcr2013010309. doi: 10.1136/bcr-2013-010309.

Sphenoidal sinus mucocele presenting with acute visual loss in a scuba diver.

Mowatt L[1], Foster T.

⊕ Author information

Abstract

A 43-year-old male scuba diver presented with an acute history of painful unilateral visual loss after scuba diving. He had right-sided retrobulbar pain and headache. He was known to have sinusitis and had transient visual loss in two previous episodes after scuba diving. His visual acuity was hand motions and 20/20 in the right and left eye, respectively. There was no proptosis. He had a right relative afferent pupillary defect. Colour vision was normal in the left eye and absent in the right eye. Fundal examination revealed healthy discs and macula bilaterally. He was assessed as a right optic neuropathy, possibly secondary to compression. An MRI of the brain revealed a large sphenoidal mucocele extending into the right optic foramen. He was treated with oral steroids, antibiotics and nasal decongestants. He underwent endoscopic intranasal sphenoidectomy and marsupialisation with return of his visual acuity to 20/25 in that eye.

粘液嚢胞による視神経圧迫による視力障害

Undersea Hyperb Med. 2013 Jan-Feb;40(1):81-6.

Unilateral optic neuropathy from possible sphenoidal sinus barotrauma after recreational scuba diving: a case report.

Gunn DJ[1], O'Hagan S.

Author information

Abstract

A case report is presented of a 35-year-old woman who developed a progressive right optic neuropathy while surfacing from a series of four recreational dives on the Great Barrier Reef, Queensland, Australia. The patient reported severe sudden onset blurred vision in the right eye associated with a mild headache and epistaxis on surfacing from diving. The patient had her first medical review the day after returning from her trip. At this time visual acuity in the right eye was 20/80, with left eye 20/20. There was a relative afferent pupillary defect in the right eye. A high-resolution computed tomography scan showed fluid in the right sphenoid sinus. Computed perimetry revealed patchy visual field loss in the right eye. The provisional diagnosis of sphenoidal sinus barotrauma-induced optic neuropathy was made. Over 10 days of observation, the visual acuity returned to 20/20 in the right eye and visual field changes resolved. This case highlights a very unusual cause of visual loss associated with diving.

鼻血、頭痛、視力力害：圧外傷による副鼻腔出血

Arch Soc Esp Oftalmol. 2016 Mar;91(3):142-4. doi: 10.1016/j.oftal.2015.09.006. Epub 2015 Dec 4.

Diplopia due to barotrauma.

[Article in English, Spanish]

González-Pastor E[1], Fernández-Tresguerres F[2], Palomares-Fernández J[2], Toledano N[2].

⊕ Author information

Abstract

CASE REPORT: A 38-year-old woman who, during a scuba dive at 7 metres, suffered from eye pain, hyperaemia, and exophthalmos. She was diagnosed with ocular barotrauma with transient diplopia. She was seen in the emergency room 10 days later, with no diplopia, but mild left proptosis. In the computed tomography an image of extraconal occupation is observed in the left orbital roof. The magnetic resonance confirmed an intraorbital haematoma.

DISCUSSION: Ocular barotrauma is usually a benign condition mostly occurring in an inexperienced diver. However, a detailed examination is important to rule out potential vision and life threatening conditions.

圧外傷による眼窩壁出血：眼痛、充血、眼球突出、複視

Am J Ophthalmol. 1997 Oct;124(4):562-4.

Optic nerve avulsion from a diving injury.

Fard AK[1], Merbs SL, Pieramici DJ.

Author information

Abstract

PURPOSE: To report a patient with optic nerve avulsion caused by forceful rotation of the globe that occurred when his thumb penetrated the orbit while he was diving.

METHODS: A 17-year-old boy was initially examined for sudden loss of vision after jumping feet first from a bridge 50 feet above a river. Upon hitting the water, he felt his right thumb push into his right globe. The patient underwent ophthalmologic and imaging examination.

RESULT: Examination disclosed a tear of the optic nerve head from the sclera temporally in the right eye.

CONCLUSION: Optic nerve avulsion occurs secondary to forceful rotation of the eye with tearing of the optic nerve as it exits the globe.

飛び込みの際の外力による視神経損傷

潜水に伴う眼科疾患のまとめ

機　序	疾　患
息こらえ・mask squeeze（圧外傷）	結膜下出血、眼窩出血、眼球出血
圧外傷	副鼻腔障害による視力障害
空気塞栓もしくは減圧症	網膜中心動脈・静脈塞栓症による視力障害
その他	
飛び込みの際の眼球への外力	眼球損傷、視神経損傷
潜水後の砂の迷入	角結膜損傷
紫外線	角膜炎

TABLE 1

Ocular Manifestations of Decompression Sickness

1. Nystagmus
2. Diplopia
3. Visual field defects
4. Scotoma
5. Homonymous hemianopia
6. Orbicularis oculi pain
7. Cortical blindness
8. Convergence insufficiency
9. Central retinal artery occlusion
10. Optic neuropathy

Diving and Hyperbaric Ophthalmology

CAPTAIN FRANK K. BUTLER, JR., MD

TABLE 2

Causes of Acutely Decreased Vision after Diving

1. Decompression sickness
2. Arterial gas embolism
3. Displaced contact lens
4. Anti-fog keratopathy
5. Ultraviolet keratitis
6. Corneal edema resulting from bubbles under PMMA or rigid gas permeable contact lenses
7. Contact lens adherence syndrome

Diving and Hyperbaric Ophthalmology

CAPTAIN FRANK K. BUTLER, JR., MD

結　語

潜水に関わる眼科疾患に関して、自験例と文献例を紹介した。

潜水に関わる眼科疾患も様々なものがあり、

潜水医学に関わるものは、精通しておく必要がある。