Short communication

Subhyaloid macular haemorrhage in Terson syndrome, treated by rupture of the posterior hyaloid using YAG laser

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ABSTRACT

Case report: We present the case of a 48-year-old man who had a sudden onset of vomiting, headache and loss of consciousness. The visual acuity was severely reduced in the left eye, with a large subhyaloid hemorrhage being observed in the fundus.

Discussion: The combination of subarachnoid hemorrhage and a vitreous hemorrhage is called Terson syndrome. The details of the treatment of this case with YAG laser are also discussed.

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Hemorragia subhialoidea macular, tratada mediante ruptura de la hialoides posterior con láser YAG en un síndrome de Terson

RESUMEN

Caso clínico: Se presenta el caso de un varón de 48 años, con vómitos, cefalea y pérdida de conciencia de instauración brusca debido a una hemorragia subaracnoidea secundaria a la ruptura de un aneurisma. Tras recuperar la conciencia, el ojo izquierdo presentaba una agudeza visual de bultos, evidenciándose en el fondo de ojo una hemorragia subhialoidea de grandes dimensiones.

Discusión: La asociación de una hemorragia subaracnoidea con hemorragia vitrea se denomina síndrome de Terson. A continuación se discute las particularidades en el tratamiento, mediante láser YAG, de este caso.

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Introduction

The association between any type of intracranial, subarachnoid or subdural hemorrhage with intraocular hemorrhage is known as Terson syndrome. It is generally due to the spontaneous rupture of a brain aneurysm. It was first described in 1900 by Albert Terson. This syndrome and other retinal hemorrhages have been associated in over 40% of patients with brain aneurysm ruptures. Frizzell et al. confirmed with their studies that subarachnoid hemorrhage (SAH) is defined as the presence of blood in the subarachnoid space and in the underlying cisterns.\textsuperscript{1,2} The origin of this hemorrhage is variable: it could be due to vascular problems, rupture of intracranial aneurysms or arterial/venous malformations, tumors that can bleed in the subarachnoid space and cranioencephalic traumatism. Approximately 80% of SAH originate due to rupture of intracranial aneurysms.\textsuperscript{1,2}

Intraocular hemorrhage can occur in the subretinal or intraretinal space as well as in the vitreous cavity. The mechanism associating intraocular hemorrhage with subarachnoid bleeding is not well known. Some theories affirm that blood is directly compressed through the optic nerve sheath within the orbit simultaneously with the occurrence of the SAH. Other theories suggest that vitreous hemorrhage is a consequence of venous hypertension and the disruption of retinal veins.\textsuperscript{2}

Clinic case

Male, 48, Caucasian, who visited the emergency service due to sudden headache, vomiting and unconsciousness. By means of computerized axial tomography he was diagnosed with SAH secondary to spontaneous aneurysm rupture. After a week in coma, the patient recovered consciousness. A few days later the aneurysm was embolized using a platinum micro-spiral. The only relevant history of the patient was arterial hypertension.

Ophthalmological exploration revealed a visual acuity of 0.8 in the right eye and bulk objects in the left eye. Under biomicroscopy, the anterior pole was normal in both eyes with ocular pressure of 12 mmHg in both eyes. Indirect ophthalmoscopy evidenced a large subhyaloid hemorrhage (Fig. 1), in the left eye. Ocular echography was performed which did not evidence regmatogenous injuries causing the hemorrhage. When the patient improved, angiography was performed with similarly normal results (Fig. 2D). After several weeks in recovery and observation no improvement was observed in ophthalmological clinical. In order to avoid submitting the patient to additional stress a conservative treatment was decided upon with YAG laser. Shots in increasing power were made on the posterior hyaloid up to 2 mJ in the inferior zone to obtain a small burn which drained the blood to the vitreous cavity, generating dense hemovitreous (Fig. 2A–C). After several months of observation, the hemovitreous was reabsorbed and the patient recovered his visual acuity (Fig. 3). At present, the patient is attending regular checkups in our service.

![Fig. 1 – Large subhyaloid hemorrhage, in the left eye fundus of our patient.](image)

Discussion

Terson syndrome makes reference to the association of SAH (Fig. 4) with intraocular hemorrhage. Approximately, 85% of these hemorrhages are caused by aneurysm rupture, located in the lower part of the Willis polygon. The 3 most frequent locations are: intracranial internal carotid artery, medial cerebral artery bifurcation and basilar artery upper area. No correlation has been found between the aneurysm location and the laterality of the Terson syndrome.

SAH is a medical emergency and as such it requires the earliest possible diagnostic and precise treatment. The rate of bleeding in aneurysm ruptures is 10 for every hundred thousand inhabitants/year. It accounts for 6% of cerebrovascular accidents and exhibits high morbidity/mortality. Incidence increases with age and in 60% of cases it affects females.\textsuperscript{1,2} Of these, 12% died suddenly before receiving medical attention. An additional 25% die within 3 months after the accident. Approximately, the mortality of these hemorrhages is 50% (including prehospital demise). The third part of survivors remain dependent and 40% exhibit some neurological sequelae. This high morbidity/mortality is due to primary bleeding as well as secondary complications of SAH such as vessel spasms and repeated bleeding.\textsuperscript{1,2}

Subhyaloid hemorrhage treatment could involve observation, vitrectomy and in some cases hemorrhage drainage to the vitreous, rupturing the retaining wall with YAG laser. However, it is a controversial subject without conclusive studies. Prior to the appearance of YAG laser, these hemorrhages were left to evolve for long periods of time up to disappearance, or cleared with pars plana vitrectomy. YAG laser has produced an alternative for treating some pre-retinal hemorrhages in the Terson syndrome.

The drainage of these hemorrhages with YAG laser was described in the late 1980s of the past century.\textsuperscript{3} Durukan et al.\textsuperscript{3} studied 16 eyes with premacular subhyaloid hemorrhage (under one month evolution and at least 4 papilla diameters, without baseline macular disease) secondary to Valsalva, submitted to hyaloidotomy with YAG laser with the aid of a 3-mirror contact lens. The powers required ranged
between 2.2 mJ and 9.7 mJ. The opening was made as far from the fovea as possible in the lower area of the hemorrhage. The patients were followed up for 2 years, with 100% visual recovery within one month in all patients and without laser-derived local complications. The vitreous hemorrhage disappeared before the month and vitrectomy was not required for any patient.

With the adequate power, a single laser pulse can drain the hemorrhage although several impacts are frequently required.

The pupil must be in maximum dilatation and the impact must be directed through the pupil center to avoid interference of the laser beam by any structure that could lead to power increases and the ensuing risk of impinging the retina. The laser must be adequately focused on the surface of the hemorrhage, in the lower limits, far from the fovea and from retinal vessels, in a hemorrhage area with sufficient thickness to protect the underlying retina. The lowest possible energy should be applied to begin with, with regular increases up to the point in which the perforation is visible in the hemorrhage surface.

It is not recommendable to treat premacular subhyaloid hemorrhages of under 3 papilla diameters and with powers over 9 mJ. In the above-mentioned study of 21 eyes, a macular hole was caused when treating a hemorrhage having a diameter of one papilla. In these cases, the posterior hyaloids is very close to the retina surface.

Optic coherence tomography can be used to identify the location of the hemorrhage. In 2 patients with retinopathy due to Valsalva, Shukla showed 2 different membranes in optic coherence tomography. The internal limiting membrane immediately above the hemorrhage exhibited high reflectiveness, while above it the posterior hyaloids were visualized as a thin membrane with low reflectiveness. Utilizing optic coherence tomography, Meyer identified a persistent premacular cavity posterior to membranotomy with argon laser, probably due to the membranotomy closure secondary to cell proliferation. If the patient of this case had not been submitted to YAG
hyaloidotomy, due to the large size of the hemorrhage it would have taken a long time to reabsorb, opening the way for complications which could have derived in a belated vitrectomy.

A broad prospective study with all 3 possible treatments, i.e., observation, YAG laser and vitrectomy is required in patients with preretinal hemorrhage to protocolize treatment of the Terson syndrome. In this Clinic Case no optic coherence tomography was performed. We suspected that the hemorrhage was subhyaloid but perhaps it was under the internal limiting membrane. The fact that it opened with low laser power leads us to suspect the subhyaloid location.

Accordingly, in young working patients without other baseline ocular disease, fast visual recovery can be achieved with YAG laser after informing the patients about the benefits as well as the risks of said treatment.5

**Conflict of interests**

No conflict of interests has been declared by the authors.

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**REFERENCES**


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**Fig. 4 – Brain CAT showing subarachnoid hemorrhage in the carotid cistern and sylvian, and temporal intracerebral hemorrhage due to aneurysm rupture.**