Short communication

Use of intravitreal bevacizumab for the treatment of choroidal neovascularization secondary to choroidal rupture

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ABSTRACT

Case report: A 28-year-old male attended our Emergency Department with a traumatic choroidal rupture and macular haemorrhage. After pneumatic displacement of the haemorrhage with C3F8 and tissue plasminogen activator, the haemorrhage was reabsorbed and visual acuity (VA) improved. Three months later the patient presented with decreased VA and a juxtafoveal choroidal neovascularization (CNV) that was treated with intravitreal bevacizumab. One year after a single bevacizumab injection the CNV remained inactive, with a final VA of 0.5.

Discussion: Intravitreal bevacizumab injection is a new and effective treatment for traumatic CNV. In our patient, in contrast to other aetiologies, the CNV needed no more than one Avastin® injection to be inactive, after one year of follow-up.

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RESUMEN

Bevacizumab intravitreo en el tratamiento de la neovascularización subretiniana secundaria a rotura coroidea

Palabras clave:
Activador tisular del plasminógeno (rTPA)
Desplazamiento neumático
Hemorragia submacular
Traumatismo ocular
Bevacizumab

Caso clínico: Paciente varón de 28 años que presenta rotura coroidea y hemorragia macular posttraumáticas de 24 horas de evolución acude al servicio de urgencias. Se realizó desplazamiento neumático de la hemorragia mediante inyección intravitrea de C3F8 y activador tisular del plasminógeno (rTPA), consiguiéndose la reabsorción de la hemorragia y mejora de la agudeza visual (AV). Al cabo de 3 meses, el paciente acude por empeoramiento de la visión con metamorfopsia, diagnosticándose de neovascularización (NVC) yuxtafoveal en la zona de la rotura, que se trata con una inyección de bevacizumab intravitreo. Un año después, la NVC permanece inactiva y la AV se mantiene en 0,5.


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Introduction

Choroidal rupture, first described by von Graefe in 1854, comprises the rupture of the choroids, Bruch’s membrane and retinal pigment epithelium (RPE). Generally, its etiology is traumatic and it also affects the posterior pole in the curved arrangement around the optic nerve. It is frequently associated to subretinal, intraretinal and/or pre-retinal haemorrhage in acute moments, with the involvement of the foveola being decisive for the visual prognosis. Damages in the Bruch membrane these predispose patients to the development of sub retinal neovascularization (NVC).

Clinic case

Male patient, age 28, visited the emergency service after traumatism due to a fist impact on the right eye (RE), 24 h after the aggression. Upon exploration, visual acuity (VA) was of hands movements in RE and 1.0 in the left eye (LE). The anterior segment of the RE did not exhibit significant alterations but the ocular fundus exhibited a large subretinal haemorrhage affecting the macular region (Fig. 1), with a probable arc-shaped and vertical temporal para-macular choroidal rupture. The LE exploration was normal.

A 50 μg intravitreal injection of plasminogen tissue activator (rTPA – Alteplase, Actilyse®, Boehringer-Ingelheim Spain SA. Sant Cugat del Vallés, Spain) and 0.4 cm³ of pure C3F8, were applied after anterior chamber paracentesis in an attempt to displace the haemorrhage. Subsequently the patient was instructed to remain lying down at 45° during 7 days. The patient evolved positively with mobilization and reabsorption of the haemorrhage (Fig. 2) and VA improvement up to 0.7 in RE 4 months after the intervention.

Three months later, the patient returned for a checkup referring diminished vision and metamorphosia in the RE. VA had diminished to 0.2 and the ocular fundus exhibited a greyish lesion in the area of the choroidal rupture (Fig. 3). Fluorescein angiograph (FA) revealed a well defined lesion with a maximum diameter of 940 μm (Fig. 4), with moderate exudation in late times, Fig. 4B. The diagnostic was typical and moderately active NVC in the foveal edge of the

Fig. 1 – Right eye retinograph showing choroidal rupture temporal to the fovea and hemorrhage with macular involvement.

Fig. 2 – After treatment with plasminogen tissue activator and 0.4 cm³ of pure C3F8, the hemorrhage reabsorbed with persistence of blood remains in the lower area.

Fig. 3 – Juxtafoveal lesion in the choroidal rupture area with subretinal fluid, corresponding to choroidal neovascularization.
It is frequently accompanied by intra-choroidal, subretinal or intraretinal haemorrhage with VA compromise when affecting the macular region. In certain situations of pathological weakness of Bruch’s membrane, such as angioid striations, slight traumatisms can cause large ruptures with extensive haemorrhage.

The histopathological process of choroidal rupture repair is completed 3 weeks after the traumatism with the formation of a well-established scar. This tissue process includes haemorrhage, early fibroelastic activity and frequently a significant fibrovascular component. RPE hyperplasia at the edges of the lesion is another frequent anatomopathological finding. The appearance of neovessels is nearly continuous in the scarring process of choroidal ruptures. In the majority of cases, this neovascularization disappears without producing clinical repercussions.

Approximately 10–20% of cases become complicated with the appearance of NVC. This occurs when angiogenic imbalance arises and it is no longer possible to inhibit the formation of neovessels. The appearance of NVC has been described from one month up to 4 years after the traumatism, generally of the classic type or type II, with growth from the scar towards the subretinal space, with the potential of invading the vitreous cavity. The frequency of appearance is greater the closer the choroidal rupture is to the fovea and the greater the size thereof, as well as in older patients.1

The treatment of subretinal haemorrhage secondary to choroidal rupture is controversial. Although in some cases observation is an option, toxicity on photoreceptors and macular RPE of blood degradation products, with possible irreversible visual loss, is a strong recommendation for treatment.2 The literature has described various treatment methods with variable results. Some conservative treatments such as intravitreal gas injections of SF6 and also C2F8 have demonstrated their effectiveness for displacing the haemorrhage both of traumatic aetiology and due to ARMD. This technique can be associated to intravitreal injection of rTPA.3 Pars plana vitrectomy with pneumatic displacement of the haemorrhage has also been utilized, optionally in association with intravitreal or subretinal rTPA injection as well as sub-macular haemorrhage drainage.

The treatment of NVC secondary to choroidal rupture is also multiple. Various management strategies have been applied to NVC, including simple observation and thermal laser photocoagulation. Photodynamic therapy with verteporfin has been broadly utilized for this disorder, as though with variable results. In several cases the NVC had to be retreated or its deactivation was not possible.

More recently,4,5 the utilization of vascular endothelial growth factor (VEGF) agents has been described in treating post-traumatic NVC. New antiangiogenic drugs have brought about a revolution in the treatment of NVC of various aetiologies. The visual improvements described with multiple injections of anti-VEGF drugs have become a turning point in the management of NBC due to exudative ARMD. Traumatic NVC has also been treated with satisfactory results with said anti-VEGF agents. Chanana et al. described the deactivation of NVC after traumatic choroidal rupture with VA improvement of 20/200 to 20/50, maintained during 6 months after a single injection of bevacizumab.4 Other authors described

**Discussion**

Concussion traumatism can produce multiple ocular lesions, both in the anterior and posterior segments of the eye. Choroidal rupture is a potential complication in this type of traumatism. It can be direct if it occurs at the place of impact or indirect when the location is opposite the point of impact. Eighty percent of choroidal ruptures are in the latter category.1 The majority of these ruptures are temporary to the papilla in a concentric arrangement around it.

Choroidal rupture consists of a tear of the choroids, Bruch’s membrane and RPE, with integrity of the sclera and the retina. The hardiness of the sclera and the elasticity of the retina allow these 2 structures to avoid tear during the traumatism.

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the need to reinject bevacizumab to deactivate the neovascular membrane or associate this treatment to photodynamic therapy.

A satisfactory result has been described in a patient after the utilization of ranibizumab, with a visual improvement of 20/40 to 20/25 after 12 months.

The result obtained in our case is in agreement with scientific literature reports to this date. In any event, at the time of the NVC treatment there were no experiences published in the literature. The treatment was initiated under the compassionate use protocol, explaining to the patient the uncertain result thereof on the traumatic NVC by a single injection of bevacizumab. In our case, in agreement with published reports, a single injection of Avastin® was able to deactivate the lesion with a VA improvement up to 20/40 and significant reduction of metamorphopsia, during 12 months follow-up. The response to the NVC treatment in our patient as well as in other cases with traumatic NVC described in the literature is substantially different to the response in patients with different aetiologies such as ARMD. Deactivation is achieved with one or two applications of anti-VEGF drug. The hypotheses that attempt to explain this relatively benign behaviour could be in the initially observed moderate activity phase of the injury. In addition, the retinal lesions observed in anatomopathological studies with loss of retinal external layers could facilitate an enhanced penetration of antiangiogenic drugs with greater action on neovascular tissue.

By way of conclusion, it can be said that an intravitreal injection of 1.25 mg of bevacizumab could represent an efficient, lasting and safe treatment for managing NVC after traumatic choroidal rupture.

REFERENCES