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ORIGINAL ARTICLE

Interest of local intra-arterial fibrinolysis in acute central retinal artery occlusion: Clinical experience in 16 patients



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KEYWORDS

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Angiography;
Visual acuity

Summary

Objective: Central retinal artery occlusion (CRAO) is a rare disease with poor visual prognosis. We evaluated clinical effectiveness of in situ fibrinolysis with original angiographic scores describing the aspect of carotid siphon, proximal ophthalmic artery, and choroid blush.

Methods: Retrospective study of 16 consecutive cases of CRAO between 2007 and 2013. Fourteen underwent in situ fibrinolysis, two were excluded due to pre-occlusive internal carotid stenosis on pre-procedural diagnostic angio-CT. Fibrinolysis was performed with rt-PA (average injected dose: 35 mg), with an average onset delay of 8 hours (4–17 h). We reported angiographic scores pre- and post-fibrinolysis, visual acuity (VA) before and after treatment, and VA improvement evaluated by ophthalmologist 6 to 12 months after thrombolysis.

Results: Six patients (43%) recovered post-fibrinolysis VA significantly improved, superior or equal to 1/10 (1/10 to 8/10). An irregular carotid siphon (2 cases) appeared as a predictive factor of failure. Fibrinolysis procedure led to a significant improvement of angiographic permeability of proximal ophthalmic artery ($P=0.0498$), but this result was not accompanied by any VA improvement. The aspect of choroid blush showed no correlation with the management of thrombolysis.

Abbreviations: CRAO, central retinal artery occlusion; VA, visual acuity; LIF, local intra-arterial fibrinolysis.

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Conclusion: In situ fibrinolysis was more effective than medical treatments or natural evolution of CRAO (VA improvement was respectively 40% and 20%). However, the benefit/risk ratio must be discussed, and an angio-CT of supra-aortic trunks could be systematically performed before thrombolysis, to assess the potential VA recovery compared with complications such as ischemic stroke.

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Introduction

Central retinal artery occlusion (CRAO) is a rare disease estimated to account for 1 in 10,000 outpatient ophthalmic visits [1]. The incidence in the general population has been reported to be 3.5 in 100,000 [2]. The visual prognosis is generally extremely poor and may lead to catastrophic sudden visual loss, especially in cases of macular impairment. The majority of CRAO cases have macular impairment unless there is a cilioretinal artery present enabling macular sparing. However, some authors have reported spontaneous good visual outcome, defined usually as final VA superior or equal to 1/10, in up to 20% of cases [3].

CRAO was first described in 1859 by Von Graefe [4], and a variety of treatments have been proposed (local management such as ocular massage, inhalation of carbogen [5] or Nd YAG laser [6]) or general management including vasodilators, antiglaucoma agents, antiplatelet agents, anticoagulants, corticosteroids, hemodilution, hyperbaric oxygen [1,3,7]. However, none of these treatments have shown a clear therapeutic benefit [8]. As for acute ischemic stroke, endovascular treatment can be used in CRAO.

In situ fibrinolysis was first described in 1992 by Schmidt and Schumacher [9]. The technique performed is based on carotid or vertebrobasilar fibrinolysis, which has been described in the treatment of ischemic stroke. Previous studies have shown visual improvement following ophthalmic artery in situ fibrinolysis in up to 30% of patients [10–17].

The fibrinolysis technique remains an invasive procedure, but few complications have been reported. The rate of potential serious complications, including stroke and intracerebral hemorrhage was calculated to be 4% [18].

The decision to perform the procedure is usually made by interventional neuroradiologists in accordance with the ophthalmologist team.

The time interval between onset of symptoms and treatment is the most important factor in determining outcome in patients with CRAO. Some authors have reported visual acuity improvement in case of treatment beyond the 8 hour after symptom onset [11]. The interest of local intra-arterial fibrinolysis (LIF) has been debated in several recent publications [19–21]. Therefore, the first objective of our study was to assess the efficacy of LIF in patients with CRAO in our institution. The secondary aim was to use an angiographic score analyzing the anterior circulation from carotid siphon to ocular globe as predictor of fibrinolysis success in CRAO.

Materials and methods

Sixteen consecutive cases of CRAO between 2007 and 2013 were considered for inclusion in this retrospective study,

and systematic angio-CT of supra-aortic trunks was performed in order to exclude patients with high embolism risk to the procedure. Out of these 16 patients, 14 underwent in situ fibrinolysis. The procedure was not performed in two patients for whom pre-procedural diagnostic angio-CT showed pre-occlusive internal carotid stenosis.

Therefore, a total of 14 patients with complete CRAO who underwent in situ thrombolysis of the ophthalmic artery were included and assessed.

Procedure

The decision to perform fibrinolysis was made in accordance between the neuroradiologist and ophthalmologist teams. All procedures were performed under conscious sedation. After completion of standard diagnostic digital subtraction angiography, supraselective ophthalmic artery catheterization was performed as follows: a bearing probe was positioned in the internal carotid artery in which a microcatheter (1.5 F Magic[®], Balt Extrusion[®], France) was inserted and positioned at ophthalmic artery ostium. Fibrinolysis was then performed in situ by slow automatic instillation of 50 mg alteplase (rt-PA, Actilyse[®], Boehringer Ingelheim[®], France) during 40 minutes. Both angiographic and clinical evaluations were performed by the neuroradiologist during injection to evaluate possible occurrence of early signs of efficacy, including: improvement of ophthalmic artery and choroid blush seen on angiography and clinical improvement reported by the patient. In cases in which all three factors were obtained, injection of rt-PA was stopped. The total injected dose of rt-PA varied from 20 to 50 mg (average 35 mg ± 13DS).

Data analysis

All angiograms were reviewed by two senior neuroradiologists and permeability scores were collected. Pre- and post-fibrinolysis angiographic scores were established based on the analysis of 3 criteria (Table 1):

- aspect of the carotid siphon (0: irregular, 1: regular);
- morphology of the ophthalmic artery (0: occluded, 1: hail 2: normal) (Fig. 1);

Table 1 Angiographic scores.

Angiography	0	1	2
Carotid siphon	Regular	Irregular	–
Ophthalmic artery	Occluded	Hail	Normal
Choroidal blush	Absent	Inconspicuous	Visible

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