

ATTEMPTS AT REVASCULARIZATION OF THE OPTIC NERVE IN TERMINAL GLAUCOMA

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The treatment, which we have called revascularization of the optic nerve, consists in the closure of the external carotid artery with the purpose of shunting the blood into the internal carotid artery, thus inducing an increase in the arterial flow to the optic nerve.

This operation should be performed in particular cases of perimetric terminal glaucoma, that is in cases where there is continued perimetrical deterioration even though intraocular pressure had been previously lowered to normal values.

The carotid artery is closed off with two strings using local anaesthesia. The following reasons led us to adopt the above method:

- 1) Notwithstanding the normalization of intraocular pressure, the sensory deterioration continued, probably owing to a "normative" pressure much lower than normal tension, i.e. lower than 18 mm. Hg.
- 2) The knowledge that in similar cases the use of vasodilator drugs may often cause cerebral damage, as they decrease cerebral blood supply due to a reduction of cardiac minute volume caused by more blood accumulation in muscle, skin, and visceral areas. Also strophanthin, suggested in these cases, has only a temporary effect.
- 3) The knowledge that the deterioration of the visual field in these forms of glaucoma is not due to intraocular pressure (already normalized) but to the ischemia of nerve fibre caused either by

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sclerosis and reduction of small nutritional-parenchymal vessels, especially in the circle of Haller, or more often as in younger patients, by a reduced rate of blood flow from the ophthalmic artery.

- 4) The knowledge that the closure of the external carotid artery had already been successfully performed in cases of cerebro-vascular failure, without giving rise to complications of any kind.

The first cases were operated on in 1963 and on five of them we can now, after 12 years, report the results.

Before the operation, a Hager's ophthalmorynamography was performed to calculate systolic and diastolic pressures, and the sphygmic volume of the ophthalmic artery; these values were compared with those of the brachial artery.

In the first case (a 30 year old man) the effect of left external carotid tying-off is the widening of visual field and the increase in systolic values of the ophthalmic artery as compared with the brachial artery.

In the second case (a man aged 43) external carotid closure was performed on both sides. No changes in tensional and ophthalmodynamographic conditions were observed, but sphygmic amplitude was increased. After 12 years, the sensory condition is quite unchanged.

In the third case (a man of 48) the visual field and sphygmic amplitude had improved after left external carotid closure, and these conditions have remained unchanged till now.

In the fourth case (a woman of 63) the improvement lasted two years and subsequently sensory conditions deteriorated.

No ophthalmorynamographic change was observed after carotid tying-off.

The fifth case is a woman of 29. There was improvement of the visual field and increase in the systolic values of the ophthalmic artery as compared with those of brachial artery, after left external carotid closure. The visual field has remained unchanged for these last years.

ATTEMPTS AT REVASCULARIZATION

These first attempts were described in a paper published in 1968 in "Rivista Oto-Neuro-Oftalmologica", and after subsequent check-ups, the conditions then reported remain constant.

In these last years, we have improved the preoperative procedure, by examining more deeply the conditions of ophthalmic circulation before starting external carotid closure.

The tests we consider to be essential for establishing the indications for this operation in terminal glaucoma are the following:

- a) Ophthalmodynamography;
- b) cerebral rheography;
- c) bulbar fluximetry;
- d) electroretinographic examination of the evoked occipital potentials.

First, these tests are performed under normal conditions; after a marked vasoconstriction in the area of the external carotid distribution is produced by applying an ice-bag on the homolateral temporal and parietal region, and then the tests are performed again.

In normal individuals, after the application of the ice-bag, clear sphygmie reduction in the temporal artery is observed with temporary increase in sphygmie volume and in bulbar fluximetry, and increase in the amplitude of the electrocortical response owing to the blood shunting from the external to the internal carotid artery.

Only if this test is positive, and after the arteriographic check of the common carotid artery, do we actually close the external carotid artery in those cases of terminal glaucoma where the perimetrical changes worsen, although intraocular pressure values are normal.

It is obvious that this operation is preferable for younger patients, because in elderly persons failure is possible due to vascular sclerosis and lack of elasticity.

For demonstrating purposes, we enclose a drawing illustrating two cases, where you can note the situation in basal condition, after applying of an ice-bag, and after closure of the external carotid.

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SUMMARY

In spite of the normalization of intraocular pressure in certain cases of glaucoma, the optic atrophy and the alterations of the eye field continue to evolve, and this may be due either to a sclerosis of the small vessels or to a reduced arterial "circulatory debit".

In the latter cases, studied with Hager's ophthalmodynamography and ocular fluxometry, the following method suggested by us is indicated:

The ligation of the external carotid artery in order to shunt a larger amount of blood towards the internal carotid artery and thus towards the ophthalmic artery.

Before the ligation of the carotid artery, it is, of course, necessary to perform an arteriography through the common carotid artery.