



Vascular blood flow in different optic nerve head neuropathies

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Abstract

Purpose: To analyze the vascular features of different optic neuropathies and their blood flow values, by scanning laser Doppler flowmetry. To show, through these examples, the analysis possibilities of optic nerve head blood flow with a new software version. **Material and methods:** We analyzed normal optic nerve heads, and others, affected with glaucoma (localized nerve fiber defect), glaucoma (diffuse atrophy), megalopapilla, anterior ischemic optic neuropathy (A.I.O.N), and ischemic disorders (Carotid Obstruccion). These diseases were analyzed with the Heidelberg retina flowmeter, by scanning laser Doppler flowmetry, with a new software AFPPIA (automatic full field percusión image analyzer). **Results:** Through the different options of analysis the quantitative and qualitative results are shown in each pathology. The values of each case were compared with the reference values of a normal control group and the significance of the same were studied. **Conclusion:** The new automatic full field perfusion image analyzer seems to be a very useful tool to the evaluation of different optic nerve head disorders concerning blood flow. We still have to study larger groups in a prospective way and in relation with other conventional examinations in order to determine the results statistically.

References

D.C.: **Reflective Image:** is the image obtained without analysis, similar to the one obtained with confocal tomography.
P.M.: **Perfusion Map:** is the image obtained with the flowmeter. Every bright point is related to circulation.

I.S.: **Intercapillar Space:** the less the intercapillar space, the smallest square. Big squares identify great intercapillar spaces. (qualitative analysis)
Z.I.: **Ischemic Zones:** bright zones identify ischemic areas, where the distance for oxygen diffusion is increased.
E.L.: **Capillaries Distribution:** show the distribution of capillaries in the analyzed area.
R.F.: **Cumulative Curve:** graphic with frequency distribution. It compares temporal flow (FT: yellow), nasal flow (FN: red) and rim flow (NRF: green).

NORMAL

GLAUCOMA (NFLD)

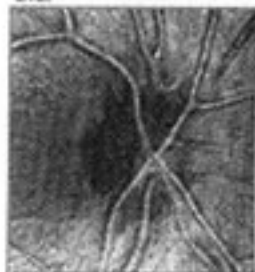
ADVAN. GLAUCOMA

MEGALOPAPILLA

A.I.O.N.

CAROTID OCCLUS.

D.C.



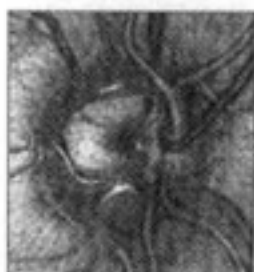
NORMAL OPTIC NERVE HEAD WITH SMALL CUP AND NORMAL VESSELS.



LOCALIZED NERVE FIBER LAYER DEFECT IN INFERO TEMPORAL SECTOR.



GLAUCOMATOUS OPTIC NERVE HEAD DAMAGE, 65 OR 90% DIFFUSE ATROPHY.



MEGALOPAPILLA: INCREASED CUP AND DISC AREA, WITH NORMAL NEURORETINAL RIM.

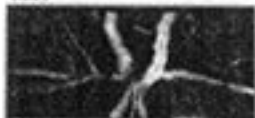


OPTIC NERVE WITH ANTERIOR ISCHEMIC OPTIC NEUROPATHY (SIGNIF. VESSELS NARROWING).



ADVANCED OPTIC NERVE HEAD ATROPHY RELATED TO GENERAL ISCHEMIA.

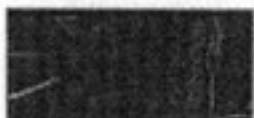
M.P.



Normal perfusion map with high capillary density and normal vessels.



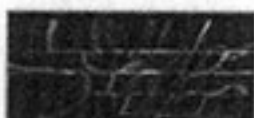
Decreased capillary density between vessels, corresponding to the localized nerve fiber layer defect.



Complete absence of capillaries in both the neuroretinal rim area, and in the peripapillary area.



Great perfusion with important vessels situated in the lamina cribrosa.



Absence of capillaries in the neuroretinal rim and big vessels narrowing.



Maps de perfusión con persistencia de grandes vasos y ausencia del neuroretinal rim.

I.S.



Very short intercapillary space due to high capillary density in a normal optic nerve head.



Increased intercapillary space in a localized nerve fiber defect (big squares).



Decreased perfusion in neuroretinal rim, with big squares in the peripapillary area.



Great perfusion in the lamina cribrosa and normal density in neuroretinal rim area.



Significant reduction of the capillary density in peripapillary capillary plexus.



Main reduction of capillary density all around the central vessels. General ischemic disease.

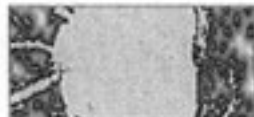
Z.I.



Absence of ischemic areas.



Temporal inferior ischemic area in correlation with localized nerve fiber defect.



General ischemia in advanced glaucoma.



Poor image due to the large disc area in megalopapilla.



Central ischemic areas, with normal peripheral areas.

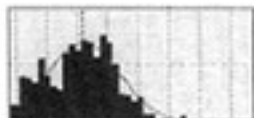


Generalized ischemia.

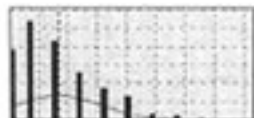
E.L.



Normal Histogram.



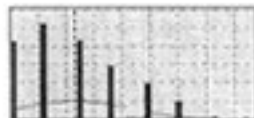
Histogram in localized nerve fiber defect.



Histogram of advanced glaucoma.



Histogram in megalopapilla.



Abnormal Histogram in AION.



Completely abnormal Histogram.

R.F.



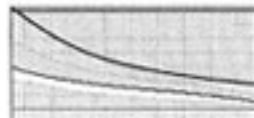
TF, FN, y NRF are included in the normal range.



Part of the curve is normal while the second part is below the normal range.



Advanced Glaucoma: TF, FN, and NRF are decreased.



Megalopapilla: big vessels measured in the lamina cribrosa show very high flow values.



AION in this case, NRF is significantly decreased, while TF and FN are still normal.



Carotid-occlusive: TF, FN and NRF are decreased and all the values are below the normal range.