

Effects of elevated intraocular pressure on haemoglobin oxygenation in the rabbit optic nerve head: a microendoscopical study.

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Intraocular pressure dependent reactions of optic nerve head vasculature and intracapillary haemoglobin oxygenation (HbO₂; oxygen saturation) were studied in the center and at the rim of the rabbit optic nerve head (ONH) as well as in the choroid, by a new combination of microendoscopy and simultaneous haemoglobin spectrophotometry. In 13 anesthetized albino rabbits the vasculature and the intracapillary Hb-oxygenation were studied by a microendoscope which was introduced into the eye bulb. Photometric measurements were performed via a beam splitter with the Erlangen micro-lightguide spectrophotometer (EMPHO) from the center of the endoscopic picture. The haemoglobin oxygenation was calculated by real time analysis of the spectral curves. Intraocular pressure was elevated stepwise from 20-80 mmHg. At the rim of the optic nerve head the vascular diameters as well as the intracapillary HbO₂-values were stable till an intraocular pressure of 60 mmHg and decrease after IOP elevation to 70 and 80 mmHg. In contrast, in the center of the optic nerve head and in the choroid these parameters decline already from 40-50 mmHg on. At an IOP of 60 mmHg ($P < 0.01$) and 70 mmHg ($P < 0.05$) HbO₂ is significantly lower in the ONH center than at the rim. In the center and the choroid HbO₂ is well maintained between 20 and 40 mmHg. After pressure release at the end of the experiment HbO₂ increased to 94.3±4.6% (rim) and 98.8±1.5% (center) of the initial value at 20 mmHg (difference not significant). By the high spatial resolution of this new optical method we were able to demonstrate that the center of the optic nerve head is more sensitive to changes in intraocular pressure than the optic nerve head rim. Thus, tissue damage after critical haemodynamic and oxygenation parameters seems more probable in the relatively poor perfused center of the ONH than in the overperfused rim. Copyright 1999 Academic Press.

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