Diameter variations of retinal blood vessels during and after treatment with hyperbaric oxygen.

Vucetic M, Jensen PK, Jansen EC.

Source
HOC-centret, Rigshospitalet, Copenhagen, Denmark.

Abstract
AIMS:
To quantify retinal vascular change during and after hyperbaric oxygenation (HO) for 6x5 weekly 90 minute treatments.

METHODS:
Fundus photographs were taken before, during, and after HO at 2.5 atmospheres absolute pressure (ATA) on days 1, 2, 3, 10, 20, 29, and 30 of treatment on three patients using a specially developed hand held ophthalmoscope with a digital colour camera. Blood vessel diameter was estimated on red free retinal images. The mean of three measurements of arterioles and venoles close to the optic disc was calculated. Consistency and repeatability of the method was verified by estimating the diameter of the vessels by three measurements in each of seven images taken within 70 seconds on the same person. Analysis of variance with Bonferroni correction for multiple comparisons was conducted to ascertain whether significant intergroup differences existed.

RESULTS:
Breathing 100% oxygen at 2.5 ATA constricts retinal arterioles by 9.6% (standard deviation 0.3%) and venoles by 20.6% (SD 0.3%) of their size in air at ambient pressure. Constriction escalates during treatment. Ten minutes after the HO, arterioles dilate to 94.5% (SD 0.3%) and venoles to 89.0% (SD 0.3%) of their primary size. This pattern is the same for each day of measurement. Heart frequency falls continually during HO. Systolic, diastolic, and mean arterial pressures stay constant.

CONCLUSION:
Exposure to hyperbaric oxygen causes constriction of the retinal vessels. It is found that this constriction is constant through the series of treatments. This suggests that oxygen or products thereof are responsible for the vascular changes during and after hyperbaric oxygenation probably through autoregulation of the retinal vessels.

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