Cerebral arteriovenous malformation pathophysiology

As brain arteriovenous malformations (AVMs) are highflow vascular abnormalities, increased CBF can be identified inside the nidus or draining veins.

Up-regulated VEGF in part of brain and Tie-2, Angiopoietin 2 high expression in endothelial cells (EC) of some vessels may be one of major factors for cerebral arteriovenous malformation (CAVM) formation growth, and rupture in the embryonic period [1].

The objective of a study was to explore the potential role of COL4A2 (Collagen alpha-2(IV)) in the pathophysiology of cerebral arteriovenous malformation.

Expression and localization of COL4A2 were analyzed on tissue microarrays from bAVM patients (n = 60) by immunohistochemistry. Correlations between COL4A2 levels and clinical parameters were examined with Pearson's test for normally- distributed or Spearman's Rho for not normally distributed data. Comparison between different clinical parameters was performed using a t-test, non-parametric Mann-Whitney U test or Kruskal- Wallis test. Fisher's exact test was used for categorical data.

COL4A2 was mainly expressed beneath the endothelium of vessels in the tunica media of bAVM. This pattern of expression indicates the basement membrane of the vessel walls. High levels of COL4A2 expression correlated with the age at surgery of patients ($p = 0.005$; $R = 0.393$; Spearman's Rho). The age at surgery in young (17-25 years) and old patients (55-76 years) showed a linear correlation; a greater variance of COL4A2 expression was observed in the age group between 26-54 years.

This study reports for the first time the expression of COL4A2 in bAVM and suggests a potential role of COL4A2 in bAVM pathophysiology. These findings contribute to a better understanding of the microenvironment of bAVM and may foster the development of improved therapeutic strategies for this disease [2].

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Li J, Gao Y, Zhao M. [Immunohistochemical study of vascular endothelial growth factor, relative receptors and ligands in vascular endothelial cells of cerebral arteriovenous malformation]. Zhonghua Wai Ke Za Zhi. 2001 Sep;39(9):675-8. Chinese. PubMed PMID: 11769600.

2)
Neyazi B, Stein KP, Wilkens L, Maslehaty H, Dumitru CA, Erol Sandalcioglu I. Age-dependent changes of collagen alpha-2(IV) expression in the extracellular matrix of brain arteriovenous malformations. Clin Neurol Neurosurg. 2019 Nov 5;189:105589. doi: 10.1016/j.clineuro.2019.105589. [Epub ahead of print] PubMed PMID: 31837516.