Are cerebral cavernomas truly non-enhancing lesion on MR imaging and thereby distinguishable from arterio-venous malformations? Correlation with histopathological findings

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Introduction

Cerebral cavernomas are by definition "occult angiographic lesions" and it is through magnetic resonance imaging (MRI) that the diagnosis of cavernoma has become clearly evident. The typical MR features of cerebral cavernoma are a well-delineated nodule including central hyperintense foci surrounded by a characteristic hypointense rim of hemosiderin due to repeated bleeding on T2*-weighted images. There should be no contrast enhancement [1]. The aim of this study was to determine whether cerebral cavernomas are truly non enhancing lesions on MR imaging, if they are thereby distinguishable from arterio-venous malformations (AVM) and to evaluate the incidence of their association with developmental venous anomalies (DVA).

Materials and Methods

In this cross sectional study we retrospectively evaluated 19 patients with lesions suspicious of cerebral cavernoma. Every patient underwent MRI at our institution with a 1.5 T unit (Siemens Vision or Phillips Gyroscan). No patient had any surgical or local treatment of the lesion before the MRI examination. The median age of the patients was 40,8 years (age range: 64- 13 years). With every examination a sufficient imaging quality (sufficient CNR, SNR, no artifact), a sufficient slice selection and an adequate MRI-sequence protocol for this specific question (T2*-and T1-weighted imaging per-and postcontrast) was provided.

We evaluated the conspicuity of the lesions before and after intravenous administration of contrast agent and in comparison to native sequences we determined if there was no contrast-enhancement, slight contrast-enhancement or strong contrast-enhancement of the lesion. Additionally we investigated a possible association of the cavernous malformation with a developmental venous anomaly, which presents the characteristic "caput medusae" appearance of dilated capillary veins draining centripedally towards the main draining vein on postcontrast images. All patients were treated surgically and every excised specimen was evaluated by experienced patho-histologists and correlated with the imaging findings.

Results and Discussion

We found no evident difference between the contrast enhancement pattern of cerebral cavernomas and AVM. Cross-tables were calculated for contrast-enhancement and histopathological diagnosis, which revealed that both entities presented variable degrees of contrast enhancement and were thereby not distinguishable from each other [Fig.1]. These findings very much disagree with reports in literature [1,2,3]. Zambranski et al. defined MR characteristics of the cerebral cavernous malformation and described them as truly non-enhancing lesions [1]. Nevertheless in our study cavernomas displayed variable enhancement patterns. However we found an association of cerebral cavernoma with DVA in 21% of cases [Fig.2]. This findings correlate very well with several reports in literature describing an association ranging from 6,2 to 100%. Bertalanffy et al. found an association in 25% (study population 72 patients), which matches our own findings quite well.

Conclusion

In contrast to reports in the literature we found no correlation between the absence of contrast enhancement and the histological diagnosis of cavernoma. We conclude that cerebral cavernomas may present with variable degrees of contrast-enhancement on MR imaging and are thereby definitely not distinguishable from AVM. However, we found an association with DVA as reported in literature.

DVA

	Frequencies	Percent
yes	3	21,4
no	11	78,6
Total	14	100,0

Fig.2

			CM-Enhancement			
			,00	1,00	2,00	total
Diagnosis	AVM	number	2	1	2	5
		expected	2,0	1,8	1,3	5,0
	CAV	number	4	5	2	11
		expected	4,4	3,9	2,8	11,0
	both	number	2	1	1	4
		expected	1,6	1,4	1,0	4,0
total		number	8	7	5	20
		expected	8,0	7,0	5,0	20,0

Fig.1

References

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