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Diagnosing distensible venous malformations of the orbit with diffusion-weighted magnetic resonance imaging

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Abstract:

Purpose: To compare the diffusion-weighted imaging characteristics of non-thrombosed distensible venous malformations of the orbit with that of other histologically-proven orbital tumors.

Design: Retrospective case-control study.

Methods: Patients with non-thrombosed distensible venous malformations of the orbit and patients with other histologically-proven orbital tumors were selected for chart review. The main outcome measure was the apparent diffusion coefficient of these lesions.

Results: Sixty-seven patients qualified for chart review; 9 patients had non-thrombosed distensible venous malformations and 58 patients had other histologically-proven tumors. Three of the 9 patients with non-thrombosed distensible venous malformations were initially misdiagnosed as having had solid orbital tumors. The mean apparent diffusion coefficient of distensible venous malformations was 2.80 +/- 0.48 x 10^{-3} mm^2/sec, whereas the mean apparent diffusion coefficient of other histologically proven tumors was 1.18 +/- 0.39 x 10^{-3} mm^2/sec ($p < 0.001$). The mean apparent diffusion coefficient ranged from 2.42 to 3.94 x 10^{-3} mm^2/sec in the distensible venous malformation group, whereas other histologically proven tumors ranged from 0.53 to 2.08 x 10^{-3} mm^2/sec. Therefore, in this single-institution series, a threshold value of 2.10 x 10^{-3} mm^2/sec was 100% sensitive and 100% specific for distensible venous malformations.

Conclusion: Certain non-thrombosed distensible venous malformations can evade diagnostic suspicion and mimic solid orbital tumors on standard MRI sequences. In this single-institution series, diffusion-weighted imaging effectively distinguished these non-thrombosed distensible venous malformations from other orbital tumors.