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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  $2.80 \pm 0.48 \times 10^{-3} \text{ mm}^2/\text{sec}$ , whereas the mean apparent diffusion coefficient of other histologically proven tumors was  $1.18 \pm 0.39 \times 10^{-3} \text{ mm}^2/\text{sec}$  ( $p < 0.001$ ). The mean apparent diffusion coefficient ranged from  $2.42$  to  $3.94 \times 10^{-3} \text{ mm}^2/\text{sec}$  in the distensible venous malformation group, whereas other histologically proven tumors ranged from  $0.53$  to  $2.08 \times 10^{-3} \text{ mm}^2/\text{sec}$ . Therefore, in this single-institution series, a threshold value of  $2.10 \times 10^{-3} \text{ mm}^2/\text{sec}$  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.

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