Susceptibility-weighted Imaging in Diagnosing Brain Capillary Telangiectasia: a case report

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A 65-year-old lung cancer patient was screened for intracranial metastases. Post–gadolinium-enhanced T1-weighted imaging revealed a small enhancing pontine lesion slightly hypointense on T2*-weighted gradient echo, invisible on T1- and T2-weighted imaging. Susceptibility-weighted imaging (SWI) showed marked hypointensity; a small linear hypointensity extension suggested a draining vein. Capillary telangiectasia or transitional capillary-venous malformation was diagnosed. To the best of our knowledge, brain capillary telangiectasia rarely has been previously reported by SWI.

Most capillary telangiectasias are in the pons, but they may also be found in the cerebral and cerebellar hemispheres and in the spinal cord. These lesions are small, usually less than 2.0 cm in diameter [1, 2]. Brain capillary telangiectasia has mild “brushlike” or “stippled” contrast material enhancement and mild hypointensity on T2*-weighted gradient echo (GRE) images [1, 2]. To the best of our knowledge, brain capillary telangiectasia has rarely been reported using susceptibility-weighted imaging (SWI) [3]. Here, we report a case of brain capillary telangiectasia or transitional capillary-venous malformation in a 65-year-old woman diagnosed by SWI.

CASE REPORT

A 65-year-old woman with lung cancer was referred by the physician using brain MRI for preoperative screening of intracranial metastases. Post gadolinium enhanced T1-weighted image revealed a small enhancing lesion with brushlike borders in the pons. The lesion was slightly hypointense on T2*-weighted GRE, but not visible on T1- and T2-weighted MR images. Three-dimensional spoiled gradient-recalled sequence (TR/TE: 50/39 ms, flip angle: 40°, section thickness: 2.5mm, matrix size: 288 × 256, field of view: 220 × 220 mm) was used for high-resolution SWI. The voxel size was 0.43 × 0.43 × 2.5 mm³ after reconstruction with 512 × 512 matrix size interpolation. SWI showed marked hypointensity of the lesion interspersed in a background of normal brain tissue, associated with a small linear hypointense structure suggesting a draining vein extending from the lesion to the surface of the pons (Fig. 1). Capillary telangiectasia or transitional capillary-venous malformation was diagnosed. Follow-up MRI 1 year after the initial examination showed no interval change on SWI, T2-weighted images, and pre-and post gadolinium enhanced T1-weighted images.
DISCUSSION

Cerebral vascular malformations frequently are classified as arteriovenous malformations, venous malformations (also called venous angiomas or developmental venous anomalies), cavernous malformations (also called cavernous angiomas), or capillary telangiectasias. Capillary telangiectasia, although known to occur throughout the brain and spine, is most frequently found within the striate pons and is the most frequent incidental vascular malformation of the pons at autopsy [1, 2]. Aside from vascular malformations, the differential diagnosis of an enhancing pontine lesion might include neoplasm, demyelinating disease, infection, infarction, or central pontine myelinolysis. In particular, the distinction from neoplasm must be reinforced to avoid unnecessary biopsy.

Capillary telangiectasias are typically devoid of mass effect, calcification, gliosis, extraluminal hemorrhage, and hemosiderin-laden macrophages. The typical microscopic features of capillary telangiectasias are numerous thin-walled “capillary-type” ectatic blood vessels interspersed in a background of normal brain tissue [1, 2]. It is a small, faint “brushlike” or “stippled” enhancing lesion that is usually located in the pons and it is often undetectable on conventional T1- and T2-weighted images. T2*-weighted GRE imaging shows it to be of mild hypointensity [1, 2]. Mild post contrast enhancement can be explained by its composition of ectatic blood vessels. The characteristic appearance on T2*-weighted GRE images may also be explained by its composition of sacs of stagnant blood that has presumably partially converted to deoxyhemoglobin, and it exhibit susceptibility dephasing [1, 2].

Venous angiomas traditionally have been treated as distinct entities, with diagnosis based on the typical caput medusae appearance resulting from convergence of dilated medullary veins [4,

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Figure 1. A 65-year-old woman with lung cancer. Brain MRI screening for intracranial metastases. A, B. T1-weighted (A) and T2-weighted (B) images show no abnormal signal intensity in the pons. C. Post gadolinium enhanced T1-weighted image shows a small enhancing lesion with brushlike borders in the right pons (arrow). D. The lesion is slightly hypointense on T2*-weighted gradient echo image (arrow). E, F. Susceptibility-weighted images reveal marked hypointensity (E, arrow) interspersed in a background of normal brain tissue located along the right posterior aspect of the pons and associated with a small linear hypointense structure suggesting a draining vein (F, arrowheads) caudal to E.
approximately one third of these lesions are located in the cerebellum and in the brainstem; the remaining two thirds are in a supratentorial location. In infratentorial locations, most venous angiomas drain centrally through veins of the lateral recess of the fourth ventricle, a transpontine vein, the precentral veins, or the longitudinal intrategmental vein [5].

Cavernous angiomas are grossly recognizable lesions composed of a central core of spongy blood-filled vascular channels with compression and hemosiderin staining of the surrounding parenchyma. Histologically, the lesion is defined as blood cavities surrounded by a single layer of endothelium without muscular tissue or intervening brain parenchyma. Cavernous angioma contains numerous hemosiderin-laden macrophages and is often calcified; hence, showing hypointensity on T2-weighted and more hypointensity on GRE T2*-weighted images. Its hallmark is a surrounding hypointense hemosiderin ring with an internal “popcorn” appearance on T2-weighted images, and marked signal intensity loss on T2*-weighted GRE images [6].

The distinction between the different nonarterial vascular histopathologic entities (capillary telangiectasia, venous angioma, and cavernous angioma) at times may be difficult. A given lesion may contain features that are usually associated with another type of lesion. The associations of a cavernous angioma with features of capillary telangiectasia, both in the vicinity and at a distance, were reported [7, 8]. Cavernous angiomas are also associated with venous angiomas in 10%-15% of cases [9, 10]. The findings in our case are atypical for classic venous angioma or cavernous angioma. Although lacking pathologic confirmation, the radiographic features are most consistent with a capillary telangiectasia or a transitional capillary-venous malformation.

SWI is essential in diagnosing brain capillary telangiectasia or transitional capillary-venous malformation, which could otherwise be misdiagnosed as neoplasm, subacute infarction, or multiple sclerosis. Further studies with pathologic correlation could confirm whether the lesion seen on SWI represents capillary telangiectasia or transitional capillary-venous malformation.

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REFERENCES

利用磁敏感加權影像診斷腦部毛細血管擴張：病例報告

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一位65歲肺癌患者來院接受磁振造影檢查是否有大腦轉移，經對比劑顯影的T1加權影像中發現橋腦部位有一顯影的小病灶，此病灶在T2梯度迴訊影像呈現低訊號，但傳統T1/T2加權影像皆不可見。磁敏感加權影像中呈現明顯低訊號，並有一小延續訊號疑為引流靜脈。診斷為毛細血管擴張或過渡型毛細血管-靜脈畸形。就我們所知，腦內毛細血管擴張鮮少以磁敏感加權影像來報告。