

The Yin-Yang Sign¹

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Appearance

The yin-yang sign is a finding that may be seen on contrast material-enhanced computed tomographic (CT) scans (Fig 1) obtained throughout the body but is primarily seen in the abdomen and the brain. The configuration of a well-defined round or oval mass with increased attenuation in half of its area and decreased attenuation in the other half resembles the ancient Chinese yin-yang symbol.

Explanation

The yin-yang sign is helpful in facilitating diagnosis of partially thrombosed true arterial aneurysms and false aneurysms. At contrast-enhanced CT, increased attenuation in one portion of the thrombosed aneurysm indicates the presence of a partially contrast material-filled lumen, whereas reduced attenuation in the remaining portion of the thrombosed aneurysm indicates the presence of a mural thrombus.

Discussion

An aneurysm is defined as the focal or diffuse dilation of an artery to more than 50% of its normal diameter (1). True aneurysms are caused by either acquired or congenital arterial disease for which all layers of the vessel wall are dilated but intact. False aneurysms are acquired lesions that lack an arterial wall and are constrained by the surrounding hematoma and soft tissues. True and false aneurysms may grow rapidly without symptoms and may even reach large dimensions. Their diagnosis is fundamental in avoiding rupture, which can be sudden and life threatening. Because large and giant aneurysms and false aneurysms tend to thrombose (usually partially), the blood flow may fill only part of the lesion (2). On CT scans, the yin-yang sign is a

frequent finding of true and false aneurysms because these lesions are usually associated with a mural thrombus. When used to evaluate aneurysm features in one study (3), CT demonstrated the presence of a mural thrombus in 82% of cases; in a similar study (4), CT demonstrated the presence of a mural thrombus in as many as 136 (89.5%) of 152 patients.

In almost every part of the human body, the presence of the yin-yang sign may increase suspicion of a partially thrombosed aneurysm; however, this sign is particularly helpful for areas such as the brain and the abdomen, in which several diseases may mimic an aneurysmal vessel (5,6). Specifically, in the brain, the differential diagnosis between cerebral aneurysms and other lesions (eg, large, partially, and/or cystic suprasellar meningiomas; craniopharyngiomas; or pituitary tumors) may often be difficult, particularly at CT (Fig 2). Also, large basilar aneurysms can, at times, simulate meningiomas or oligodendrogliomas. Finally, hemorrhagic metastases or metastases with areas of high protein content (eg, those in the colon or thyroid) may all be included in the differential diagnosis of mixed lesions that mimic the yin-yang sign (2).

In the abdomen, the yin-yang sign is often helpful in differentiating aneurysms from other masses that are commonly seen in the left upper quadrant, including cystic pancreatic tumors, islet cell tumors, solid and epithelial neoplasms, pseudocysts, gastric leiomyomas, and leiomyosarcomas (7). The yin-yang sign is not, however, a specific sign for partially thrombosed or false aneurysms. Although rare, some neoplasms, such as solid and papillary epithelial neoplasms, may demonstrate the yin-yang sign.

Because the presence of the yin-yang sign cannot lead to a definitive diagnosis of partially thrombosed aneu-

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Figure 1



Figure 1: Transverse contrast-enhanced abdominal CT scan obtained during arterial phase in patient who underwent orthotopic liver transplantation and had a partially thrombosed splenic artery aneurysm. Posterior hypoattenuating mural thrombus (arrow) and anterior hyperattenuating contrast material–filled lumen (arrowhead) demonstrate yin-yang sign.

Figure 2



Figure 2: Transverse contrast-enhanced CT scan of the brain in a patient with giant suprasellar partially thrombosed aneurysm. Angiography performed 3 days later confirmed the CT finding and showed the lesion to arise from the right anterior cerebral artery. Note that the yin-yang sign is of similar appearance to that in Figure 1.

rysms, the absence of this sign when an aneurysm is suspected is not an otherwise valid criterion for definitely excluding aneurysm. For example, when the thrombus is concentric rather than eccentric, the typical yin-yang pattern is not seen.

It is, however, important to say that the yin-yang sign may also be seen in aneurysms and false aneurysms at digital subtraction angiography and/or ultrasonography (US) (8–10). Nevertheless, during color Doppler US and angiography—as opposed to CT, during which the features of the sign relate to a

patent lumen versus a thrombosed lumen—the yin-yang sign can be seen as antegrade blood flow during systole and retrograde blood flow during diastole within the nonthrombosed portion of the aneurysmal cavity.

In conclusion, the yin-yang sign seen at contrast-enhanced CT raises the strong possibility of a diagnosis of aneurysm.

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