Anterior communicating artery aneurysm computed tomography angiography

Digital subtraction angiography (DSA) represents the gold standard in aneurysm detection, location, and surgical planning. Since the advent and continuous improvements in computed tomography angiography (CTA), it has supplemented and at times replaced DSA for surgical planning of aneurysms. CTA has shown to adequately predict surgical anatomy around the anterior communicating artery aneurysm.

Ahmed et al. used three mathematical models to correctly identify the dominant anterior cerebral artery to the ACoA aneurysm based on CTA. The first mathematical model (MM1) compared the diameter of the two A1s and selected the larger A1 as the dominant artery. The second model (MM2) measured the angle formed by the long axis of the A1 segment and the long axis of the aneurysm. The angle that was closest to 180 degrees was considered to have the most direct trajectory to the aneurysm. Thus, the A1 segment with an angle closest to 180 degrees was considered the dominant inflow artery. The third model (MM3) measured the degree between both A1 arteries and the aneurysm. If the difference in angles was greater than 30 degrees, it chose the larger angle as the side of dominance. This signified a straighter trajectory to the AcoA complex. If the difference between these angles was less than 30 degrees, the larger A1 was determined to be dominant.

MM3 provided the most accurate method in determining dominant inflow to the AcoA aneurysm. CT angiogram accurately predicted the dominant artery in 97% of the cases. Therefore, this study supports that CTAs can be a reliable, independent imaging tool in predicting the inflow dominance to AcoA aneurysms. This is the first study to quantitate the accuracy of CTA in determining inflow dominance to the AcoA complex [1)].

Intraventricular hemorrhage is common after the rupture of anterior communicating artery (ACoA) aneurysms, although the anatomical pathway has not been described. Knowledge of the mechanism of hemorrhage may enhance understanding of its prognosis. Using CT angiography, Scholtes et al. analyzed this pathway in 2 cases of ACoA aneurysm rupture associated with intraventricular hemorrhage. The initial hemorrhages created a hyperdense ventriculographic image on which the subsequent contrast medium ejection could be followed. The contrast medium entered the subarachnoid space of the anterior interhemispheric fissure and broke through the lamina rostralis into the septum pellucidum and into the frontal horns of the lateral ventricles. Thus, the authors provide an explanation for bleeding from ACoA aneurysms into the ventricular system in the presence of an intact lamina terminalis. The septum pellucidum may act as a buffer before extension of the bleeding into the ventricular system [2)].

3D-CT angiograms of an anterior communicating artery aneurysm associated with acute retrobulbar optic neuropathy that caused subarachnoid hemorrhage and vision loss in a 39-year old man. The 3D-CT angiograms were consistent with findings identified directly during surgery [3)].

Kim reported a case of actively rebleeding aneurysm of the anterior communicating artery with intraventricular extravasation on the hyperacute CTA imaging. The rebleeding route, not into the third ventricle but into the lateral ventricles, can be visualized by real-time three-dimensional CT pictures. The hemorrhage broke the septum pellucidum and the lamina rostralis rather than the lamina terminalis [4].

References

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