Intracranial Venous Sinus Reflux on CT Angiography: Benign or Malignant Entity?

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The study conducted by Tseng et al3 showed that venous reflux may occur till the level of neck veins (brachiocephalic or internal jugular veins) in CTA.1–3 Common causes for venous reflux are severe heart failure, stenosis in the brachiocephalic vein, absence of valves or valvular insufficiency in IJV, superior vena cava syndrome, and mediastinal masses.4–7 If the scan is acquired in expiratory phase, it can also lead to increased venous reflux due to increased positive thoracic pressure during expiration. A study conducted by Tseng et al3 showed that venous reflux occurred more commonly with intravenous contrast injection in left side arm veins in comparison to right side. Another similar study by Demirpolat et al1 also showed...
that the reflux of contrast into neck veins is more common if left arm injection is used. Both the studies conclude that a developmentally decreased retrosternal distance on left side is the cause of this phenomenon as the left brachiocephalic vein is more transverse in course, and delivers a higher amount of undiluted contrast material obscuring the origins of the great vessels. Also, compression of left brachiocephalic vein by aorta can cause reflux into neck veins. In our case, the cause of reflux was likely due to contrast injection from the left arm. However, presence of underlying venous insufficiency or valvular incompetence may be there.

Thoracic breathing and postural change can narrow the space of left brachiocephalic vein and may result in reflux in neck vessels from left side injection. In our case, there was no obvious movement or coughing of the patient during acquisition.

Yen et al.\(^8\) observed jugular venous reflux in six cerebral radionuclide angiograms. In one case, the reflux was likely related to the arm position; but in the other five cases, the cause was unknown.

The reflux of contrast till the level of dural venous sinuses is a rare phenomenon and on reviewing previous literature, we found only one case report by Chen et al.\(^9\) Similar finding by using magnetic resonance angiography (MRA) was reported by Paksoy et al.\(^7\) who attributed reflux to brachiocephalic venous stenosis.

Venous reflux, when present especially in the inferior dural sinuses, can be a diagnostic dilemma and confused with dural arteriovenous fistulas, which are common in this region along the tentorium. Radionuclide venography or dynamic examination may be performed to differentiate the two. Kim et al.\(^10\) speculated that early opacification of the cavernous sinus in the arterial phase of contrast-enhanced (CE)-MRA, ipsilateral jugular venous drainage in the arteriovenous phase of CE-MRA, and ipsilateral retrograde jugular venous flow on neck time-of-flight (TOF)-MRA could differentiate the two findings.

With this report, we establish a key finding of intracranial venous reflux that may be seen in otherwise normal patients who undergo a CTA examination of the head and neck.

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Conflicts of Interest
There are no conflicts of interest.

References

