Case 17309

Extensive cerebral venous sinus thrombosis with subarachnoid densities on NECT: subarachnoid versus pseudosubarachnoid haemorrhage

Published on 22.06.2021

DOI: 10.35100/eurorad/case.17309
ISSN: 1563-4086
Section: Neuroradiology
Area of Interest: Artificial Intelligence Emergency
Neuroradiology brain
Imaging Technique: CT
Imaging Technique: MR
Case Type: Clinical Cases
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Patient: 44 years, female

Clinical History:
A 44-year-old female patient with no significant medical history presented to the ER with unusual multifocal neurologic manifestations: mild anisocoria, echolalic speech and right-sided facial paresis.

Imaging Findings:
A non-enhanced CT (NECT) of the brain was performed (Figure 1) and demonstrated bilateral sulcal densities without the involvement of the basal cisterns. A commercially available AI program (Aidoc, Intracranial haemorrhage) also identified these densities as potential haemorrhages. Since we would not expect disseminated bilateral subarachnoid haemorrhages (SAH) without the context of trauma, a contrast-enhanced CT venography was performed (Figure 2). This demonstrated an extensive thrombosis of the sinus sagittalis superior and right-sided sinus transversus and sigmoïdeus (CVST). We concluded this to be proof of a pseudosubarachnoid haemorrhage. Consequent MRI demonstrated subarachnoid hyperintensities on fluid-attenuated inversion recovery (FLAIR) and associated loss of signal on susceptibility-weighted imaging (SWI) (Figure 3 and 4). These findings then suggested a component of underlying SAH. Contrast-enhanced MR venography confirmed the presence of a CVST in the superior sagittal and transverse sinus (Figure 5).

Discussion:

Background
The extravasation of blood into the subarachnoid space is called a subarachnoid haemorrhage (SAH) and presents as hyperdensities in the subarachnoid space on NECT. A wide range of clinical manifestations aside from thunderclap headache may occur. Most SAH's have a traumatic or vasculopathic (often aneurysmal) aetiology. Aneurysmal bleeding has several distinct patterns, none of which were present in our patient. An increased attenuation within the basal cisterns without the presence of a true SAH is called a pseudosubarachnoid haemorrhage and can mimic SAH. These densities are usually symmetrical with sparing of the sulcal region. It is caused by the dilatation of superficial venous structures within the subarachnoid space. Pseudosubarachnoid haemorrhage is commonly associated with cerebral oedema, but can also be seen in cases of severe meningitis and CVST [1]. A large bilateral subdural haemorrhage can also be responsible for effacement of sulci and basal cisterns and thus give rise to the false notion of blood in the subarachnoid space [2]. Lastly, intralesional contrast
Clinical Perspective

Imaging is required for the diagnosis of SAH and mimicking conditions, as both can present a wide spectrum of clinical manifestations.

Imaging Perspective

A SAH will most often be easy to recognize on a NECT. However, identifying the aetiology of the bleeding can be challenging. Antecedents of trauma are usually known to the clinician. Spontaneous cases of SAH are often of vascular origin, which may present typical patterns [3].

When the SAH is confined to parasagittal or dorsolateral cerebral convexity and when the basal cisterns remain normal, pseudosubarachnoid haemorrhage due to CVST or oedema should be considered [4]. On MRI, a recent SAH can be demonstrated as hyperintensities in the subarachnoid space on fluid-attenuated inversion recovery (FLAIR) sequence. SAH and CSVT will also show susceptibility-weighted artefacts [5]. If NECT or MRI can't differentiate a true SAH from a pseudo-SAH, a lumbar puncture can be helpful since elevated xanthochromia in cerebrospinal fluid is pathognomonic for SAH [6].

Outcome

Our patient was treated with anticoagulants and showed full recovery at 6-month follow-up

Take-Home Message / Teaching Points

CVST can be associated both with true SAH as well as pseudosubarachnoid haemorrhage. MRI or lumbar puncture can be helpful to distinguish both diagnoses. CVST should immediately be treated with anticoagulants, even if some brain bleeding is present.

Written informed patient consent for publication has been obtained.

Differential Diagnosis List: Extensive cerebral venous sinus thrombosis with subarachnoid haemorrhage, Pseudosubarachnoid haemorrhage, Cerebral oedema, Severe meningitis, Large bilateral subdural haemorrhage, Intrathecal contrast

Final Diagnosis: Extensive cerebral venous sinus thrombosis with subarachnoid haemorrhage

References:


Figure 1

Description: Non-contrast-enhanced CT of the brain, axial plane. Sulcal densities in the right parietal lobe (blue arrow). Also, note the discrete hyperdensity of the sinus sagittalis superior (green arrow).

Origin: Department of Radiology, UZ Brussel, Jette, 2021
Description: Contrast-enhanced CT of the brain, venography, sagittal plane. Note the absent enhancement of the sinus sagittalis superior (red arrows) as opposed to the sinus rectus (blue arrow).

Origin: Department of Radiology, UZ Brussel, Jette, 2021
Description: Fluid-attenuated inversion recovery (FLAIR) sequence demonstrates hyperintensities in the right frontal and bilateral parietal subarachnoid space-Origin: Department of Radiology, UZ Brussel, Jette, 2021
Description: Susceptibility-weighted imaging demonstrates loss of signal in the right frontal and parietal subarachnoid spaces (red arrows) as well as in the cerebral sinus (blue arrow)

Origin: Department of Radiology, UZ Brussel, Jette, 2021
Description: Contrast MR venography confirms the presence of thrombotic material in the superior sagittal sinus. Origin: Department of Radiology, UZ Brussel, Jette, 2021