

Case Report

Odd Hemoventricle Pattern Masking Bilateral Trigone Xantogranulomas

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Abstract

Reactivity of the choroid plexuses in neurovascular or traumatic pathologies has long been studied. Presence of intraventricular hematoma during basal ganglia hemorrhage is a negative prognostic factor since correlates with increased risk of hydrocephalus. The dynamic evolution of an intraventricular hematoma may be influenced by the secretory activity of the plexuses but also the very presence of intraventricular tumors could modify the morphology of the hematoma. Pathologies such as Xanthogranulomas of the choroid plexuses are benign malformations, as they are asymptomatic they are generally found as incidentalomas. Having a density similar to that of the choroid plexuses they may not be easily observed. Brain CT study in 73-year-old male patient showed left basal ganglia hemorrhage with hemoventricle occupying a large part of the trigone with a honeycomb-like radiological pattern. This pattern was characterized by the presence of hemorrhagic hyperdensity with irregular hypodense lobulated alveoli inside separated by isodense septa. The above morphological pattern persisted and was unveiled even contralaterally in subsequent CT follow-ups.

Keywords: Intraventricular Haemorrhage (IVH); Honeycomb-Like CT Pattern; Choroid Plexus Xantogranuloma (CPX); Cerebrospinal Fluid (CSF) Secretion; Hematoma Shaping

Abbreviations

IVH: Intraventricular Haemorrhage; CSF: Cerebrospinal Fluid; CPX: Choroid Plexus Xantogranuloma

Introduction

Intraventricular Haemorrhage (IVH) may be secondary to the extension of a Intraparenchymal Haemorrhage (ICH) or directly caused by bleeding of the Choroid Plexuses (CPs) for neoplastic causes [1-6]. Hemoventricle is a negative prognostic factor as it increases the ICH score [7-10]. The intraventricular space may be the site of primary or secondary lesions that spread by CSF or directly by diffusion (exfoliation) from the choroid plexuses [11-16]. The reaction of the CPs to vascular or neoplastic lesions has long been studied and its re-activity could interfere with the shaping of an intraventricular haematoma conferring particular morphology. We will see that IVH morphology in the region of ventricle trigone may mold over the CPX getting a honeycomb appearance. Generally, Xantogranuloma of the Central Nervous System are granulomatous tumors characterized by lamellated cholesterol clefts with hemosiderin deposits, reactive fibrosis and inflammatory infiltrates (predominantly lymphocytes) [4]. Xantogranuloma of Choroid Plexus (CPX) are benign idiopathic and asymptomatic lesions, usually unilateral but may be bilateral with cystic appearance [15]. When associated with inflammation they can bleed and become symptomatic [17-20]. CT pattern described in this report is not very common and often could get unnoticed, but when found it should raise suspicion of the CPXs.

Case Description

73-year-old patient with history of severe hypertension presented state of consciousness with GCS 9/15 preceded by incoercible headache. No known pathology in neurological history to date. On neurological examination he presented with right facio-brachio-crural hemiplegia, myopic and isochoric pupils. Brain CT study showed left nucleo-capsular haemorrhage and intraventricular haemorrhage with irregular honeycomb-shape located in lateral ventricle trigone and 1.1 cm shift. On reaching a GCS of 7/15 he was intubated and maintained in deep-sedation for neuroprotection. The diagnosis of suspected CPXs no was obvious already at the first CT scan. Indeed, it was interesting to note that next CT studies performed after 3-12-24 hours confirmed and improved visualization of this hematoma pattern bilaterally. The patient was extubated with a GCS of 9/15 and had a gradual reduction of the hemorrhagic component accompanied by a gradual recovery of symptoms until his discharge (Fig. 1-4).



Figure 1: Brain CT at time 0 showing onset of honeycomb pattern in left trigone region of lateral ventricle with tight hyperdense wall (acute blood density) and thin septa inside, in presence of left deep ganglia hemorrhage and hemoventricle.



Figure 2: In 3h CT control is visualizable a stationary honeycomb pattern in left trigone, while in posterior part of the contralateral trigone an iso-hyperdense layer begins to appear.



Figure 3: CT scan performed 12 h later shows an increase in cerebral hemorrhage: early hyperdense wall in right trigone region, while the honeycomb pattern remains stationary on the left side.



Figure 4: In the 24-hour control, the pattern in the left trigon is clearly more evident, whose walls are well hyperdense and the penetrating septiments (septa) are iso-hyperdense but still evident radiologically.

Discussion

An intracranial hematoma can have variable shapes since it is subjected to severe forces by increasing endocranial hypertension. Some CT markers, each with a different hypodensity/hyperdensity ratio (difference varying from 15 to 30 HU), have been analyzed and considered prognostic markers since they correlate with increased expansion risk [17]. The hemoventricle CT-pattern here described is a honeycomb-like pattern characterized by hypodensity with irregular and lobular margins in choroid plexuses region. This pattern was not immediately evident bilaterally. In fact, as CT scans continued and the intraventricle blood spread increased, this honeycomb-like pattern became increasingly evident. Because CPXs generally have similar density to CPs, they on CT may go undetected [15]. Therefore, it is likely that peripheral hyperdense blood served to increase the "density contrast" between these areas and facilitated the visualization of CPXs with this atypical pattern. In some instances, Xanthogranuloma may have hyperdense or hypodense radiological aspect depending on the calcification degree, the presence of bleeding and blood clotting, the thickening of the capsule and the pericapsular reaction of contiguous tissues [4,20]. The morphology of the IVH is certainly molded on the trigone CPX and acquired a honeycomb aspect. Attention to radiological features such as irregularly pyramidal shape, diffusely trabeculated inside and thick peripheral hyperdensity may help to discern intraventricular hematoma from a xanthogranuloma, where intra-plexus homogenous calcifications are usually found [5]. Since most CPXs are asymptomatic many are discovered as incidentalomas. When found, it is rare that they are bilateral. If the patient had two bilateral CPXs probably already at the first CT (time 0) the density in the contralateral trigone region would have been suggestive. Even though the patient had no neurological pathology in history, CT morphology allowed the diagnosis of CPX to be made. Although the presence of CPXs contributed primarily to organization of this pattern, CSF secretion in reaction to blood stimuli may have helped shape the morphology of intraventricle hematoma. In chronic diseases some changes in CPs morphology and function have been reported [7]. Coagulation of the blood within liquid cavities, such as ventricles, may have different evolution than intraparenchymal one. Hyperdensity with irregular margins would explain the attempted formation and gradual coagulation of the intra-ventricle blood mass, where the alternation of convective-unidirectional and pulsatile-bidirectional flows can change the shape of haematoma since it has not yet fully clotted [19]. As described in a study by Xiang, choroid plexus plays an important function in responding to brain damage, attempting to reduce its effects both "adjacent to" and "distant from" the lesion with mechanisms only partially elucidated [21]. During intracranial haemorrhage, could occur compensation mechanisms such as altering the morphology of CPs epithelial-ependymal cells (shrinking, apoptosis) and their function, replying with hypo- or hyper-secretion [2,12]. Alteration of Cerebrospinal Fluid (CSF) volume and speed secretion could still influence the ventricular haematoma organization. In keeping with Monroe-Kelley law and due to increased sympathetic tone CSF secretion should be reduced as a compensation mechanism [11,18]. However, many components released by the haemorrhage and inflammation (haemoglobin degradation proteins, cytokines, ROS, iron cations) can lead to hypersecretion [8,9,13]. Therefore, spreading of blood from the ventricle to the subarachnoid space (SAH) may be associated with alterations in CSF dynamics as already described by Döczi in 1983 [3]. Both the presence of hypertrophic plexuses, typical of the elderly that jut into hematoma and the rapid liquor secretion could interfere with blood pooling in presence of acute stormy flow [1,14]. These alterations of CSF secretion could act upon clot stability modifying hematoma morphology and giving it a heterogeneous radiological appearance [2]. It is unclear whether this honeycomb-like pattern is to be attributed to physiopathology of acute cerebral hemorrhage. To the best of our knowledge this has never been studied but it may be worthy of further targeted studies and investigations to better understand its meaning.

Conclusion

CPXs are generally asymptomatic and discovered incidentally. The presence of these malformations can affect the organization of IVH and alterations in CSF secretion could affect the IVH morphology conferring a characteristic radiological mold pattern. CPXs, having a density similar to CPs one, may not be easily spotted. Thus, the presence of hyperdense acute hematoma may have facilitated, due to black and white contrasts, the visualization of this pattern.

Conflict of Interests

Authors declare that there is no conflict of interest for this paper.

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