

A CASE OF POLYCYTHEMIA SHOWING HYPERDENSE CEREBRAL VESSELS ON NON-CONTRAST COMPUTED TOMOGRAPHY SCAN

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ABSTRACT

Polycythemia is a disease state in which the proportion of blood volume that is occupied by red blood cells increases. It can result in increased density of intracranial blood vessels on non-contrast computed tomography scan. This imaging findings can closely mimic appearance of a contrast enhanced CT scan and those of cerebral venous thrombosis. We are presenting a case of 11-year-old child with Fallot's tetralogy who showed abnormally hyperdense intracranial vessels on NCCT of brain.

KEYWORDS

Polycythemia, Fallot's tetralogy, NCCT.

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INTRODUCTION

Hyperdense cerebral vessels and venous sinuses on non-contrast computed tomography is a characteristic imaging feature of conditions with raised hematocrit. This mimics the appearance of a contrast enhanced scan. The hyperdense venous sinuses also resembles the appearance of cerebral venous thrombosis. Sometimes it may lead to diagnostic difficulty. Appropriate history and biochemical parameters helps in reaching the diagnosis. Furthermore, conditions that cause high hematocrit may also cause hypercoagulability, which in turn predisposes to venous thrombosis. This suggests that a high hematocrit and dural venous sinus thrombosis may coexist.

CASE REPORT

An eleven-year-old, male child with history of headache for the last three months was referred to Radiology Department of Gauhati Medical College, Guwahati, underwent NECT brain. The child was also a known case of Fallot's tetralogy. NECT brain revealed hyperdense vasculature of the brain including large and small branches of Circle of Willis, dural venous sinuses with HU values ranging from 50–55. There is also enlargement of cavernous sinuses. There was no other neuroparenchymal abnormality. Based on these findings, the possibility of polycythemia was suggested. The diagnosis was confirmed following laboratory tests, which revealed increased red cell mass in the form of raised hemoglobin (17.5gm/dL%) and raised hematocrit (70%).

DISCUSSION

Non-thrombotic dural sinus opacification is a sign of increased blood viscosity in patients with congenital heart disease, hemoconcentration states, polycythemia of the new-born, and polycythemia rubra vera.

These patients are at high risk for hypoxemic cerebral insult, which can be detected by cranial computed tomography. Nelson MD Jr. in 1981 studied 300 computed tomographic scans in a polycythemic patient to show apparent dural sinus opacification with cerebral infarction.¹ New et al. in 1976 demonstrated a linear relationship between hematocrit and CT attenuation of whole blood. They used blood product preparations to demonstrate an in-vitro correlation between HU and HCT.² Black DF et al. measured HUs in a region of interest within the confluence of dural venous sinuses in 166 unenhanced head CTs and correlated these data with HCT and HGB values in male and female patients aged 2 to 100 years.

They found hemoconcentration correlates with CT attenuation in cerebral venous sinuses.³ in patients with a hematocrit percentage exceeding 60%, both Circle of Willis and dural sinuses are hyperdense on NECT scans of brain. A linear relationship exists between the hemoglobin level and the contrast of the dural sinuses compared with the gray matter suggesting that increased density of cerebral vessels on NECT is a sign of a high hemoglobin level.⁴ Abnormal hyper density of intracranial blood vessels on non-contrast computed tomography scan found in patients with high hematocrit may also simulate the appearance of a contrast enhanced scan.⁵

CONCLUSION

We report a case of polycythemia due to right to left shunt, which on NECT shows diffuse hyper density of the cerebral vessels including both arteries and veins. Diffuse hyper density of the cerebral vasculature on NECT scan is a rare phenomenon seen characteristically in polycythemia. The knowledge of this phenomenon can help the radiologist in guiding the clinicians towards early diagnosis of this condition.

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CASE REPORT

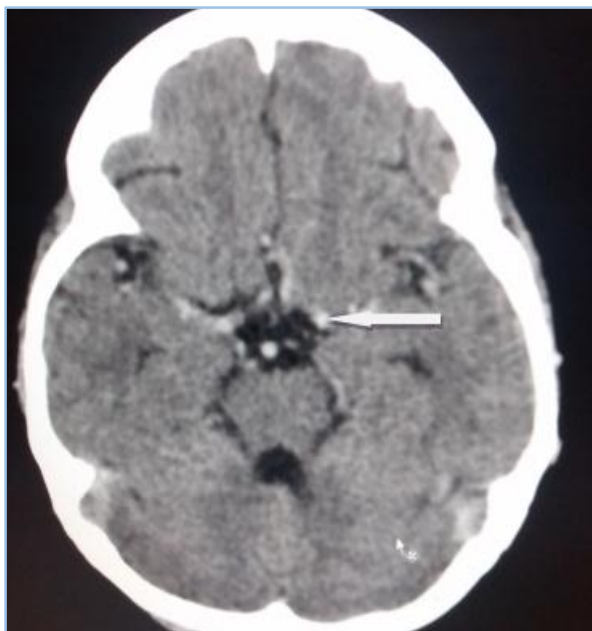


Fig. 1: NECT brain shows hyperdense vessels in the circle of Willis (Large Arrow)

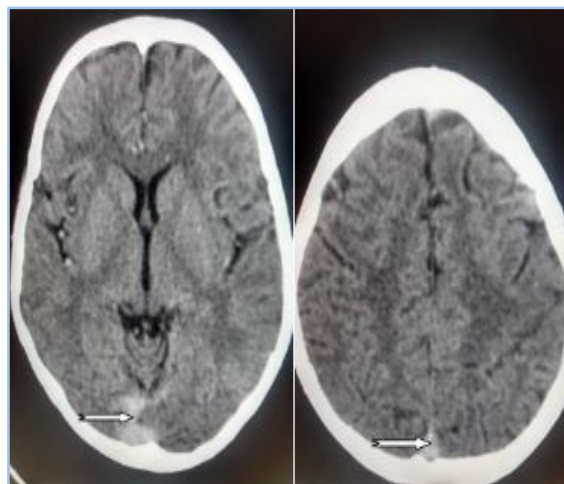


Fig. 2(a, b): NECT showing dense venous sinus mimicking thrombosis (White arrows)

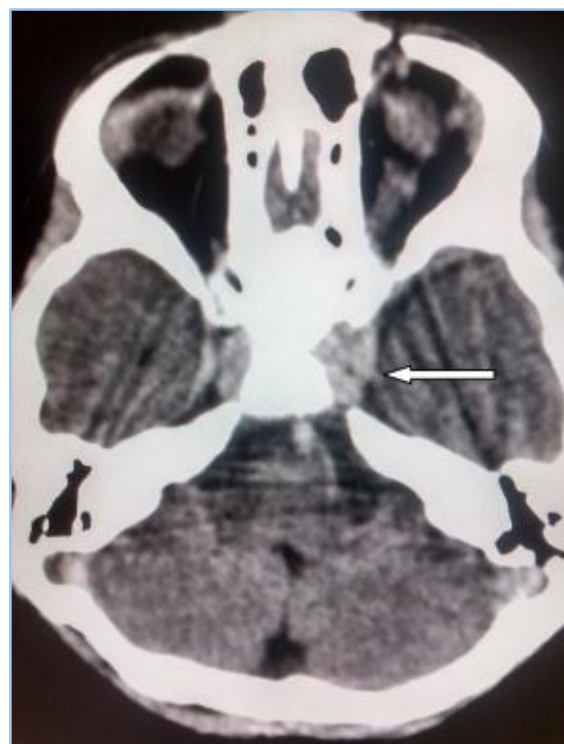


Fig. 3: NECT showing enlarged hyperdense cavernous sinus bilaterally (White arrow)