

Imaging Findings of Nonketotic Hyperglycemia

Nonketotik Hiperglisemide Görüntüleme Bulguları

 Ergül Cindemir,  Nurdan Gocgun,  Turkan İkizceli,  Behice Kaniye Yılmaz,  Rustu Turkey

Istanbul Haseki Training and Research Hospital, Department of Radiology, Istanbul, Turkey.

ABSTRACT

The globus pallidus and putamen are highly vascular structures, because of that, they are more sensitive to the metabolic changes in the brain. In the evaluation of nonketotic hyperglycemia and differential diagnosis with imaging findings is in the globus pallidus and nucleus caudatus usually symmetrically and bilaterally but rarely unilaterally hyperattenuating on non-enhanced computed tomography (NECT) and hyperintensity on T1-weighted magnetic resonance images (MRI) have been reported. In this report, we aimed to present poorly controlled diabetic patients that have been admitted to the emergency service with uncontrolled movements defined as chorea.

ÖZET

Globus pallidus ve putamen, beyindeki metabolik değişikliklere duyarlı hipervasküler yapılardır. Nonketotik hipergliseminin değerlendirilmesinde ve görüntüleme bulguları ile ayırıcı tanıda kontrastsız beyin bilgisayarlı tomografide (BBT) globus pallidus ve nukleus caudatus da genellikle simetrik ve bilateral ancak nadiren tek taraflı hiperatenuasyon ve T1 ağırlıklı manyetik rezonans görüntülerde (MRG) bu alanlarda hiperintensite artışı izlenmektedir. Bu yazıda acil servise kore olarak tanımlanan kontrolsüz hareketlerle başvuran diyabetik hastaların görüntüleme bulgularını sunmayı amaçladık.

Keywords:

Nonketotic hyperglycemia,
Chorea,
Stroke mimickers,
Magnetic resonance imaging.

Anahtar Kelimeler:

Nonketotik hiperglisemi,
Kore,
Stroke taklitçileri,
Manyetik rezonans görüntüleme.

INTRODUCTION

Deep gray matter structures such as the thalamus and the basal ganglia are highly metabolically active. In various pathologic conditions like metabolic abnormalities, toxic poisoning, and neurodegeneration of the brain with iron accumulation, these structures are affected usually symmetrically and bilaterally (1). Nonketotic hyperglycemia has been associated with a characteristic appearance in the basal ganglia usually bilaterally but rarely unilaterally hyperattenuating on non-enhanced computed tomography (NECT) and hyperintensity on T1-weighted magnetic resonance images (MRI) (2). If symptoms are unilateral, the imaging findings will be typically contralateral to the symptomatic body side (3).

CASE

A 61-year-old female presented to the emergency service with uncontrolled movements defined as chorea. Her medical history includes poorly controlled diabetes mellitus. NECT was performed in the emergency department with a 128 detector CT scanner (PHILIPS Ingenuity, Nederland) and MRI was performed with a 1.5T MR Scanner (GEM flex LG full, USA).

NECT showed hyperdensity within the right caudate nuclei and lentiform nucleus (figure 1). Acute infarction was excluded because diffusion restriction was not observed on diffusion-weighted images (DWI). Control MRI revealed hyperintensity on T1WI (figure 2) and slightly hypointensity on T2WI (figure 3) within the

right caudate nuclei and lentiform nucleus. Gradient echo images showed normal signal intensity in these areas (figure 4), so hemorrhage was excluded. And in the basal ganglia, T2 prolongation was not observed because of that acute toxic poisoning and metabolic abnormalities were also excluded. With the clinical history, we defined the lesions as nonketotic hyperglycemia.

DISCUSSION

The caudate nucleus and the lentiform nucleus are symmetrically located between the lateral ventricles and are isointense compared to the cortical gray matter in all sequences on MRI. The globus pallidus and putamen are highly vascular structures, because of that, they are more sensitive to the metabolic changes in the brain and also generalized and systemic disease (1).

NECT typically shows symmetrically and bilaterally but rarely unilaterally hyperattenuating on the basal ganglia. At MRI, T2WI are usually hypointense and variable but on T1WI these areas are characteristically hyperintense. The mechanism is unknown but some hypothesis have been reported, the most commonly accepted hypothesis is that the signal abnormality represents putaminal petechial hemorrhage (4). Some case series have reported that diffusion restriction may be seen in these areas (2, 3). Gradient echo imaging is important to exclude parenchymal hemorrhage or hemorrhagic

Received: 16. 09.2020

Accepted: 23.09.2020

Correspondence: Ergül Cindemir, Istanbul Haseki Training and Research Hospital, Department of Radiology, Istanbul, Turkey. Email: ergulkahraman@yahoo.com.

Cite this article as: Cindemir E, Gocgun N, İkizceli T, Yılmaz BK, Turkey R. Imaging Findings of Nonketotic Hyperglycemia. Phnx Med J. 2020;2(3):175-177.

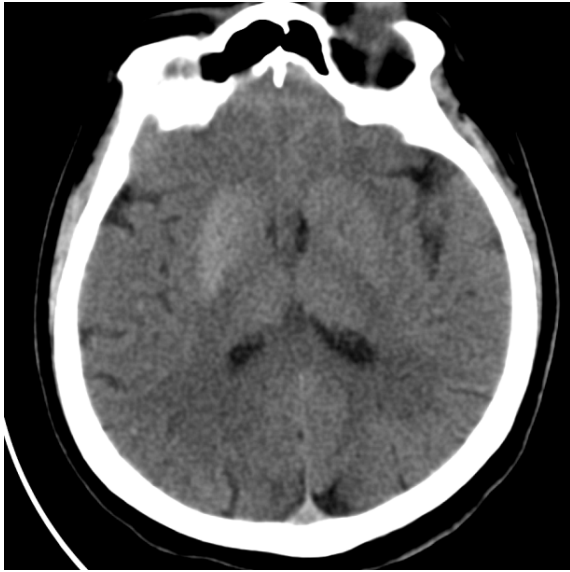


Figure 1: Non-enhanced axial CT imaging reveals hyperdensity within the right caudate nuclei and lentiform nucleus.

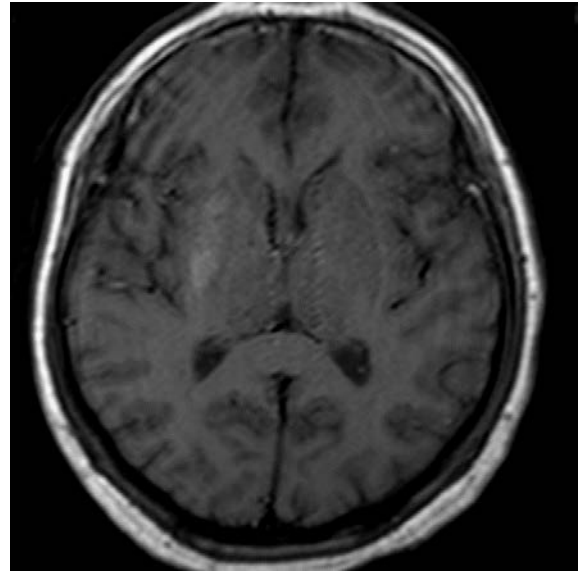


Figure 2: Non-enhanced T1 weighted MRI reveals hyperintensity within the right caudate nuclei and lentiform nucleus.

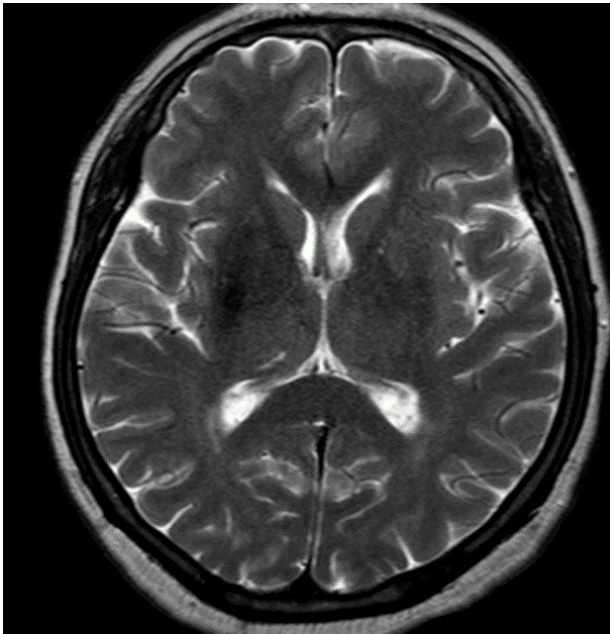


Figure 3: Axial T2 weighted MRI shows the abnormal area is slightly hypointense.

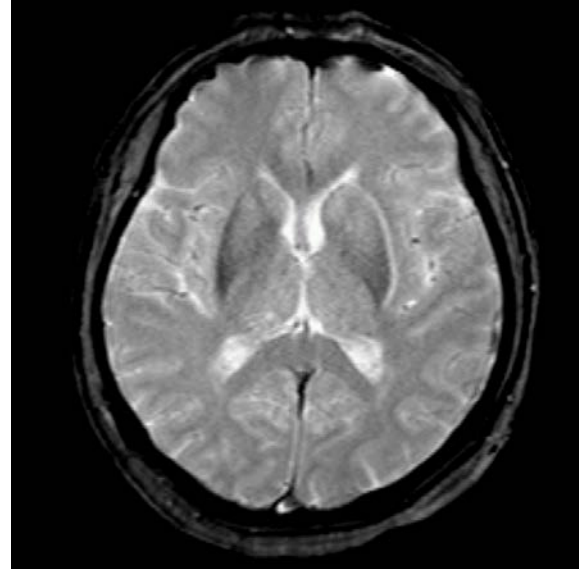


Figure 4: Axial gradient-echo MRI revealed that the right caudate nuclei and the lentiform nucleus are normal because of this parenchymal hemorrhage or hemorrhagic infarct is excluded.

infarct. The other hypothesis is the deposition of some minerals like calcium, proteins, and myelin breakdown products (1,2). Besides knowing the clinical history of a patient, imaging findings are diagnostic. MRI is the modality that must be selected for the final diagnosis but NECT may be the first choice, especially in emergencies.

Conclusion: Although nonketotic hyperglycemia mimics stroke, in poorly controlled diabetic patients who present with acute chorea, and sometimes mental deterioration have typically imaging findings such as hyperdense/hyperintense putamen and/or caudate nucleus contralateral to the side of the patient's symptoms should be diagnostic on both NECT and T1 weighted MRI.

Conflicts of Interest

The authors have no conflicts of interest to declare.

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