Hb Andrew-Minneapolis Variant in a Turkish Family

Bir Türk Ailesinde Hb Andrew-Minneapolis Varyantı

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To the Editor,

There are a total of 1864 known structural hemoglobin (Hb) variants [1] and Hb Andrew-Minneapolis is a rare variant. Hb Andrew-Minneapolis is a beta-chain variant of hemoglobin, which is formed with the replacement of lysine at position 144 with asparagine (HGVS name: HBB:c.435G>C, beta 144(HC1) Lys>Asn), and it was first identified in 1973 by Zak et al. [2]. This variant is inherited in an autosomal dominant manner [2,3]. The first case in Türkiye was published by Aykut et al. [4]. Here we present the Hb Andrew-Minneapolis variant in two siblings whose parents were not alive.

Sibling 1: A 29-year-old female patient was evaluated in our hematology outpatient clinic with polycythemia. She had no active complaints. Laboratory values were as follows: Hb: 16.5 g/dL, hematocrit (Hct): 51.7%, red blood cell count (RBC): 8.17x10^6/µL, mean corpuscular volume (MCV): 63.2 fL, mean corpuscular hemoglobin (MCH): 20.2 pg, red cell distribution width (RDW): 17.1%, white blood cell count (WBC): 7.73x10^3/µL, and platelet count (PLT): 276x10^3/µL. There were no atypical cells in the peripheral smear. Serum iron was 21 µg/dL (normal range: 40-167), iron-binding capacity was 328 µg/dL (normal: 70-240), serum ferritin was 5.3 µg/L (normal: 7-277), and erythropoietin was 250 mIU/mL (normal: 4.3-29). High-performance liquid chromatography (HPLC) analysis of hemoglobin revealed HbA1 of 7.5%, HbA2 of 1.4%, HbF of 8.5%, P3 of 66.2%, and 10.2% unknown results. Although there was no diagnosis of diabetes, HbA1c was found to be high at 6.2% (normal: 3.5%-5.6%). Repeated fasting blood glucose levels were 70-80 mg/dL. Iron deficiency and abnormal hemoglobin were observed. New-generation sequencing (NGS) analysis was performed for a definitive diagnosis and the patient was diagnosed with heterozygous Hb Andrew-Minneapolis by NGS (Figure 1).

Sibling 2: The 26-year-old brother of Sibling 1 was also evaluated. He had no active complaints. Laboratory values were as follows: Hb: 19.4 g/dL, Hct: 57.1%, RBC: 6.58x10^6/µL, MCV: 86.9.2 fL, MCH: 29.5 pg, RDW: 13.4%, WBC: 7.45x10^3/µL, and PLT: 231x10^3/µL. The results of HPLC analysis were as follows: HbA1: 42.2%, HbA2: 2%, HbF: 9.5%, and unknown: 46.1%. Erythropoietin was 9.49 mIU/mL (normal: 4.3-29). This patient was diagnosed with heterozygous Hb Andrew-Minneapolis by sequencing analysis. Genetic analysis of their parents could not be performed as the parents were not alive.

This is a new report of Hb Andrew-Minneapolis, detected in two siblings in Türkiye. This variant has high oxygen affinity [5]. Compared to normal HbA, however, there is less tissue oxygenation. Therefore, erythropoiesis is stimulated as compensation [6]. The oxygen pressure required for the saturation of 50% of the hemoglobin is low. The half-life for RBCs based on chromium-51 is approximately 30 days. If the HbA1c measurement conducted to evaluate the presence of diabetes mellitus in these patients is performed by HPLC, false results may be obtained, and falsely high HbA1c values are often observed [3].

Hb Andrew-Minneapolis is a rare anomaly that results in the formation of a Hb molecule with high oxygen affinity. This results in a left shift of the Hb-oxygen dissociation curve and consecutive erythrocytosis. Limited reports of falsely high HbA1c levels exist.

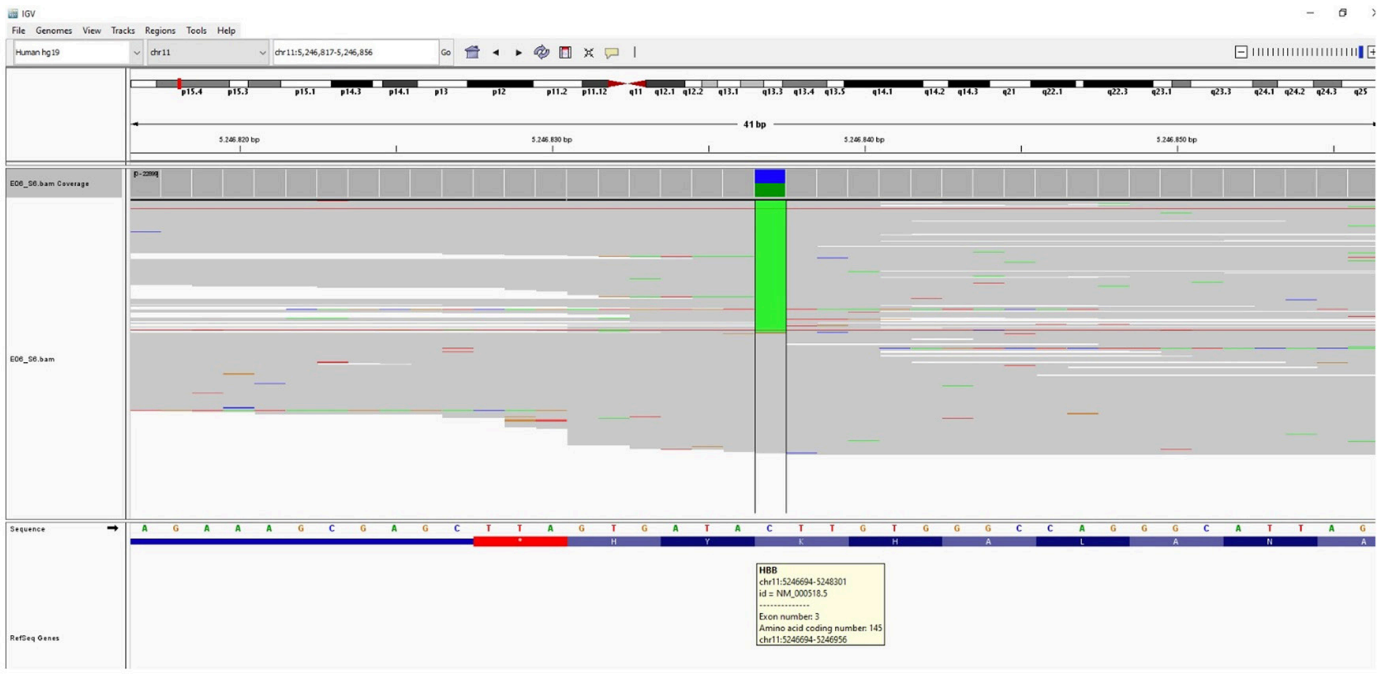

Figure 1. Hemoglobin Andrew-Minneapolis results by next-generation sequencing.

Keywords: Abnormal hemoglobins, Hemoglobin Andrew-Minneapolis, HbA1c

Anahtar Sözcükler: Anormal hemoglobinler, Hemoglobin Andrew-Minneapolis , HbA1c

Ethics

Informed Consent: Obtained.

Authorship Contributions

Concept- H.S.; Design- H.S., D.C.; Data Collection or Processing- H.S., S.M.; Analysis or Interpretation- D.C., S.C.; Literature Search- H.S.; Writing- H.S., D.C.

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