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 1864 variants in structural hemoglobin variants[1] and Hb-Andrew-Minneapolis is a rare variant. Hb Andrew-Minneapolis is a beta chain variant of hemoglobin, which is formed by replacing lysine at position 144 with asparagine (HGVS name HBB:c.435G>C, beta 144(HC1) Lys>Asn) and was first described in 1973 by Zak et al. This variant is inherited as an autosomal dominant [2, 3]. The first case in our country was published by Aykut et al. [4]. Here we present the Hb Hb Andrew-Minneapolis 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. The patient had no active complaints. Her laboratory values are follow up; Hb: 16.5 gr/dl, Hct: 51.7%, RBC: 8.17 10⁶/ul, MCV: 63.2 fl, MCH 20.2 pg, RDW: 17.1%, WBC: 7.73 10³/ul, PLT 276 10³/ul. There were no atypical cells in peripheral smear. Serum iron: 2.1 ug/dl (40-167) Iron binding capacity: 328 ug/dl (70-240) Serum Ferritin 5.3 ug/L (7-277) Erythropoetin 250 mIU/ml (normal: 4.3-29) was detected. The result of High Performance Liquid Chromatography (HPLC) was HbA1: 7.5%, HbA2: 1.4%, HbF: 8.5%, P3: 66.2%, unknown: 10.2%. Although there was no diagnosis of diabetes, HbA1c: 6.2% was found to be high (normal: 3.5-5.6%). Repeated fasting blood glucose levels were 70-80 mg/dl. There was iron deficiency and abnormal hemoglobin. New Generation Sequencing (NGS) Analysis was performed in the for certain diagnosis. Patient was diagnosed as heterozygous Andrew-Minneapolis by NGS (Figure-1).

Sibling 2: A 26-year-old male patient whose sister had Andrew-Minneapolis was evaluated. He had no active complaints. His hematological levels are follow up; Hb: 19.4 gr/dl, Hct: 57.1%, RBC: 6.58 10⁹/ul, MCV: 86.9.2 fl, MCH: 29.5 pg, RDW: 13.4%, WBC: 7.45
The result of HPLC was HbA1c: 42.2%, HbA2: 2%, HbF: 9.5% and unknown: 46.1%.

Erythropoietin (EPO): 9.49 mIU/ml (normal: 4.3-29) Patient was confirmed as heterozygous Andrew-Minneapolis with Beta Sequencing Analysis. Genetic analysis could not be performed to their parents because the parents were not alive.

The Hb Andrew-Minneapolis case, which was detected in two siblings in Turkey. This variant has high oxygen affinity [5]. Compared to normal HbA, tissue oxygenation is less. Therefore, erythropoiesis is stimulated as compensation [6]. The oxygen pressure (P50) required for the saturation of 50% of hemoglobin is low. The half-life (t1/2) for RBC made with chrom51 is approximately 30 days. If the HbA1c measurement used for diabetes mellitus in these patients is performed by high performance liquid chromatography (HPLC) method, it causes false results and false high HbA1c values are often obtained [3].

Conclusion: 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. Only limited reports of falsely high HbA1c levels exist.

REFERENCES

1. https://globin.bx.psu.edu
Figure 1. Hemoglobin Andrew-Minneapolis in NGS