A Case Report of Metformin Related Lactic Acidosis

Case Report

A 57 years old woman was admitted to the emergency department with vomiting, confusion and low blood glucose. According to the anamnesis obtained from the patient, she had consulted to the family physician with the same complaints about 1 hour ago and the patient’s blood glucose level was 55 mg/dl at the family health center, dextrose infusion was started and the patient was referred to the emergency department when her complaints persisted although her blood glucose level increased to around 200 mg/dl. It was learned that the patient had diabetes mellitus and was taking metformin for this reason. When the drugs used by the patient were questioned, he stated that he used metformin irregularly. For this reason, he
stated that he had taken extra metformin tablets recently. Initial evaluation of the patient was performed in the emergency department. Blood tests of the patient were analyzed. Blood glucose, sodium, calcium and carbon monoxide values were found to be within the normal range. Creatinine value was 0.94 mg/dL (minimally elevated). Computerized brain tomography and diffusion MRI performed due to clouding of consciousness revealed no pathology. In the venous blood gas analysis of the patient; pH: 7.2, PCO₂: 35.4 mmHg, PO₂: 40.4 mmHg, lactate: 13.5 mmol/L, metabolic acidosis with anion gap and increased base deficit was present. A differential diagnosis was made to explain vomiting, confusion and lactic acidosis and metformin-associated lactic acidosis was considered. The patient was hospitalized in the internal medicine clinic. In the continuation of the treatment, the general condition of the patient improved and the blood gases obtained during the treatment process showed pH: 7.29, PCO₂: 41 mmHg, lactate: 9.5 mmol/L. Base deficit and bicarbonate were within normal range. In the arterial blood gas analysis of the patient in the 1st week of treatment; pH: 7.38, PCO₂: 43 mmHg, PO₂: 97 mmHg, HCO₃⁻: 24.3 mmol/L and lactate: 1.2 mmol/L, his general condition improved completely and he was discharged with recovery.

**Discussion**

Metformin is a drug from the biguanide group used in the treatment of type 2 diabetes mellitus (2). In high dose metformin intake, nonspecific symptoms including anorexia, lethargy, nausea, vomiting and epigastric pain as well as life-threatening symptoms including moderate renal failure, hypotension, hypothermia, respiratory failure and cardiac rhythm disturbances may develop (2, 3, 4, 7). Our patient had nausea/vomiting, minimally elevated creatinine levels and confusion. Eosinophilia in peripheral blood, hematuria and proteinuria in urine are possible findings in cases of interstitial nephritis (2, 3, 4). In our case, eosinophilia and hematuria/proteinuria in urine analysis were absent.

Lactate is one of the end products of anaerobic glycolysis. Lactate is utilized by hepatocytes and converted to glucose through gluconeogenesis. Normal blood lactate levels range between 0.5 and 1 mmol/L. Blood lactate levels greater than 2 mmol/L are defined as hyperlactatemia. Lactic acidemia occurs when serum lactate concentration exceeds 4 mmol/L with pH less than 7.35. In general, elevated lactate levels result from increased production or decreased urinary excretion. Etiology of the anaerobic metabolism required to cause a lactic acidosis includes various disease processes such as sepsis, hemorrhagic shock, cardiac arrest, trauma, intoxications (such as: metformin poisoning, metabolic poisons such as cyanide), burns, diabetic ketoacidosis, cancers and intense muscle activity (8). In a study by Wills et al. the incidence of metformin-induced severe lactic acidosis was reported to be 9.1% in patients who received a single over dose of metformin (9). In another study conducted by Li Cavoli et al. among 1014 renal patients, it was reported that acute renal failure accompanied by lactic acidosis was detected in 47 patients who used metformin for hyperglycemia control (10). In another case of metformin intoxication reported by Mustaфа et al., acute renal failure with lactic acidosis and hypothermia was reported (11). In our case, there was an elevated lactate level in the blood gas obtained at the first presentation. In articles in the literature reporting the development of metformin-induced lactic acidosis and acute renal failure, it has been reported that hemodialysis is usually performed in treatment (12). In our patient, blood creatinine levels were found to be minimally elevated and normalized with hydration/ fluid support. Hemodialysis was not performed. The effects of metformin on the kidney are thought to be related to renal hypoperfusion or direct renal toxic effect of metformin (12).

**References**