METFORMIN-INDUCED LACTIC ACIDOSIS: A CASE ANALYSIS

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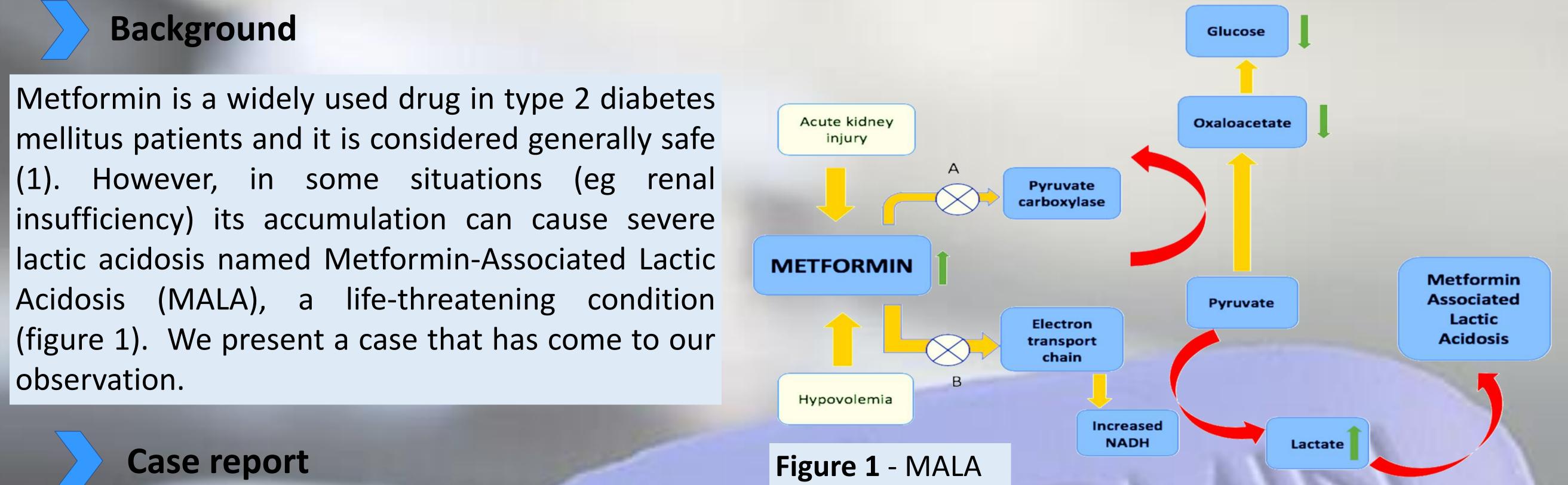
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Background

Metformin is a widely used drug in type 2 diabetes mellitus patients and it is considered generally safe (1). However, in some situations (eg renal insufficiency) its accumulation can cause severe lactic acidosis named Metformin-Associated Lactic Acidosis (MALA), a life-threatening condition (figure 1). We present a case that has come to our observation.

Figure 1 - MALA

Case report

A 70-year-old man was admitted in Emergency Department for dyspnea and chest pain. At the entrance his vital signs were: GCS 15, respiratory rate 24 act/min and blood pressure 180/100 mmHg; the first arterial blood sample showed a severe metabolic acidosis (table 1). At first he was treated with NaHCO3 5.4% 500ml. After the start of treatment, we recorded a severe hypotension poorly responsive to fluid challenge with crystalloids; therefore norepinephrine was started (max 0.2mcg/kg/min). The subsequent anamnesis reveals that he had taken metformin to treat type 2 diabetes mellitus. The first blood sample collected in the Emergence Department indicated a severe renal impairment with creatinine 14.8 mg/dl associated with anuria. Hence we decided to admit the patient to ICU and submit him to urgent RRT with CVVHDF (within 3 h from accessing the ED). Our diagnostic hypothesis was metformin induced lactic acidosis (MALA). In the following 48 hours there was a gradual improvement of the metabolic state with normalization of the pH, return to the normal range of lactacidemia and resumption of diuresis with pharmacological stimulation. After 72 hours from ICU admission, RRT was suspended and then the patient was transferred to the medical department.

Figure 2 – MALA: decision-making approach

Arterial blood sample at ED admission

pH	6.93
paCO2	12.4 mmHg
paO2	139 mmHg
HCO3 -	2.6 mmol/l
BE	-28
Lat	17 mmol/l
Glyc	241 mg/dl
K+	5.6 mEq/l
Anion Gap	38.6

Table 1

Discussion

Metformin intoxication should be suspected in a diabetic patient with metabolic acidosis, high anion gap and severe increase in lactacidemia. The history and blood samples allow an easy and early diagnosis and the measurement of the blood metformin level is not necessary. (figure 2). However, early supportive therapies such as hemodinamic support and hemodialysis are essential to improve the outcome of these patients.

References: 1) A. Protti et al. Critical Care 2012, 16:R75. 2) R. DeFronzo et al. Metabolism Clinical And Experimental 65. 2016 20-29