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Case report of chloroquine therapy and hypoglycaemia in type 1 diabetes: What should we have in mind during the COVID-19 pandemic?

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ABSTRACT

A type 1 diabetes patient experienced remission associated with chloroquine therapy while travelling to a malaria-endemic area. Chloroquine has immunomodulatory and hypoglycaemic effects and may become more frequently used due to the COVID-19 pandemic. Patients with type 1 diabetes treated with chloroquine should be monitored for hypoglycaemia, even after recovery.

Dear Editor,

I read with great interest article by Singh AK et al. [1] and would like to share a case of a patient with type 1 diabetes mellitus (T1DM) and the possible long-term consequences of chloroquine therapy.

A 26-year old man was diagnosed with T1DM in 2007. His body mass index was 27 kg/m^2, C peptide 0.19 nmol/L, A1C 7.5% and he had striking hyperglycaemia with positive pancreatic antibodies confirming autoimmunity, so he was treated with insulin. Shortly thereafter, he started to use prophylactic chloroquine phosphate (500 mg once a week for 4 consecutive weeks) due to a trip to a malaria-endemic area and experienced hypoglycaemia following 2 weeks of therapy. Insulin was gradually reduced and eventually stopped. In the next years, he was able to keep his blood glucose optimal with dietary measures alone with A1C 6.2–6.9% (44–52 mg/mol), HOMA index 1,7; fasting C peptide was 0,74 nmol/L, after a meal it was 1,2 nmol/L β-cell autoimmunity; however, persisted. In 2014, following a short febrile illness, his glucose levels rose and the insulin was reintroduced permanently. During his last evaluation in 2020, the fasting C peptide was 0.29 nmol/L, after a meal C peptide was 0.61 nmol/L confirming residual endogenous secretion of insulin, but A1C 9.2% (77 mmol/L).

Is remission of T1DM associated with chloroquine, a drug also used for the treatment of autoimmune disorders (rheumatoid arthritis) and known to cause hypoglycaemia? With the natural progression of T1DM, some patients regain transient β-cell activity which lasts in most cases a few weeks or months, or rarely, years. The factors that prolong partial recovery from an autoimmune attack are still unknown. Chloroquine, however, is known to reduce the incidence of diabetes in patients with rheumatoid arthritis and lupus and to improve glycaemia if diabetes is already present [2]. The anti-inflammatory mechanisms of chloroquine are possibly related to lysosomotropic and immunomodulatory mechanisms [3], but chloroquine also causes changes in insulin metabolism through the signalling of cellular receptors and post-receptor clearance [4]. In diabetic animals, it has been shown that chloroquine raises serum insulin levels even without exogenous insulin treatment [5].

Patients with T1DM are likely to have worse outcomes with COVID-19 infection. If infected, there may be a chance that they will be treated with chloroquine which has been associated with positive outcomes in COVID-19-related pneumonia. If so, and there is still some β-cell activity present, it might precipitate hypoglycaemia which is associated with increased mortality in subjects hospitalised with pneumonia, regardless of whether they have

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diabetes [6].

What is the lesson from this case? Chloroquine has both immunomodulatory and hypoglycaemic effects. In the future, we might use chloroquine more frequently due to the COVID-19 pandemic, including in patients with T1DM. Such patients should be monitored closely for hypoglycaemia and if necessary, their insulin dose must be adjusted, even after recovery.

Declaration of competing interest

Author of the paper has no competing interests and did not receive any financial resource for publication and authorship. Patient has signed informed consent for the publication of particular material.

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