Hypoglycemia and myocardial infarction: Inhibition of ischemic preconditioning response

Sir,

We have read the article by Mahajan et al.[1] with great interest. It is well known that diabetes is an important risk factor for myocardial infarction (MI) which is considered equivalent to known coronary artery disease.[2] Good glycemic control can reduce the incidence of long-term diabetic complications.[3] However, achieving a good glycemic control is often limited by hypoglycemia. Today, hypoglycemia emerges as a marker for increased cardiovascular mortality among patients with or without underlying heart disease.[4] Also, increased frequency of MI during hypoglycemic spells was observed in patients who where treated with oral hypoglycemic agents, especially with sulfonylurea, as observed in this case too, and in patients who had experienced more than two episodes of severe hypoglycemia in the same event.

We agree with the authors[5] and attribute it to inhibition of ischemic preconditioning response. Ischemic preconditioning, a cardioprotective effect, is facilitated by opening of $K_{ATP}$ channels, which are located in pancreatic
islet cells, cardiomyocytes, vascular smooth muscle, and brain. A decline in intracellular ATP and an increase in intracellular lactate along with adenosine were observed during ischemia, which led to opening of $K_{ATP}$ channels. This resulted in an outward flow of potassium current that in turn led to earlier repolarization, shortening of action potential, and reduction of calcium influx. Further, myocardial ischemia is worsened by decreased cardiac contractility and increased vascular smooth muscle relaxation. It has also been reported that hypoglycemia can induce platelet aggregation, blood hypercoagulability, and localized vasoconstriction of the coronary arteries.\[5\] Thus, the risk for myocardial injury is further increased. Repeated hypoglycemic episodes often go unrecognized due to failure of neuroendocrine and symptomatic responses to subsequent hypoglycemia. Hence, we need to be vigilant in monitoring patients on oral hypoglycemic agents.

Unfortunately, the occurrence of cardiovascular complications during hypoglycemia and their molecular mechanisms do not receive much attention during medical education or are remembered during medical emergencies in general. In view of these, ischemic preconditioning response has to be reinforced in educational programs on diabetes to students of health sciences and practitioners working in the emergency department so that patients with hypoglycemia will be evaluated for silent acute coronary syndrome and treated appropriately.

Subramanian Senthilkumaran, Ramachandran Meenakshisundaram¹, Ponnuswamy Suresh, Ponniah Thirumalaikolundusubramanian¹

Department of Emergency and Critical Care Medicine, Sri Gokulam Hospitals and Research Institute, Salem, Tamil Nadu,

¹Department of Internal Medicine, Chennai Medical College and Research Center, Irungalur, Trichy, India

Corresponding Author: Dr. Subramanian Senthilkumaran, Department of Accident, Emergency and Critical Care Medicine, Sri Gokulam Hospital and Research Institute, Salem – 636 004, Tamil Nadu, India. E-mail: maniansenthil@yahoo.co.in

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