

Liver transplant and the sweet-bitter truth

TO THE EDITOR: Kim et al. [1] recently published a research report in *Anesthesia & Pain Medicine* highlighting the early mortality predictive value of intraoperative hyperlactatemia during liver transplantation (LT). While the results of this considerably large patient cohort retrospective analysis, highlighting the prognostic implications of metabolic alterations in LT, are undeniably commendable [1], the index findings need to be carefully interpreted in light of several observations.

Given that Kim et al. [1] focused on the intraoperative factors affecting outcomes following LT, the lack of the consideration of intraoperative glycemic fluctuations in their analysis deserves attention. This is extremely important, considering that hyperglycemia can be caused intraoperatively during LT from intrinsic diabetogenic patient characteristics, and extrinsic factors such as perioperative stress, corticosteroids, and catecholamine infusions [2-4]. Apart from the problems surrounding intraoperative hyperglycemia, the larger problem lies in the proposition of von Platen et al. [4] of evaluating the lactate levels during LT in close conjunction with the glucose values. They elaborate on the unique activity of hepatocytes in response to ischemia by glycogenolysis, which contributes to hyperglycemia and is further compounded by the likelihood of stress-induced insulin resistance [4]. Thus, ischemia is intricately linked to both intraoperative lactate and glucose dynamics during LT. Indeed, the total ischemia time in the hyperlactatemia group was higher in the analysis by Kim et al. [1]. Apart from ischemia, prior studies have also associated hyperglycemia with concomitant lactate elevations in diverse clinical settings, indicating glycometabolic interactions [5].

Even from a practical standpoint, the institutional glucose management protocol in the study by Kim et al. [1] was not adhered to, as in a major surgical procedure should be followed. The prognostic importance of intraoperative hyperglycemia in LT has been described by Ammori et al. [2] and Park et al. [3]. Interestingly, of the 184 patients included in the study by Ammori et al. [2], as many as 124 recipients had poor glycemic control (defined as mean blood glucose [BG] level ≥ 150 mg/dl), eventually demonstrating a mean intraoperative BG level of 184 mg/dl. Park et al. [3] reported an incidence rate of severe intraoperative hyperglycemia (BG level ≥ 200 mg/dl) of 37.8% in 76 LT patients with surgical site infections (SSIs), as opposed to a 21.9% incidence in 604 LT patients not with SSIs ($P = 0.002$). Focusing specifically on mortality, which was the primary outcome in Kim et al.'s study [1], being evaluated at 30 and 90 days, Ammori et al. [2] notably outlined an elevated 1-year mortality rate in patients with poor glycemic control compared to those with well-controlled glucose levels (21.9% vs. 8.8%, $P = 0.05$).

Irrespective of whether it is viewed as an independent prognosis or as glycometabolic interactions [5], hyperglycemia in LT cannot be neglected.

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