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LETTER TO EDITOR/LED REPLY

Response to Letter to the Editor: The Impact of Roux-en-Y Gastric Bypass on Bone Remodeling Expressed by the P1NP/βCTX Ratio: a Single-Center Prospective Cohort Study

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Dear Editor,

We thank the authors of this letter to the editor for their thoughtful insights and comments regarding our recent findings concerning the impact of Roux-en-Y gastric bypass (RYGB) on bone remodeling expressed by the procollagen type 1 N-terminal propeptide/beta-C-terminal crosslinking telopeptide of type 1 collagen (P1NP/βCTX) ratio over the first postoperative year [1]. The main goal of our study was to investigate the short-term influence of RYGB on bone remodeling, and to investigate a new, composite biomarker of bone turnover in the context of bariatric surgery (BS). The results of our study showed a postoperative increase in both bone turnover markers, and an overall decrease in the P1NP/βCTX ratio. This suggests that although bone remodeling is increased during the first year after RYGB, there seems to be a shift toward bone degradation. The changes in the bone turnover markers were already present at 1 month, and were independent from the 1-year body mass index loss. At 1 year, we identified significant inverse correlations between the P1NP/βCTX ratio and age and C-reactive protein, as well as a positive correlation with postoperative albumin levels. Given the prospective observational design of the study, we could examine the associations between multiple outcomes simultaneously, but were unable to investigate physiological mechanisms that could explain our observations.

In case we grasped the authors' concerns correctly, we agree that more studies are needed to better clarify the complex interactions between BS and bone health. Avoiding nutrient deficiencies, especially calcium and vitamin D, is undeniably important to decrease the risk of postbariatric bone fractures [2]. Nevertheless, in the context of obesity and BS, additional pathways may interact with bone remodeling and osteoclast differentiation, including mechanical unloading, gut-hormones, systemic inflammation, oxidative stress, the endocannabinoid system, sex-hormones, impaired glucose tolerance, and hypertriglyceridemia [3–5].

We also thank the authors for emphasizing the limitations of our study, namely that the follow-up was limited to 1 year and that data on eating behavior was not collected. The effect of BS on ingestive behavior is in fact one of the main focuses of our

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research group. We recently reviewed postbariatric food preference changes and potential underlying behavioral mechanisms [6], prospectively applied the Eating Disorder Examination-Questionnaire in BS patients [7], and developed a novel drinkometer to enable direct measurements of the microstructure of meal intake following BS [8]. However, to the best of our knowledge, evidence is lacking to support a direct impact of eating behavior on postbariatric bone metabolism.

We appreciate the authors' conclusions that appear to echo the findings in our study, suggesting that bone health should receive a privileged attention in patients with obesity, and adequate measures to prevent postbariatric fatigue fractures are necessary to support the optimal quality of life of BS patients. Although the results of our study are bounded by study design constraints, we hope our study encourages future exploration on the subject of bone metabolism and BS.

Authors' Contribution All authors approved the final version of the manuscript.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflicts of interest.

Ethical Approval Statement For this type of study, formal consent is not required.

Informed Consent Statement Does not apply.

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