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Commentaries

Commentary on: “Underweight patients are an often under looked ‘at risk’ population after undergoing posterior cervical spine surgery”

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In this edition of NASSJ, we highlight the results of a large database study exploring the impact of low body mass index (BMI) upon surgical outcomes after posterior cervical surgery [1]. The authors queried the National Surgical Quality Improvement Program (NSQIP) database from 2005 to 2016 and identified 16,806 patients who were submitted to elective posterior cervical spine surgery.

After controlling for demographics and overall health status, the results of risk-adjusted multivariate regressions demonstrated that underweight patients (BMI <18.5 kg/m²) had the highest risk among all others groups in the BMI spectrum for multiple perioperative complications including adverse events, post-operative infection and reoperation. Perhaps somewhat surprisingly, the impact of low BMI upon complication rates was even greater than those of morbid obesity (BMI >50.0 kg/m²), which, similarly to what has been previously demonstrated by other groups, was associated only with increased risks of perioperative infection [2].

Nevertheless, it is important to emphasize that the concept of “obesity paradox” (i.e. the observation that patients with high BMI may fare better than those with normal or lower ones) [3,4], which has led to descriptions such as “metabolically healthy obesity” or “fat but fit”, has been recently been put into question on the grounds that the observed effects might well have been the result of a combination of methodological flaws in earlier studies on the topic including, but not restricted to, the crudeness of BMI as an isolated measure of obesity, confounding, selection and detection bias, reverse causality, and the so-called collider bias [5]. It should be emphasized that the “obesity paradox” “obesity”, initially described in cardiovascular diseases but later explored in the realm of oncology [6] as well in chronic systemic diseases [7], has never been demonstrated in the field of spine surgery [8].

So far, the vast majority of the scientific literature on the impact of BMI upon surgical outcomes after spine surgery has focused on the deleterious effects of obesity and morbid obesity [9–11]. A few studies in other specialties have suggested that underweight patients may display higher rates of unfavorable outcomes, especially after oncological surgeries [12,13]. As one of the first well-conducted studies highlighting the impact of low BMI upon complications rates after spine surgery, we believe the results of this study are definitely worthy of attention, especially taking into account the extensive efforts in the recent literature

toward developing measures to quantify frailty as well as to evaluate its impact upon surgical outcomes after spine surgery [14,15].

There are obviously some methodological limitations, such as the lack of more granular clinical data, a problem which seems to be inherent to such type of large database study. In terms of interpreting the obtained results, although it is true that this study demonstrated an association between low BMI and perioperative adverse events, infections and re-operations rates after posterior cervical spine surgery, any possible attempts to establish a causative role between low BMI and such adverse events should be tempered by the possibility of confounding factors.

For instance, it has already demonstrated that poor nutritional status (as measured by the prognostic nutritional index - PNI) [16] as well as low albumin are associated with increased risks of wound infection after spine surgery [17,18]. As one could naturally expect some degree of correlation between body weight, nutritional status and albumin levels, it might well be the case that, when adjusting for albumin levels and lymphocyte count (the other variable employed to calculate the PNI), low BMI per se may not play a significant role in predicting perioperative adverse events.

Similarly, considering the possible association between low BMI and decreased bone mineral density (BMD) as well as the extensive literature on the impact of osteopenia and osteoporosis upon complication rates after spinal fusion [19,20], it is highly recommended that future studies on the topic consider bone quality in their multivariate analysis.

Finally, several studies in the literature have suggested an association between nicotine consumption and low BMI [21], as well as between smoking cessation and weight gain [22]. Considering the well-established association between smoking status and poor surgical outcomes and complications rates in spine surgery [23], future studies should also control for such a factor, as the current study published in NASSJ actually did.

Ultimately, although this commendable study which NASSJ is honored to publish constitutes an important step toward properly identifying a still largely underrecognized problem (i.e. the deleterious effects of low BMI upon surgical outcomes after spine surgery), additional research is necessary in order to both confirm the observed findings in other clinical series as well as to properly unveil the possible underlying pathophysiological mechanisms which may explain the association

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of low BMI and increased rates of perioperative complications and adverse events after spine surgery.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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