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**Pharmacologic venous thromboprophylaxis after bariatric surgery:  
burning questions regarding doses, duration and strategy.**

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To the Editor:

We read with particular interest two articles published in recent issues of *Annals of Surgery* investigating the risk for venous thromboembolism (VTE) in severe obese patients submitted to bariatric surgery (BS).<sup>1,2</sup> The authors raised important concerns regarding this topic and are to be congratulated on their work.

Our interest in reading in parallel these two articles relates to the fact that the results of both Aminian et al.<sup>1</sup> and Thereaux et al.<sup>2</sup> provided new evidences regarding the urgent need to define suited dosing recommendations in the most severely obese patients, who are often excluded from clinical trials. Prevention of VTE in severely obese patients still remains challenging, since there is to date no consensus on the optimal anticoagulant, dosing or duration of thromboprophylaxis. Indeed, if all current international guidelines agree to recommend pharmacologic prophylaxis to all bariatric surgery patients, they remain exceedingly vague regarding treatment dose duration, and do not provide any specific dosing strategy to help practitioners in daily routine care.<sup>3,4,5</sup> We recently took advantage of the well-organized French health care system for obesity treatment in the 37 Obesity Specialized Care Centres (CSO), to highlight this wide heterogeneity in pharmacologic prophylaxis dosing regimens and duration. Since these centers are all accredited by ministry of health, specialized in the coordination, medical and surgical care of the most severe cases of obesity (highest level of care), our results reflect well these uncertainties<sup>6</sup>, and suggest that there is still much to do in this regard.

Based on data analysis including more than 20, 000 BS patients from the American College of Surgeons-National Surgical Quality Improvement Program (ACS-NSQIP), Aminian and colleagues found that 0.38% of patients experienced VTE during the first 30 post-operative days, 83% of VTE events occurring after hospital discharge.<sup>1</sup> They identified 10 main risk

factors for VTE, and generated a risk calculator for post-discharge VTE events, proposing personalized medicine in this setting.

For their part, Thereaux and colleagues analyzed recent data from a large nationwide cohort of more than 110,000 BS patients.<sup>2</sup> They aimed to assess the contemporary incidence, risk factors and impact of post-hospital discharge chemoprophylaxis on VTE in BS patients. The main strength of their study is that it reflects patients' real-life risk after BS in one country. Importantly, the study group is very representative of current populations candidate for BS (including low-income patients). They found that 0.51% of patients experienced VTE during the first 90 post-operative days, despite post hospital discharge chemoprophylaxis in 75% of cases. Interestingly, no use of chemoprophylaxis was an independent and significant predictive factor for VTE, whereas a higher heparin defined daily doses was associated with a lower rate of VTE event.

In light of the results of these two extremely interesting large studies, we raised 2 important questions: firstly, since more than half of VTE events occurred after hospital discharge, should extended prophylaxis be recommended for all BS patients? Secondly, as VTE risk remains important in high BMI patients despite prophylaxis, should we use higher dose of anticoagulants?

To our knowledge, a single monocenter prospective study investigated the benefit of extended post-discharge chemical thromboprophylaxis on VTE rates in 308 obese patients after BS.<sup>7</sup> The rate of VTE was significantly lower in patients receiving extended thromboprophylaxis compared to patients receiving in-hospital prophylaxis [0 (0%) vs 6 (4.5%) VTE events,  $p=0.006$ ]. However, the two groups were not comparable in terms of hospital stay and open versus laparoscopic approach, a parameter that was again confirmed to be associated with increased risk, (both higher in the control group).<sup>2</sup> Moreover, the study was not randomized, and extended thromboprophylaxis was limited to 10 days, which limits the impact of this

study. Further prospective randomized trials are hence needed to strongly establish the benefit of extended prophylaxis scheme in BS patients.

Furthermore, ample literature has suggested that higher doses of low molecular weight heparin should be used, especially in patients with extreme body weights.<sup>8,9,10</sup> However, the only specific dosing recommendations published to date are largely based on expert opinion.<sup>3,4,5</sup> On the other hand and considering the low-lipophilic property of LMWH, in severely obese patients, a truly weight-adapted dose, would result in overdosing. Our opinion is that we need to go beyond BMI to take into account the complex heterogeneity of obesity phenotypes. We strongly believe that other body composition parameters should be used in strategies, such as fat-free mass for example. Finally we agree with Aminian et al.,<sup>1</sup> that personalized medicine has its entire place in this complex setting firstly to decipher which patients are at increased risk, and subsequently to propose a personalized doses regimen.

In conclusion, the works of Aminian et al.<sup>1</sup> and Thereaux et al.<sup>2</sup> highlight major outstanding issues concerning thromboprophylaxis in obese patients after BS and bring new insights in the evolution of bariatric practices and complications prevention. We congratulate the authors on their work and on their analysis, and we do believe that this field may be greatly improved.

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