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*Editorial*

# Severe Obesity is Not One Disease—Dissecting Different Treatment Options to Improve Outcomes with Emphasis on Medical and Surgical Approaches

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With the pandemic of obesity, the frequency of severe obesity (SO) has expanded in an exponential way [1]. SO, by definition, is characterized by a body mass index (BMI) above 35 kg/m$^2$, even though several modern obesity physicians suggest that any kind of obesity deserves aggressive treatment, be it medical or surgical. SO is a serious disease, and its burden is made heavier by the complications of obesity, metabolic, social, cardiovascular, psychological, and by reduction in life expectancy [2,3]. The story of medical treatment of obesity starts in the late years of the 19th century, and only in recent years has it become safe and effective [3,4]. The story of surgical treatment is much shorter, beginning in the second half of the last century, and changes have substantially been centered on rendering surgery more effective, safer, and simpler to do [5]. The problem remains that SO has been considered one disease be it for surgeons or for physicians, while several lines of evidence have come to show that there are several kinds of obesity and probably, they require different treatments or approaches. In other words, we still must better understand what SO is to reach better results.

A. The different origin of obesity

Even within an epidemic, there are possible differences in the origin of SO, especially in their genetics [6,7], and for instance, the response to surgical treatments can vary in different patients but seems to be identical in identical twins [8,9].

B. Older and newer paradigms of medical treatment

Up to recent times, it was assumed that treatment of SO was unsuccessful, and that the goal to reach was maintenance of the current weight, while the natural story of SO was of continuous increase of body weight [10]. This was probably due to several reasons, like poor efficacy and side-effects of effective treatments [3,4], or inability to plan effective and long enough studies [11]. The diary is full of loss to follow-up in children and in adults [11]. Fortunately, with the advent of new drugs, loss of weight is possible, in the same order of magnitude that can be reached through metabolic/bariatric surgery (MBS) [12,13]. However, in contrast to MBS, medical treatment works when continued and stops working when interrupted. With drugs and changes of lifestyle it was also possible to prevent some of the complications of obesity, namely type II diabetes mellitus (metformin and orlistat followed by other approaches) [14–19], and to reverse to some extent, clinical diabetes [20].

C. Outcomes of surgical treatments

For sure, MBS is more than one treatment. The advent of laparoscopic techniques has expanded the use of MBS [5]. Several techniques are available, some older techniques have almost disappeared, and newer and simpler techniques are now the most used; techniques are reversible, others, more demolitive are not reversible [5]. This raises one concern: MBS has been shown very effective in young people, in adolescents; would it be advisable to

use demolitive techniques at such ages, or it would be more advisable to postpone MBS or to use less demolitive MBS techniques [21]? In contrast, delay in treatment in this young population may lead to progression of SO and its complications. For optimal outcomes of MBS compliance of patients with MBS workup and post-surgery follow up is needed, be it with older or with newer MBS techniques [22,23].

Metabolic/bariatric surgery (MBS) differs from medical treatment because of its durability of weight loss with one treatment episode; for the future, combination of preoperative or post operative medical and surgical therapy will still be of interest (see below). Mechanisms of action of MBS have been extensively studied and clarified [24]. The greater effect of MBS is not through previously thought mechanisms of restriction and malabsorption, but simply derives from the greater weight loss; greater and greater weight losses are accompanied by progressive ameliorations of several metabolic derangements [25]; for similar weight losses, the effects of MBS and medical treatment are similar [26], and response to medical treatment can predict response to MBS [27]. MBS can revert various co-morbidities, and improves quality of life [20,28–31]; the question remains if MBS really puts type II diabetes in remission or only leads to resolution of clinical diabetes [32–34]. However, together with resolution of diabetes, MBS is also able to prevent diabetes, and diabetic complications [19,35–38].

D. The preventive role of treatments on mortality

Medical treatment of SO has never proven able to prevent mortality in obesity [16–18], although new drugs might be effective, given their effect in preventing cardiovascular diseases [39]. In contrast, various types of MBS can prevent mortality [40,41]. Still, this does not seem to be a universal rule; for instance, the ability to prevent mortality is valid only for patients above certain ages, not for younger patients [42]. Also, it is not clear if the ability to prevent mortality is valid for all stage of SO, or only for patients without extreme SO.

E. The future treatment of severe obesity

To combine medical and surgical treatments or to consider them as alternative will be probably the main issue of the future treatment of SO. With the advent of highly effective drugs for weight loss, one might think that MBS is going to disappear. This is possible, but it is also possible that medical and surgical treatments will find place in different kinds of SO; in the last years, prescription of newer drugs has increased more than 130%, while BS has decreased 5% [43]. For instance, one might propose that lower degrees of SO will be managed through medical treatment, and that higher degrees of MO will continue to receive MBS. It has been shown that in patients with recurrent weight gain or suboptimal weight loss after MBS, medical treatment can restore weight loss [44]. On the other hand, pre-BS treatment of patients with extreme SO by medical treatment might induce a significant pre-surgery weight loss, and help to reduce the risks of MBS for such patients [45,46].

These few observations indicate that the future of SO will be with a center for weight management that focuses on the management of the disease, tailored to the individual patient, with no prejudice for medical or surgical treatment. Different approaches might be more suitable for different patients, alone or combined.

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## Conflicts of Interest

The authors declare no conflict of interest.

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