




# Bariatric Surgery Should Be Proposed in Certain Septuagenarian Patients with Obesity

Boris Hansel<sup>1</sup>  · Pierre Sabatier<sup>2</sup> · Diana Kadouch<sup>3</sup> · Tigran Poghosyan<sup>4</sup> · Konstantinos Arapis<sup>5</sup> · Claire Rives-Lange<sup>6,7</sup> · Sebastien Czernichow<sup>8,9</sup> · Anne-Sophie Jannot<sup>2</sup> · Claire Carette<sup>8,9</sup>

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## Abstract

Bariatric surgery (BS) is rarely performed on patients aged 70 and over, due to the fear of adverse effects, particularly related to sarcopenia. We examined the outcome of obese patients who underwent BS after the age of 69 in the French population. Operated subjects were matched with non-operated obese patients ( $n = 1307$  in each group after matching). We showed that BS was associated with a reduction in mortality and no increase in the risks of rehospitalization or fracture events.

**Keywords** Bariatric surgery · Elderly

## Introduction

Bariatric surgery (BS) beyond 60 years old has been evaluated in numerous studies [1], but data in septuagenarians are scarce [2–4], and to date, no study has analyzed the long-term effect of bariatric surgery in this age group. The objective of our study was to examine, in subjects over 69 years of age, the potential benefit and/or possible risks of BS, particularly on the risk of death.

## Methods

We analyzed data from a comprehensive national medico-administrative database of hospitalizations performed in France between 2011 and 2020. The database used is the database of hospital activity based on a diagnosis-related group (DRG) model for reimbursement (PMSI). Patients coded with obesity during at least one hospital stay were selected. For these patients, we extracted the codes corresponding to the following variables and endpoints: sex, body mass index (BMI) class, sleep apnea syndrome, hypertension, diabetes, chronic kidney disease, heart failure,

✉ Boris Hansel  
boris.hansel@aphp.fr

<sup>1</sup> Unité de Nutrition-Prévention, Service de Chirurgie cardiaque, Université Paris Cité, AP-HP.Nord, Hôpital Bichat Claude Bernard, LVTS, UMR 1148, Inserm, 46 Rue Henri Huchard, Paris, France

<sup>2</sup> Université Paris Cité, AP-HP.Centre, Hôpital Européen Georges Pompidou, HeKA, UMR 1138, Centre de Recherche Des Cordeliers, Inserm, INRIA Paris, Paris, France

<sup>3</sup> Unité de Nutrition-Prévention, Service de Chirurgie cardiaque AP-HP.Nord, Hôpital Bichat Claude Bernard, Paris, France

<sup>4</sup> Université Paris Cité, AP-HP.Nord, Hôpital Bichat Claude Bernard, Service de Chirurgie Digestive UMR 1149, Inserm, Paris, France

<sup>5</sup> AP-HP.Nord, Hôpital Avicenne, Paris, France

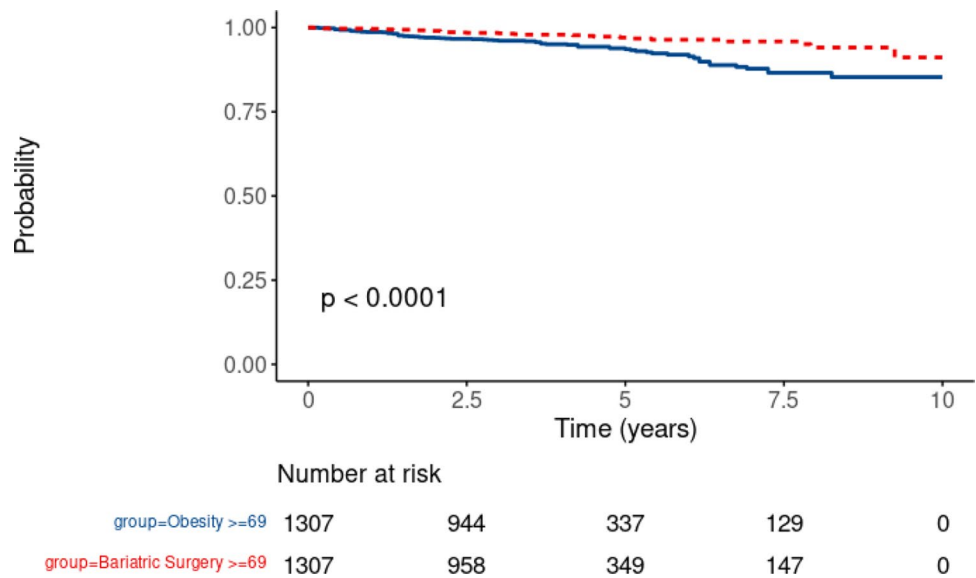
<sup>6</sup> Université Paris Cité, AP-HP.Centre, Hôpital Européen Georges Pompidou, Paris, France

<sup>7</sup> UMR1153, Inserm, Epidemiology and Biostatistics Sorbonne Paris Cité Center (CRESS), METHODS Team, Paris, France

<sup>8</sup> Université Paris Cité, AP-HP.Centre, Hôpital Européen Georges-Pompidou, Service de Nutrition, Centre Spécialisé Obésité, Paris, France

<sup>9</sup> Université Paris Cité, AP-HP.Centre, Hôpital Européen Georges-Pompidou, Inserm, CIC1418 Paris, France

**Fig. 1** Survival analysis estimated by the Kaplan-Meier method with in-hospital death as the defined event



liver fibrosis or cirrhosis, hospitalization for cancer. We excluded patients with a history of hospitalization for cancer as we could not rule out that the gastrectomy was performed for the treatment of the cancer rather than for obesity. Descriptive data are presented as % or mean (SD). After matching for age, sex, year of BS, range of obesity, history of heart failure, and renal failure, two groups were compared: subjects > 69 years having undergone BS (gastric band, sleeve gastrectomy, or gastric bypass) and subjects > 69 years displaying obesity without BS. We used exact matching

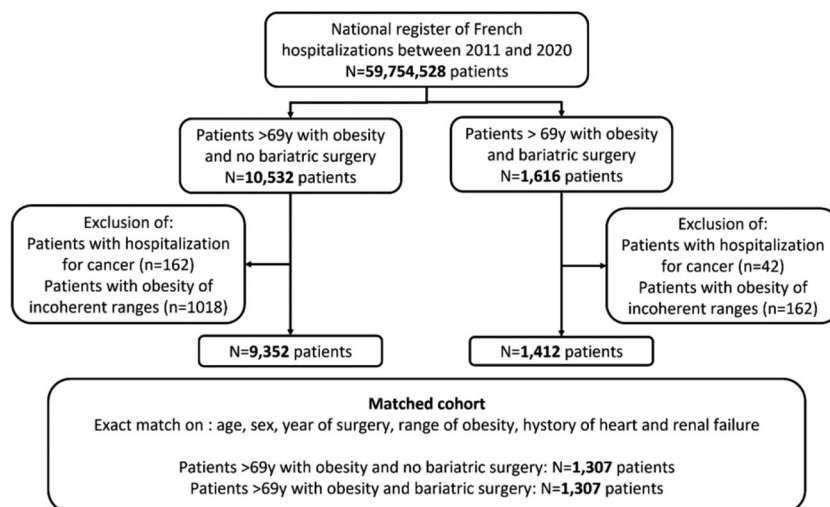
in order to have no statistical differences between the two groups for all matching variables. Therefore, the two groups for these variables were strictly similar. For other variables, we compared the two groups using chi-squared tests.

The primary endpoint was the risk of in-hospital death estimated using a Cox model and Kaplan-Meier survival analysis (Fig. 1). Secondary endpoints were the risk of rehospitalization and the risk of fracture events, estimated using the Cox model.

**Table 1** Description of the population after matching (qualitative variables are described as count and percentage and quantitative variables as mean and standard deviation)

Variables	Patients with obesity and BS after matching (N= 1307)	Patients with obesity and no BS after matching (N= 1307)	
Age (years)	70.6 (1.9)	70.6 (1.9)	
Gender (males)	303 (50.0)	303 (50.0)	
Obesity grade			
30–35 kg/m <sup>2</sup>	52 (50.0)	52 (50.0)	
35–40 kg/m <sup>2</sup>	212 (50.0)	212 (50.0)	
40–50 kg/m <sup>2</sup>	642 (50.0)	642 (50.0)	
> 50 kg/m <sup>2</sup>	115 (50.0)	115 (50.0)	
Unspecified	286 (50.0)	286 (50.0)	
Heart failure % (n)	14 (50.0)	14 (50.0)	
Chronic kidney disease % (n)	31 (50.0)	31 (50.0)	
Essential hypertension % (n)	795 (52.0)	733 (48.0)	p=0.01
Type 2 diabetes % (n)	396 (46.4)	458 (53.6)	p=0.01
Sleep apnea % (n)	676 (60.0)	450 (40.0)	p<0.001
Fibrosis and cirrhosis of liver % (n)	11 (44.0)	14 (56.0)	NS

Fig. 2 Flow chart



## Results

Before matching, the two groups of patients with obesity over 69 years having or not having undergone BS differed significantly ( $p < 0.001$  for each comparison) in age, (median: 70 (IQR: 2) years in the operated group vs. 74 (8) years in the non-operated group), sex (75% women vs. 71%), mean duration of follow-up, (4 (2) vs. 5 (3)) years, sleep apnea (53% vs. 34%), diabetes (31% vs 39%), congestive heart failure (2% vs. 15%), and renal insufficiency (4% vs. 11%). After matching, 1307 pairs of patients were available (Table 1). The risk of in-hospital death was significantly lower in BS patients than in non-operated matched subjects with obesity (HR 0.41 CI95% (0.27–0.62);  $p < 0.001$ , Fig. 2). There was no difference for the risk of rehospitalization (HR=0.83 CI95% (0.68–1.01)) and the risk of fracture events (HR=1.02 CI95% (0.72–1.43);  $p=0.93$ ).

## Discussion

BS appears to be effective in reducing mortality in subjects > 69 years with obesity. Moreover, BS is not associated with any increase both in the risk of rehospitalization or fracture events. The available knowledge on BS in septuagenarians patients is scarce, and previous publications concern only the short-term postoperative risks [2–4]. The data on this topic are reassuring, but no work has yet been published on the longer-term risks and benefits. The main fear that justifies the reluctance to operate on elderly patients is the risk of sarcopenia and disability. Our results are reassuring since there is no increase in the risk of hospitalization for fractures (a good indicator of disability and sarcopenia) [5]. We cannot exclude that this result is partly related to a better preventive management of the operated patients with respect to fractures. Nevertheless, our results show that surgery does not lead to an increase in these events. However, the patients who

underwent BS in our cohort were probably carefully selected since current French guidelines state the following: “After 60 years, the indication must be determined on a case-by-case basis according to physiological age and associated comorbidities.” This is particularly apparent in the baseline characteristics of our population who show, except for sleep apnea, fewer severe comorbidities compared with non-operated patients. The main limitations of our study are its observational design and possible unmeasured confounding factors for BS decision. Furthermore, only hospital mortality could be taken into account. In conclusion, our results suggest that BS could be proposed to prolong healthy life, even after 69 years of age, in well-selected obese patients. Further works should be designed to confirm these results permitting to refine the selection criteria that will ensure a positive benefit-risk ratio for BS in septuagenarians patients.

## References

1. Vallois A, Menahem B, Alves A. “Is laparoscopic bariatric surgery safe and effective in patients over 60 years of age?” An updated systematic review and meta-analysis. *Obes Surg*. 2020;30:5059–70.
2. Smith ME, et al. Perioperative and 1-year outcomes of bariatric surgery in septuagenarians: implications for patient selection. *Surg Obes Relat Dis*. 2019;15:1805–11.
3. Iranmanesh P, et al. Outcomes of bariatric surgery in elderly patients: a registry-based cohort study with 3-year follow-up. *Int J Obes (Lond)*. 2022;46:574–80.
4. Ramirez A, Roy M, Hidalgo JE, et al. Outcomes of bariatric surgery in patients >70 years old. *Surg Obes Relat Dis*. 2012;8:458–62.
5. Yeung SSY, et al. Sarcopenia and its association with falls and fractures in older adults: a systematic review and meta-analysis. *J Cachexia Sarcopenia Muscle*. 2019;10:485–500.

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