

# Obstructive sleep apnoea syndrome – longitudinal outcomes and improvement predictors after bariatric surgery

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## Background

- Obesity is a major risk factor for obstructive sleep apnoea syndrome (OSA).
- Bariatric surgery has been associated with a decrease in multiple obesity-related comorbidities including OSA.
- This study aims to access the OSA evolution in obese patients who underwent bariatric surgery in a tertiary care hospital.

## Methods

### Participants selection process

- Retrospective longitudinal study
- Population of obese patients
- Multidisciplinary Group for Surgical Management of Obesity in our centre
- Bariatric surgery between January/2010 - July 2014
- Inclusion criteria: polysomnography in our centre; study both before and after surgery; OSA in preoperatively study

### Statistical analysis (SPSS Statistics 20.0)

- Frequencies and percentages, median, interquartile range (IQR)
- Kolmogorov-Smirnov test
- Wilcoxon test (signed-ranks), Chi-square test
- Pearson correlation, simple and multiple linear regression

### Clinical and anthropometric data

- Demographic, anthropometric and polysomnographic data
- Apnoea-hypopnoea index (AHI); OSA severity**
  - Absent: AHI < 5 events/hour
  - Mild: AHI ≥ 5 and < 15 events/hour
  - Moderate: AHI ≥ 15 and < 30 events/hour
  - Severe: AHI ≥ 30 events/hour
- OSA treatment**
  - Sleep hygiene measures
  - Positional therapy
  - Continuous positive airway pressure
  - Bi-level non-invasive ventilation (NIV)
- Pre-surgery and post-surgery (3-39 months) evaluation

## Results

78 patients

56 female (71.8%)

Median 51 years old

CHARACTERISTICS	PRE-SURGERY	POST-SURGERY	p value
<b>ANTHROPOMETRIC DATA</b>			
Weight [kg, median (IQR)]	117.35 (106.00-133.25)	<b>84.00</b> (76.15-91.78)	< 0.001
Body mass index (BMI) [kg/m <sup>2</sup> , median (IQR)]	44.04 (40.56-49.17)	<b>31.62</b> (28.05-35.57)	< 0.001
<b>BMI degree [n (%)]</b>			
Normal	0 (0)	3 (3.8)	<b>29 (37.1) non obese 48 (61.5%) improvement BMI degree</b>
Overweight	0 (0)	26 (33.3)	
Obesity grade 1	0 (0)	28 (35.9)	
Obesity grade 2	18 (23.1)	19 (24.4)	
Obesity grade 3	60 (76.9)	<b>2</b> (2.6)	
Waist circumference [cm, median (IQR)]	127.50 (117.25-138.75)	101.50 (96.25-109.25)	< 0.001
Hip circumference [cm, median (IQR)]	128.00 (121.00-141.00)	111.00 (104.00-115.00)	< 0.001
<b>POLYSOMNOGRAPHIC DATA</b>			
AHI [events/hour, median (IQR)]	36.90 (23.40-52.15)	<b>11.40</b> (6.63-31.70)	< 0.001
<b>OSA severity [n (%)]</b>			
Absent	0 (0)	<b>13</b> (16.7)	<b>13 (16.7%) OSA resolution 37 (47.4%) OSA improvement</b>
Mild	6 (7.7)	<b>30</b> (38.5)	
Moderate	26 (33.3)	14 (17.9)	
Severe	46 (59)	21 (26.9)	
<b>OSA treatment [n (%)]</b>			
Sleep hygiene measures	3 (3.8)	33 (42.3)	<b>34 (43.6%) continued to be treated with positive airway pressure</b>
Positional therapy	1 (1.3)	11 (14.1)	
Continuous positive airway pressure	58 (74.4)	<b>27</b> (34.6)	
Bi-level noninvasive ventilation (NIV)	16 (20.5)	<b>7</b> (9)	
Epworth Sleepiness Scale [score, median (IQR)]	8.00 (4.00-14.25)	<b>5.00</b> (1.75-11.00)	0.010
Mean O <sub>2</sub> saturation [%, median (IQR)]	91.00 (88.00-93.00)	<b>93.55</b> (92.00-94.78)	< 0.001
Minimum O <sub>2</sub> saturation [%, median (IQR)]	71.50 (62.00-78.00)	<b>83.00</b> (77.25-86.00)	< 0.001
O <sub>2</sub> saturation < 90% [% time, median (IQR)]	24.90 (8.30-52.50)	<b>3.20</b> (0.68-13.45)	< 0.001
Desaturation index [events/hour, median (IQR)]	31.40 (19.45-49.05)	<b>8.55</b> (4.75-16.93)	< 0.001

### Correlations AHI variation

<u>BMI reduction</u> (r=0.296; p=0.009)	<u>Pre-surgery AHI</u> (r= -0.792; p<0.001)
<u>Total weight loss</u> (r=0.289; p=0.010)	<u>Pre-surgery BMI</u> (r= -0.259; p=0.022)
<u>% weight loss</u> (r=0.249; p=0.028)	<u>Pre-surgery weight</u> (r= -0.267; p=0.018)

Adjusted for  
age and sex

### Multiple linear regression Predictors of AHI improvement

- BMI reduction** (β=1.217; p=0.014)
- Weight loss** (β=0.418; p=0.035)
- Pre-surgery AHI** (β=-0.840; p<0.001)
- Pre-surgery BMI** (β=-1.093; p=0.017)

## Conclusion

- Bariatric surgery has a significant beneficial effect on OSA outcome.
  - 63 patients (80.8%) with OSA improvement or resolution
  - 50% suspended positive airway pressure treatment
- This effect seems to be dependent on **weight loss** and on the **preoperative values of AHI and BMI**.

