Concurrent LSG with UPPP in the Treatment of Morbid Obesity Comorbid with Severe Obstructive Sleep Apnea: A Retrospective Cohort Study

Chengcan YANG, Wenwen YU2, Kan YAO, Yining HE, Hongxia SUN, Bei XU, Jia NI, Min HU, Fen GU, Xiaofeng LU*, Min ZHU*, Bing WANG*

MDT team of Bariatric Surgery， Shanghai Ninth People's Hospital
Shanghai JiaoTong University School of Medicine

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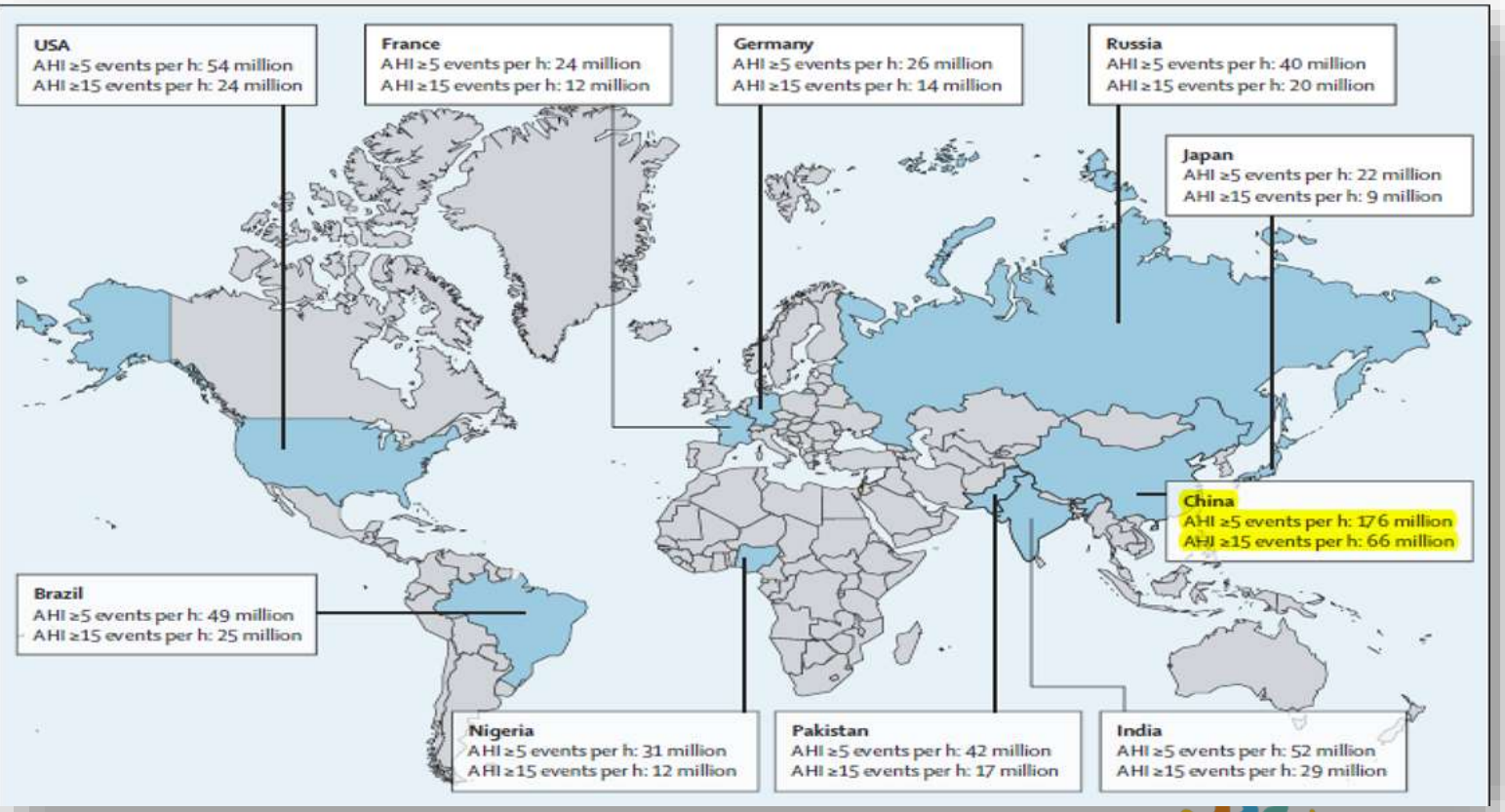
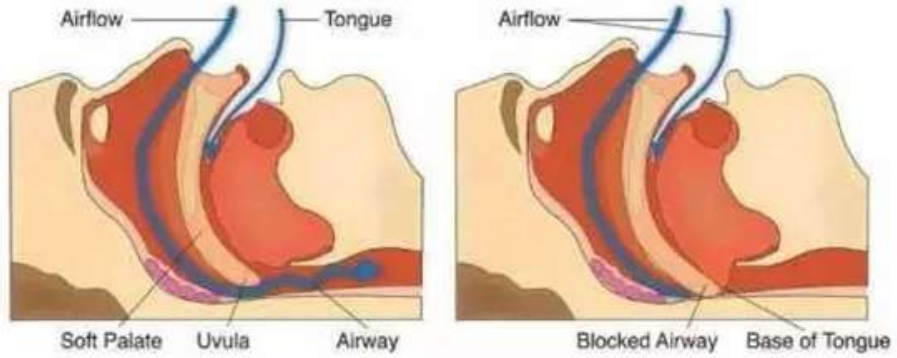
Background

Obstructive Sleep Apnea





Complete/partial obstructions of upper airway

Obesity is its main risk factor

China OSA： 12.5%

35-94% in MBS Patients

perioperative morbidity and mortality ↑

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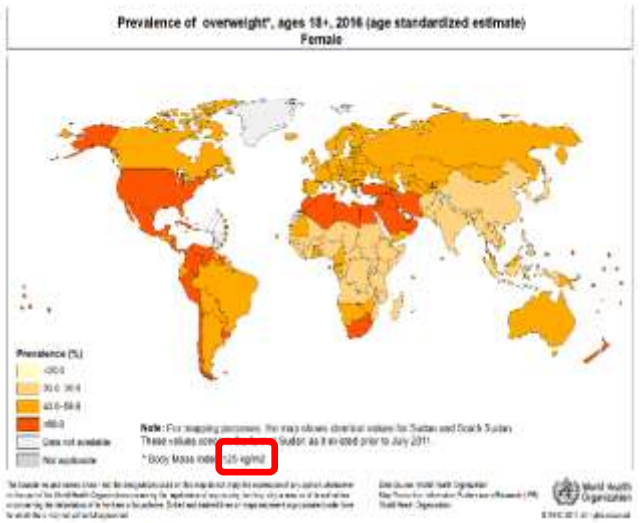
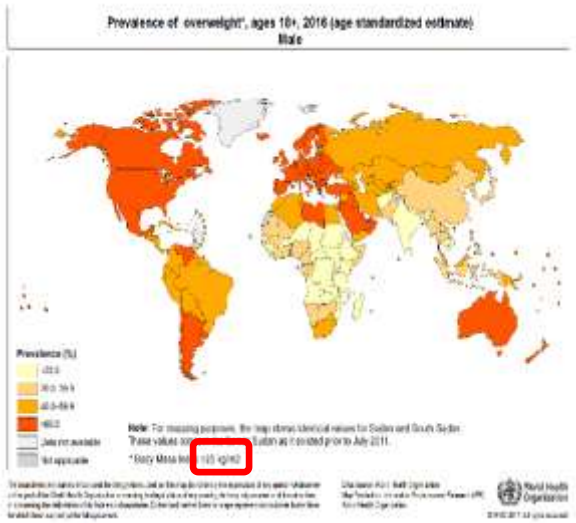
Background

Obesity

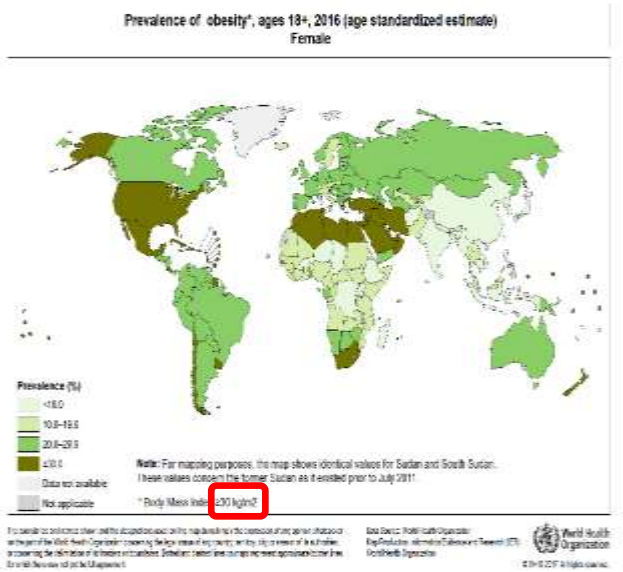
World Health Organization

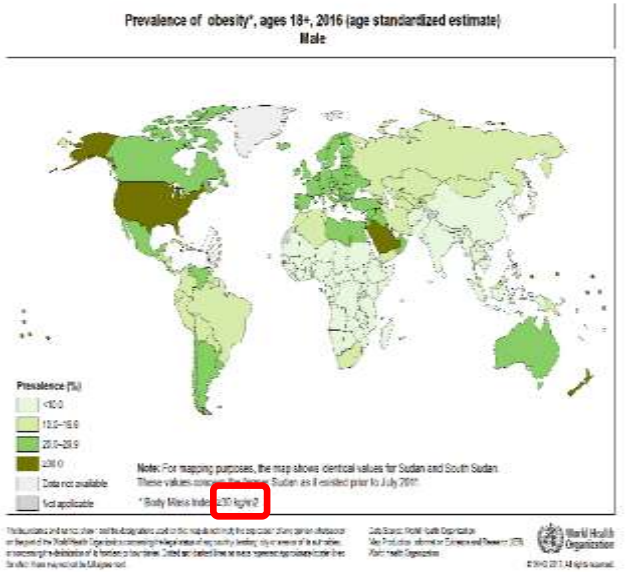
Health Topics | Countries | Newsroom | Emergencies | Data | About Us





BMI > 25 450 million





BMI > 30 87 million

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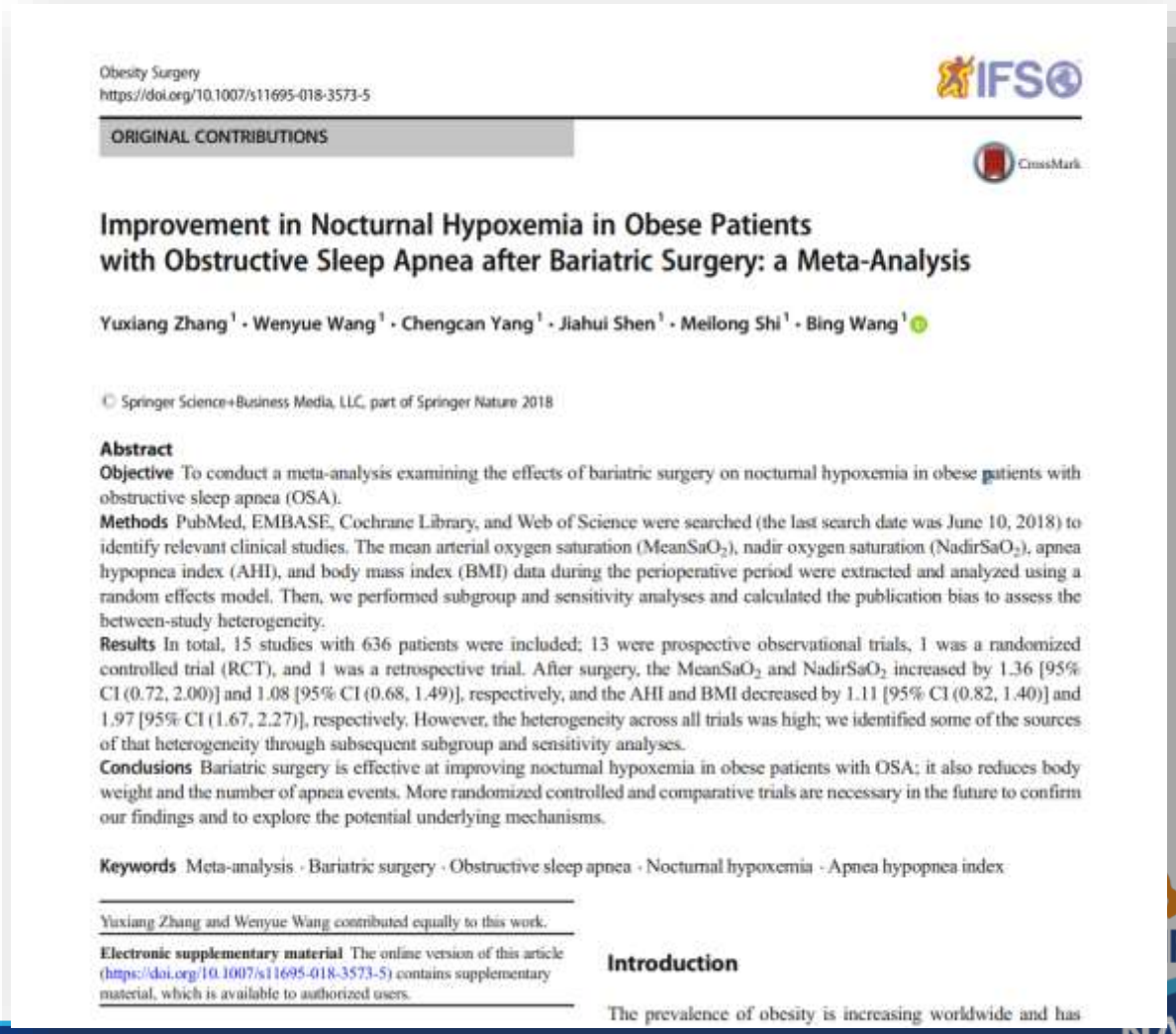
Background

MBS for OSA with Obesity



Obesity Surgery
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ORIGINAL CONTRIBUTIONS

Improvement in Nocturnal Hypoxemia in Obese Patients with Obstructive Sleep Apnea after Bariatric Surgery: a Meta-Analysis

Yuxiang Zhang[1] · Wenyue Wang[1] · Chengcan Yang[1] · Jiahui Shen[1] · Meilong Shi[1] · Bing Wang[1]

Abstract

Objective To conduct a meta-analysis examining the effects of bariatric surgery on nocturnal hypoxemia in obese patients with obstructive sleep apnea (OSA).

Methods PubMed, EMBASE, Cochrane Library, and Web of Science were searched (the last search date was June 10, 2018) to identify relevant clinical studies. The mean arterial oxygen saturation ($MeanSaO_2$), nadir oxygen saturation ($NadirSaO_2$), apnea hypopnea index (AHI), and body mass index (BMI) data during the perioperative period were extracted and analyzed using a random effects model. Then, we performed subgroup and sensitivity analyses and calculated the publication bias to assess the between-study heterogeneity.

Results In total, 15 studies with 636 patients were included; 13 were prospective observational trials, 1 was a randomized controlled trial (RCT), and 1 was a retrospective trial. After surgery, the $MeanSaO_2$ and $NadirSaO_2$ increased by 1.36 [95% CI (0.72, 2.00)] and 1.08 [95% CI (0.68, 1.49)], respectively, and the AHI and BMI decreased by 1.11 [95% CI (0.82, 1.40)] and 1.97 [95% CI (1.67, 2.27)], respectively. However, the heterogeneity across all trials was high; we identified some of the sources of that heterogeneity through subsequent subgroup and sensitivity analyses.

Conclusions Bariatric surgery is effective at improving nocturnal hypoxemia in obese patients with OSA; it also reduces body weight and the number of apnea events. More randomized controlled and comparative trials are necessary in the future to confirm our findings and to explore the potential underlying mechanisms.

Keywords Meta-analysis · Bariatric surgery · Obstructive sleep apnea · Nocturnal hypoxemia · Apnea hypopnea index

Yuxiang Zhang and Wenyue Wang contributed equally to this work.

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s11695-018-3573-5) contains supplementary material, which is available to authorized users.

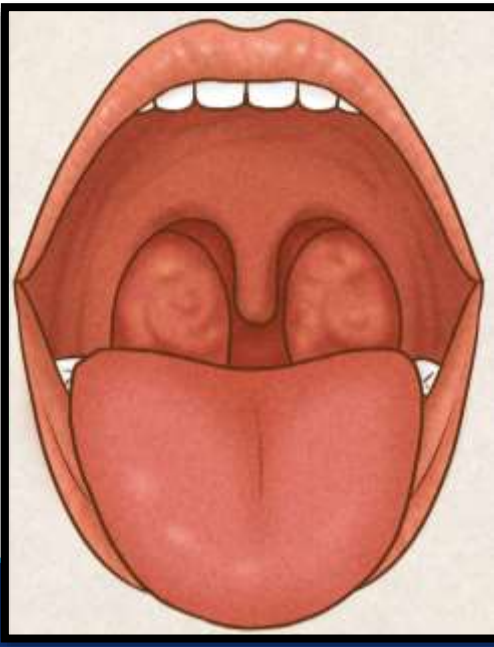
Introduction

The prevalence of obesity is increasing worldwide and has

- **MBS is effective at improving nocturnal hypoxemia in obese patients with OSA**
- **It also reduces body weight and the number of apnea events**

Background

- **Residual OSA after BS**
- **Especially for patients with tonsillar hypertrophy and soft palate elongation**
- **Problem of CPAP adherence**



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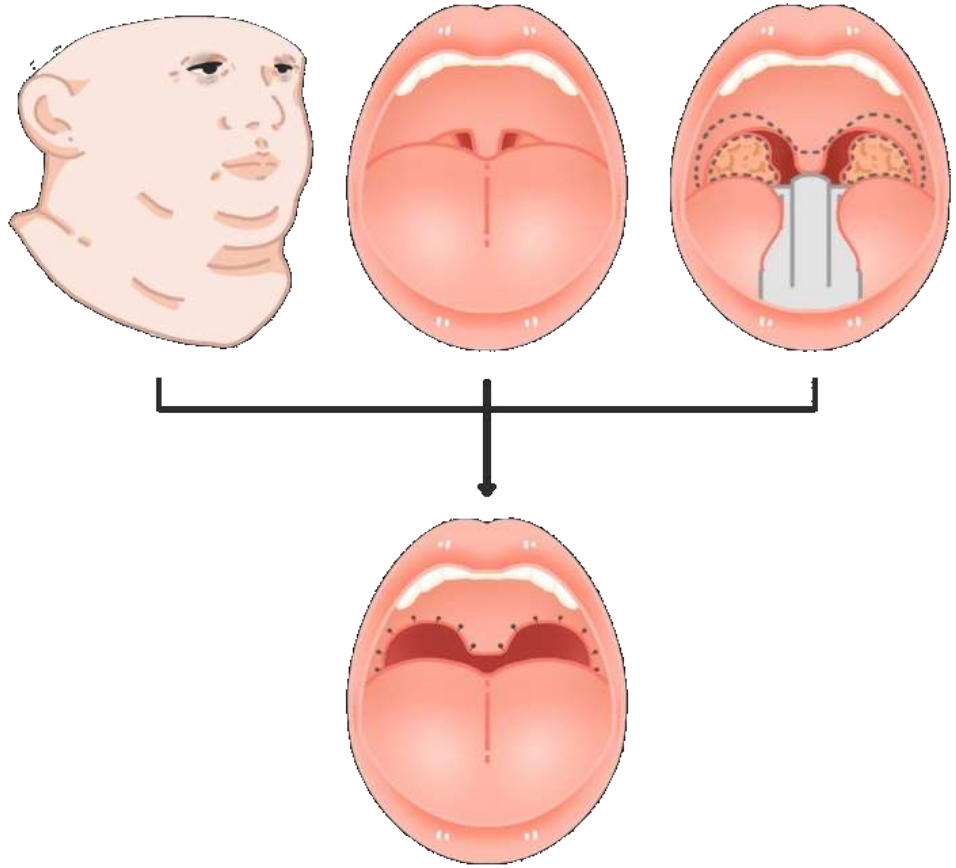
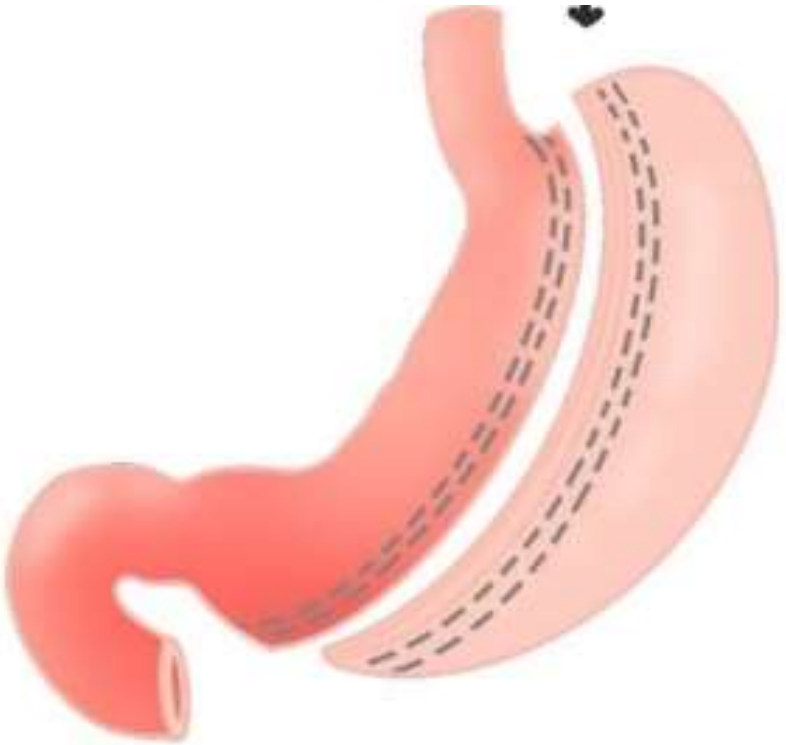
Background

UPPP



LSG



Objective

Evaluate the safety and short-term effect of contemporaneous surgeries (LSG+UPPP) in the treatment of morbid obesity with severe OSA.

Study design

Retrospective clinical study

Center(Single-Cent)

Department of general surgery, Shanghai Ninth People's Hospital.

Size

101 of 591 patients with severe OSA between December 2019 and December 2021 contemporaneous group 42 vs LSG group 59

Follow-up

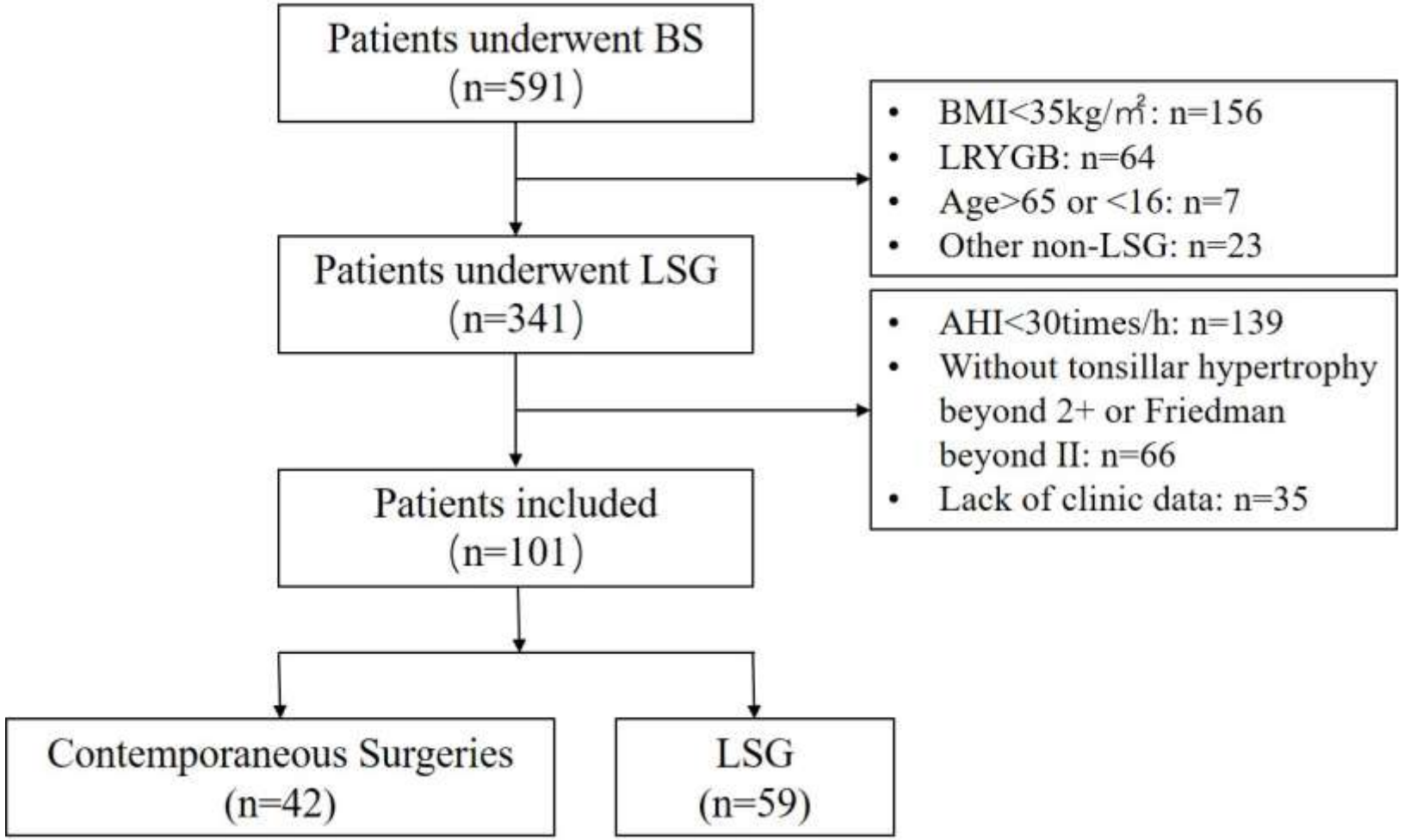
12 months

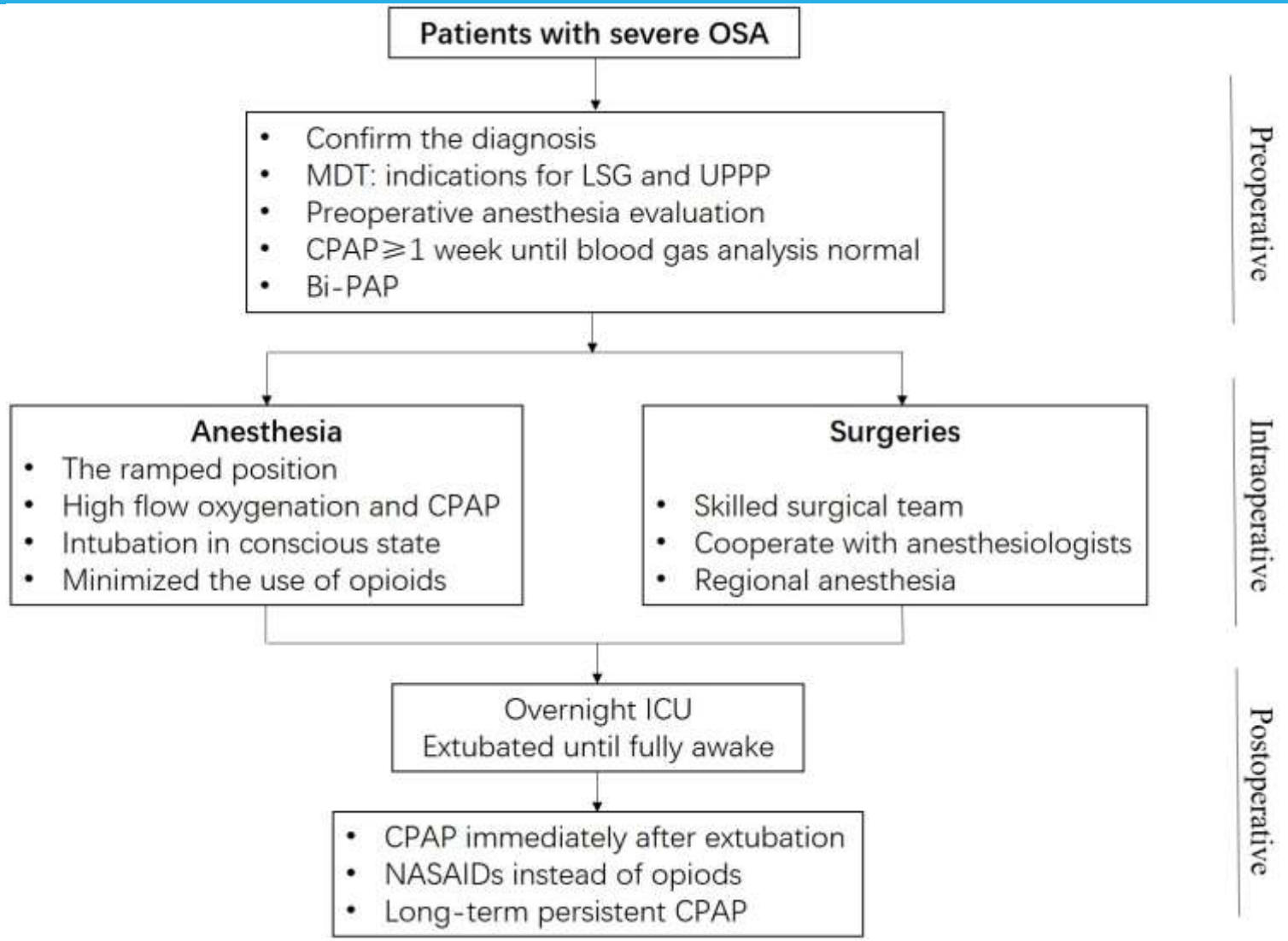
Inclusion Criteria

- Patients underwent bariatric surgery

Exclusion Criteria

- Aged out of 16 to 65 years old
- BMI < 35 kg/m2 or AHI< 30
- Underwent other bariatric surgeries rather than LSG
- Other surgical treatments for OSA (e.g. skeletal surgeries, nose surgeries) other than non-invasive positive pressure ventilation (NPPV)
- Incomplete follow-up data (e.g., lack of sleep study data)
- Without tonsillar hypertrophy beyond 2+ and/or Friedman tongue position graded beyond II, or with apparent skeletal deformities contributing to narrow upper airway (e.g., retrognathia deformity).


Patients underwent BS
(n=591)
BMI<35kg/m²: n=156
LRYGB: n=64
Age>65 or <16: n=7
Other non-LSG: n=23
Patients underwent LSG
(n=341)
AHI<30times/h: n=139
Without tonsillar hypertrophy beyond 2+ or Friedman beyond II: n=66
Lack of clinic data: n=35
Patients included
(n=101)
Contemporaneous Surgeries
(n=42)
LSG
(n=59)


Patients with severe OSA
Confirm the diagnosis
MDT: indications for LSG and UPPP
Preoperative anesthesia evaluation
CPAP⩾1 week until blood gas analysis normal
Bi-PAP
Anesthesia
The ramped position
High flow oxygenation and CPAP
Intubation in conscious state
Minimized the use of opioids
Surgeries
Skilled surgical team
Cooperate with anesthesiologists
Regional anesthesia
Overnight ICU
Extubated until fully awake
CPAP immediately after extubation
NASAIDs instead of opiods
Long-term persistent CPAP
Preoperative
Intraoperative
Postoperative

Baseline

Table 1 Baseline characteristics of the study population

	Contemporaneous Surgeries (n = 42)	LSG (n = 59)	*P*
Age (years)	30.9±7.5	33.9±9.4	0.099
Female	13 (30.9%)	26 (44.1%)	0.182
BMI (kg/m^2)	40.6±5.8	41.9±6.4	0.315
Comorbidities	-	-	-
NAFLD	41 (97.6%)	57 (96.6%)	0.132
type 2 diabetes	19(45.2%)	23 (38.9%)	0.192
dyslipidemia	38 (90.4%)	51 (86.4%)	0.091
hypertension	11 (26.2%)	19 (32.2%)	0.059

Safety

Table 2 Surgical safety between contemporaneous surgeries group and LSG group

	Contemporaneous Surgeries (n=42)	LSG (n=59)	*P* value
Operative time (min)	122.1±9.0	61.8±7.7	<0.001
Blood loss (ml)	42.5±6.4	15.7±6.1	<0.001
Postoperative pain scores	3.5±0.6	3.3±0.8	0.085
post-operative length of hospital stay (d)	3.5±1.1	3.3±0.6	0.416
24-h extubation rate (%)	100	100	-
Short-term complication	-	-	-
Post-operative bleeding	2	1	0.061
Perforation	0	0	-
Leakage	0	0	-
Lung infection	1	1	0.974
Respiratory failure	0	0	-
Incision infection	1	2	0.781
Long-term complications	-	-	-
Malnutrition	0	0	-
Gastroesophageal reflux	5	6	0.219
Dysphonia	0	0	-
Chronic pain	0	0	-
Mortality	0	0	-

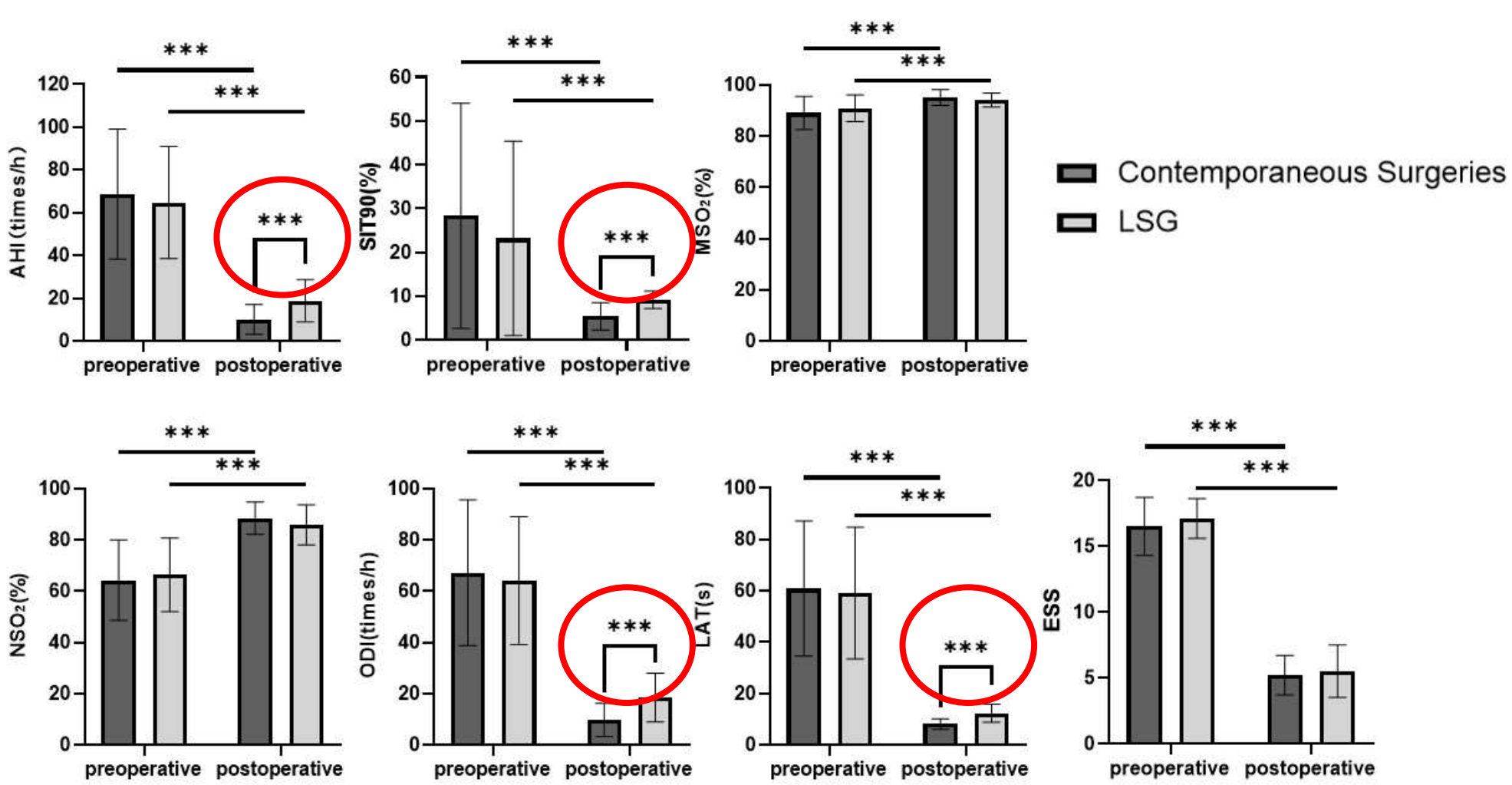
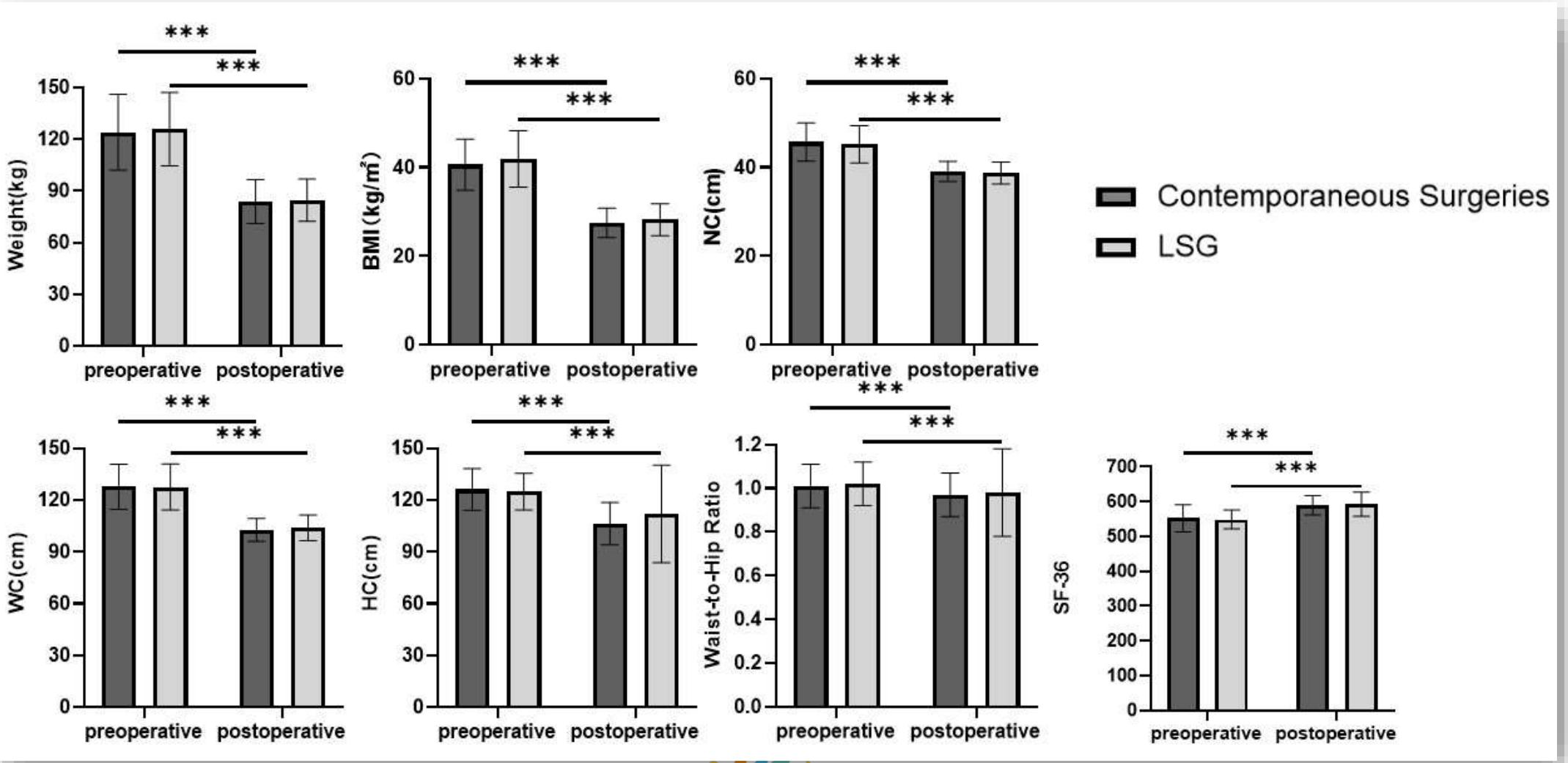

AHI (times/h)
SIT90(%)
MSO₂(%)
NSO₂(%)
ODI(times/h)
LAT(s)
ESS
***
preoperative
postoperative
Contemporaneous Surgeries
LSG

Table 4 The efficacy of OSA

Efficacy	Contemporaneous group (n=42)	LSG group (n=59)	*P* value
Surgical success	42 (100.0%)	41 (69.5%)	<0.001
[Including surgical cure]	*[21(50.0%)]*	*[8(13.5%)]*	*[<0.001]*
Unsuccess	0(0.0%)	18 (30.5%)	<0.001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Weight(kg)
150
120
90
60
30
0
preoperative
postoperative
BMI (kg/m²)
60
40
20
0
NC(cm)
WC(cm)
HC(cm)
Waist-to-Hip Ratio
1.2
1.0
0.8
0.6
0.4
0.2
0.0
SF-36
700
600
500
400
300
200
100
Contemporaneous Surgeries
LSG

Conclusion

Contemporaneous surgery (LSG and UPPP) is an safe and effective option for patients with obesity and severe OSA

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