

# Anesthesia Management in Laparoscopic Sleeve Gastrectomy Cases

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## ABSTRACT

Obesity is a rapidly growing health condition worldwide and negatively affects the quality and duration of life. Anesthesia for morbidly obese patients is considered to be a real challenge to the anesthetist. In this study we aimed to evaluate difficult tracheal intubation and anesthesia management for obese patients.

This study included 60 patients who had undergone laparoscopic sleeve gastrectomy (LSG) between July 2012 and July 2017. We recorded gender, age, and body mass index (BMI) at the time of LSG, intraoperative incident, comorbidities, length of intensive care unit (ICU) admission.

The relation of weight with difficult intubation was statistically significant, but it was not correlated with height and body mass index. Weight and BMI were found to have a statistically significant relationship with neck extension limitation. Difficult cases of intubation were seen mostly by 28% of patients.

In this retrospective study, it was determined that laparoscopic sleeve gastrectomy and intubation difficulty was independent of body mass index. More extensive studies should be done to demonstrate the specific airway management and anesthesia of laparoscopic sleeve gastrectomy.

**Key words:** laparoscopic sleeve gastrectomy, anesthesia, difficult airway

## Introduction

Obesity is a rapidly growing health condition worldwide and negatively affects the quality and duration of life (1,2). The prevalence of obesity more than doubled between 1980 and 2014 (3). Laparoscopic bariatric surgery is the most effective long-term treatment for severe obesity and obesity-related comorbidities (4). Anesthesia for morbidly obese patients is considered to be a real challenge to the anesthetist. This group of patients may have comorbidities in addition to the expected difficulties relating to airways and ventilation. Careful preoperative evaluation and intraoperative management decrease anaesthetic side effects and help to rapid recovery. The incidence of difficult laryngoscopy (DL)/difficult tracheal intubation (DTI) is apparently high in obese patients. Incidence of difficult intubation is reported ranging from 1% to 15% (5). The present study is designed to evaluate increasing body mass index (BMI) as a risk factor for DTI in patients undergoing laparoscopic sleeve gastrectomy surgery and to evaluate anesthesia management.

## Materials and Methods

**Study Design:** This was a retrospective observational study approved by the research and ethics committees of our local institution. We analyzed clinical data of morbidly obese patients who had undergone laparoscopic sleeve gastrectomy between July 2012 and July 2017. Data were obtained from electronic clinical records and anesthetic records. This study included 60 patients of both genders with written informed consent between 18-65 years, American Society of Anesthesiologists physical status classification (ASA) I-III, BMI  $\geq 30$  kgm<sup>2</sup> in combination with obesity-related disease. The patients, who have uncontrolled diabetes mellitus, cardiovascular disease, pulmonary disease, cerebrovascular disease, bleeding because of an emergence gastrointestinal pathology or drug and alcohol addiction, with acute psychiatric illness or eating disorder, who refused informed consent were excluded. And also pregnant patients and the patients who need fiberoptic intubation were excluded due to absence of this equipment. We recorded the following variables were gathered and studied: gender, age, and BMI at the time of

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Received: 07.04.2019, Accepted: 20.06.2019

**Table 1.** Patient's data

Patients	(n=60)
Gender M/F	14 (%23.3) / 46 (%76.7)
ASA I/II/III	26(%43.3) /22(%36.6) /12(%20)
Mallampati I/II/III/IV	38(%63.3) /13(%21.6) /8(%13.3) /1(%1.6)
Comorbidities	Diabetes Mellitus:34 (%56.6) Hyperlipidemia:42 (%70) Obstructive sleep apnea:8 (%13.3) Hypertension:28 (%46.6) Ischemic heart disease:3 (%5) Asthma/COPD:26 (%43.3)
Limited neck extension	26 (%43.3)
Difficult intubation	17 (%28.3)
Intubation with devices	3 (%5)
Extubation on the operation table :	58 (%96.6)

COPD: Chronic obstructive pulmonary disease  
ASA: American Society of Anesthesiologists

**Table 2.** Difficult intubation

		n	Mean±Std. Deviation	Minimum	Maximum	p
Weight	Other	44	108.55 ± 14.102	87	144	0.098
	Diffucult	16	116.19 ± 19.107	96	154	
	Total	60	110.58 ± 15.791	87	154	
Height	Other	44	163.16 ± 6.948	155	186	0.799
	Difficult	16	163.69 ± 7.409	155	181	
	Total	60	163.30 ± 7.014	155	186	
BMI	Other	42	41.1548 ± 3.65601	35.50	49.20	0.103
	Difficult	16	43.2438 ± 5.68612	38.40	59.00	
	Total	58	41.7310 ± 4.36003	35.50	59.00	

LSG, intraoperative incident,comorbidities, length of ICU admission.

**Preoperative Management:** Patients were taken to the operating room without premedication. All participants were fasted at least 8 hours. Standard anesthesia monitoring, including electrocardiogram, non-invasive blood pressure, pulse oxygen saturation (SpO<sub>2</sub>) and bispectral index (BIS; VISTA Monitoring System, Massachusetts, USA) monitoring for depth of anesthesia was applied after the patients arriving in the operating room.

**Anesthesia Management:** A standardized general anesthesia protocol was administered in all patients by two experienced anesthesiologists. Patients were positioned in supine ramped position. After preoxygenation (100%, 4 l/min O<sub>2</sub> for 3 minutes by a non-rebreathing facemask until end tidal oxygen concentration reached 80 %), propofol (1–2 mg/kg), rocuronium (0.8 mg/kg)

and fentanyl (0.1 µg/kg) were administered during the induction of anesthesia. Doses calculated according to ideal body weights. Tracheal intubation was performed with direct laryngoscopy (Macintosh standard blade) and an endotracheal tube with an inner-diameter of 8.0 mm was used for men and a 7.0-mm for women. The view upon direct laryngoscopy was graded according to Cormack and Lehane classification (CLC)(6). The number of attempts was documented. End-tidal carbon dioxide (EtCO<sub>2</sub>) was continuously monitored after intubation. Anesthesia was maintained at sevoflurane inhalation in a 0.5 O<sub>2</sub> oxygen-air mixture. At the end of surgery the effect of rocuronium was reversed by sugammadex 4 mg/kg. Patients were extubated when fully awake, able to lift and hold their heads up for at least 5 seconds.

**Surgical Approach:** The surgical procedure was performed by two same surgeons. Laparoscopic

**Table 3.** Limited neck extension

		n	Mean±Std. Deviation	Minimum	Maximum	p
Weight	Other	34	104.71±10.961	87	135	0.001
	Limited	26	118.27±17.930	96	154	
	Total	60	110.58±15.791	87	154	
Height	Other	34	162.41±6.081	155	186	0.266
	Limited	26	164.46±8.051	155	182	
	Total	60	163.30±7.014	155	186	
BMI	Other	32	39.8250±2.82649	35.50	46.20	0.001
	Limited	26	44.0769±4.80236	38.50	59.00	
	Total	58	41.7310±4.36003	35.50	59.00	

**Table 4.** Continuous covariates of males vs. females

Continuous covariates	Male	Female	p	Total
Age	33.61(±6.85) (n=14)	33.29(±8.32) (n=46)	0.88	60
BMI(kg/m <sup>2</sup> )	41.325(±2.92) (n=14)	41.84(±4.68) (n=46)	0.72	60
Weight (kg)	117.14(±16.38) (n=14)	108.59(±15.23) (n=46)	0.07	60
Height (cm)	169.36(±10.30) (n=14)	161.46(±4.36) (n=46)	0.001	60

sleeve gastrectomy or tubular gastrectomy, the lesser sac was entered by dividing the gastroepiploic vessels along the greater curvature. The stomach was transected using a stapler. Gastric transection is begun 4- 5 cm above the pylorus, guided by a 34F bougie.

**Statistical Analysis:** Categorical data are expressed as absolute or relative frequencies. Descriptive statistics for the features under consideration; Continuous data are expressed as mean, standard deviation, minimum and maximum value. T-Test was used in cases with normal distribution condition. Mann-Whitney U test was used in cases where normal distribution condition was not provided. The statistical significance level was taken as 5% in the calculations and the SPSS Version 20.0 statistical package program was used for the calculations.

## Results

A total of 60 patients were included with patient characteristics as described in Table 1.

In 17 patients, intubation was performed with more than two attempts and three of them were required supportive equipments. We have had no fiber optic entubation equipment in our center so we could use fastrach laryngeal mask airway (LMA), bougie for

them. There were no patients we couldn't intubate and no one of the patients had failed intubation.

The relation of weight with difficult intubation was statistically significant, but it was not correlated with height and body mass index. We couldn't see statistically significance between difficult intubation and BMI (Table 2).

In the present study we also looked and recorded limited neck extension for all patients (Table 3). Neck extension was measured in the sitting position and facing forward with the shoulder and spine supported. Patients were asked to extend the neck without moving shoulders while the mouth closed. The angle traversed between the external auditory canal to the tip of the nose was measured by a goniometer, and movements less than 90 degrees were considered to be significant. In 43.3 % of patients, neck movement was restricted. Weight and BMI were found to have a statistically significant relationship with neck extension limitation. Difficult cases of intubation were seen mostly by these patients.

In comparison to age, height, weight and BMI, only height was seen as a statistically significant parameter. This was thought to be related to the low number of patients (Table 4).

Post-operatively, patients were managed via a standardized protocol. Early mobilization was routine in all patients. Three patients needed to admission ICU because of desaturation. Two of them could be extubated there.

**Limitation:** There are some limitations of this study. This study included only obese patients and we didn't design control group from non-obese patients. And secondly we studied only on laparoscopic sleeve gastrectomy patients, for this reason the data were similar and restricted.

## Discussion

One of the main findings of this study was that, 28% of the patients going under laparoscopic sleeve gastrectomy had intubation difficulties. There have been many studies evaluating intubation difficulties in bariatric surgery (7,8,9,10). Difficult tracheal intubation rate was found to be 5.2 % in a large-scale study in Denmark (11).

In the present study, as in the literature, bariatric surgery cases were mostly female patients (12). And at the same time, there is no statistical meaningful relationship between BMI height and education mobility. It was compatible with Juvin et al's study (8).

Bariatric surgery is an effective treatment for obesity with recipients experiencing superior weight loss compared with medical and or lifestyle management. Multiple retrospective studies have associated bariatric surgery with improvements in obesity-related comorbidities such as diabetes and its vascular complications, hypertension, ischaemic heart disease and sleep-disordered breathing (13,14). In the present study patients also had comorbidities before surgery. There were no extra complications because of these comorbidities. Patients should continue their usual cardiovascular medicines up to the point of surgery

To our knowledge, no prior studies have investigated the association between intubation difficulties and admission to ICU. In this study we have seen three patients needed to ICU, but there was no enough significant importance to think a relation between these parameters.

Rao et al., evaluated neck extension status and other parameters in their study and concluded that they were important factor in intubation difficulty in accordance with our study (15).

In this retrospective study, it was determined that 28% of patients had laparoscopic sleeve gastrectomy and intubation difficulty was

independent of body mass index. We believe that more extensive studies should be done to demonstrate the specific airway management and anesthesia of laparoscopic sleeve gastrectomy, which is the most commonly used and most effective method in the treatment of obesity with chronic metabolic disease.

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