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ORIGINAL RESEARCH ARTICLE

OR-MRS Cannot be used for Morbidity in Laparoscopic Sleeve Gastrectomy

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Abstract

Introduction: A reliable method to predict postoperative risks may improve surgical risks and ensure preventive precautions to reduce complication risks. American Society of Anesthesiologists (ASA) is a common method to determine surgical risk, but at first glance it appears to be insufficient to determine the risk of morbid obesity surgery. The greatest advantage of Obesity Surgery Mortality Risk Score (OS-MRS) is the use of five easily obtained clinical variables. A possible disadvantage is that it may only show mortality. It was reported that OS-MRS can be used for morbidity. However, there are inconsistent results. In this study, we aimed to compare the preoperative OS-MRS results with postoperative Clavien-Dindo for ASA III patients undergoing laparoscopic sleeve gastrectomy and to show the predictive power of the OS-MRS for morbidity in this group.

Material-Method: The study retrospectively included patients who underwent laparoscopic sleeve gastrectomy for morbid obesity from 2014 to 2018. All patients had OS-MRS scores recorded as clinical protocol in their files. The morbidity within 90 days in files was assessed according to the Clavien-Dindo classification.

Results: Values remaining under the curve may be used to interpret OS-MRS points ($p < 0.05$). The cut-off value for OS-MRS points according to complications was calculated as 1. OS-MRS points above 1 may be associated with complications. The variable of OS-MRS points may be used as a parameter for complication cut-off. However, as the area under the curve (AUC) was close to 0.5, it is necessary to question the reliability.

Conclusion: OS-MRS may be used for mortality in laparoscopic sleeve gastrectomy; however, it is unreliable to determine morbidity.

Keywords

OS-MRS, Clavien-Dindo, Morbidity, Mortality

Introduction

Though ASA is a common method to determine surgical risk, at first glance it appears to be insufficient to determine the risk of morbid obesity surgery. The ASA guidelines published in 2014 accepted morbidly obese patients with body mass index (BMI) ≥ 40 as ASA III without examining comorbid diseases [1]. As a result, ASA is not used as an effective assessment scale for surgical groups undergoing morbid obesity surgery. Due to this deficiency, mortality risk scores were developed for morbid obesity surgery. One of these is the obesity surgery mortality risk score (OS-MRS) with accuracy proven in many studies. The greatest advantage of OS-MRS is the use of five easily obtained clinical variables. A possible disadvantage is that it may only show mortality [2].

The mortality linked to bariatric surgery has reduced in recent years (0.2%), while postoperative morbidity is still significant (5%) [3]. A reliable method to predict postoperative risks may improve surgical risks and ensure preventive precautions to reduce complication risks.

In our study, we aimed to compare the preoperative OS-MRS results with postoperative Clavien-Dindo for ASA III patients undergoing laparoscopic sleeve gastrectomy and to show the predictive power of the OS-MRS for morbidity in this group.

Material-Method

Patients

The study retrospectively included patients who un-

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derwent laparoscopic sleeve gastrectomy for morbid obesity (BMI > 40) from January 2014 to December 2018. The 90-day follow-up forms of patients were assessed. All patients had OS-MRS scores recorded as clinical protocol in their files. The morbidity within 90 days in files was assessed according to the Clavien-Dindo classification.

Inclusion criteria were patients who underwent laparoscopic sleeve gastrectomy due to morbid obesity with BMI > 40, age from 18-65 years and no previous history of bariatric surgery.

Surgical technique: Each procedure was completed with laparoscopy using five trochars. All surgeries were performed by three experienced surgeons. A 36F bougie was used to calibrate the volume of the remnant stomach. The large curvature of the stomach was freed proximal at the hiatus level to distal at the pylorus. The fundus was followed along the left cruces as standard and freed from surrounding tissue. Linear gastrectomy began 2-3 cm proximal of the pylorus and continued until the gastroesophageal junction. Based on the intraoperative decision and experience of the surgeon, endoscopic clips were used to ensure hemostasis along the stapler line. The leak test with methylene blue was routinely applied intraoperatively. If necessary, low absorption silicon drainage (Jackson-Pratt drainage) was inserted adjacent to the stapler line.

Obesity surgery-mortality risk score: OS-MRS is calculated by giving one point for each factor affecting the patient during the preoperative process (presence or absence of AHT, male gender, ≥ 45 years of age, BMI ≥ 50 kg/m^2 and risk factors for pulmonary embolism). According to the points obtained, patients are placed in one of three groups: low-risk group with 0-1 points (A class), moderate-risk group with 2-3 points (B class) and high-risk group with 4-5 points (C class) (Table 1).

Definition of complications: Clavien-Dindo classification: Surgical complications are defined as deviations from the ideal postoperative outcome that are not natural to the process and do not involve insufficient treatment. The Clavien-Dindo classification is a system which groups surgical complications according to the type of treatment required. As a result, we recorded complications occurring during the follow-up process and continued to plan and classify appropriate treatment choices. Grade I: Any complication not requiring medical or surgical treatment; Grade II: Complications requiring pharmacological treatment but not requiring active in-

Table 1: Distribution of parameters.

		Mean ± SS	Med. (Min.-Max.)
Age (years)		38 ± 11	38 (18-68)
Body Mass Index (BMI) (kg/m^2)		47 ± 7	46 (40-106)
OS-MRS Points		2 ± 1	2 (0-5)
		n	**n (%)**
Sex	**Female**	822	74.5
	Male	281	25.5
Hypertension	**No**	829	75.1
	Yes	274	24.9
Pulmonary Embolism Risk	**No**	1071	97.1
	Yes	32	2.9
Mortality	**Ex**	5	100.0
	Survived	1098	99.5
Age	**< 45 years**	766	69.4
	45 years and older	337	30.6
BMI	**< 50 kg/m^2**	777	70.4
	50 and above	326	29.6
OS-MRS	**A**	844	76.5
	B	241	21.8
	C	18	1.6
Clavien-Dindo	**1**	1014	91.9
	2	20	1.8
	3	37	3.4
	4	27	2.4
	5	5	0.5
Complications	**Absent**	1034	93.7
	Present	69	6.3

tervention; Grade III: Complications requiring surgical, radiological or endoscopic treatment without general anesthesia (IIIa) or with general anesthesia (IIIb); Grade IV: Complications involving potential threat to life and requiring intensive care like organ failure (including dialysis), and finally Grade V: Complications resulting in death. According to Clavien-Dindo's recommendation, patients with more than one complication are listed according to the most severe complication.

Statistics

Descriptive statistics were used to define continuous variables (mean, standard deviation, minimum, median, maximum). Comparison of two independent variables abiding by normal distribution used the Student T test. The Mann-Whitney U test was used to compare two independent variables without normal distribution. The chi-square (or Fisher Exact test as appropriate) was used with the aim of investigating the correlation between categoric variables. ROC analysis was used to calculate cut-off points. With the aim of investigating the effect of independent variables on continuous dependent variables, multiple linear regression analysis was used. Spearman's rho correlation analysis was used to analyze the correlation between two continuous variables not abiding by normal distribution. Statistical significance was determined as 0.05. Analyses were completed using the MedCalc Statistical Software version 12.7.7 (MedCalc Software bvba, Ostend, Belgium; http://www.medcalc.org; 2013).

Results

The mean age of patients participating in the study was 38 ± 11 years. Of 1103 patients, 281 (25.5%) were male and 822 (74.5%) were female. Mean BMI was 47 kg/m^2. The number of patients with accompanying hypertension and pulmonary embolism risk were 274 (24.9%) and 32 (2.9%), respectively. The parameter details of OS-MRS are given in Table 1, with the distribution of A, B and C classes being 884, 241 and 18 patients (76.5%, 21.8% and 1.6%), respectively. A total of 89 patients (8.1%) had complications, with the number of major complications (Clavien-Dindo ≥ 3) identified as 69 (6.3%) (Table 2). In our series total mortality was (grade IV) 5; with 2 patients dying due to uncontrolled intraabdominal sepsis after treatment for leak, 2 patients dying due to cardiac and pulmonary embolism and 1 patient developing acute respiratory distress syndrome (ARDS) after aspiration pneumonia.

Table 2: Specific complication distribution by Clavien-Dindo ≥ 3 grade.

	III	IV	V
Gastrointestinal bleeding	4	3	0
Wound infection	1	1	0
Intra-abdominal bleeding	6	9	**2**
Strangulated hernia	1	0	0
Respiratory disease	6	9	0
Gastrojejunostomy leak	14	4	0
Myocardial infarction	3	0	**3**
Postoperative ileus	2	1	0
Total	37	27	5

ROC analysis

Values remaining under the curve may be used to interpret OS-MRS points ($p < 0.05$) (Table 3). The cut-off value for OS-MRS points according to complications was calculated as 1. OS-MRS points above 1 may be associated with complications. The variable OS-MRS points may be used as a parameter for complication cut-off (Figure 1). However, as the under the (ROC curve) AUC was close to 0.5, it is necessary to question the reliability.

Discussion

Our results show that OS-MRS can be used in statistically significant fashion to determine morbidity after laparoscopic sleeve gastrectomy ($p < 0.05$). However, as the area under the ROC curve (AUC) was 0.573, which is close to 0.5, it leads to a lack of reliability. As a result, our opinion is that it cannot be used for laparoscopic sleeve gastrectomy in this case series.

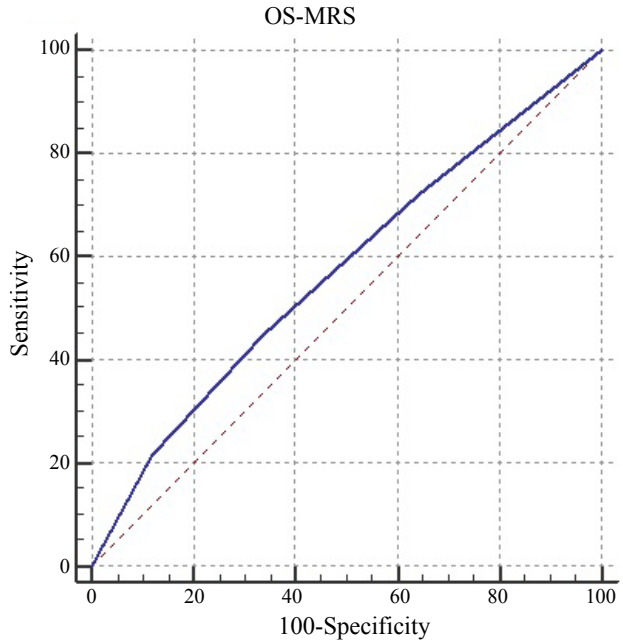

Figure 1: Graphics of ROC analysis.

Table 3: OS-MRS ROC analysis.

Complication present vs. absent	AUC	p value	Cut-off	Sensitivity	Specificity	PPV+	PPV-
OS-MRS Points	0.573	**0.048**	1	44.93	66.44	8.2	94.8

To determine mortality preoperatively for morbid obesity surgery, the OS-MRS is used primarily and is an accepted scale. Since the original publication, OSMRS was independently validated in both North America as well as Europe in over 9000 patients and is now well recognized as a simple and effective classification system for the preoperative identification of high-risk patients undergoing gastric bypass surgery [2-4]. However, it is recommended especially for gastric by-pass [2]. The area of use for a short-duration and low mortality surgical procedure like laparoscopic sleeve gastrectomy is limited. The mortality rate for sleeve gastrectomy is 0 to 1.3 percent [4]. The morbidity rate for laparoscopic sleeve gastrectomy is 0 to 17.5 percent. In this situation the obesity surgical team wish to report the perioperative morbidity and mortality rates to the patient before surgery. It appears necessary in this case to have a predictive marker. The ASA unfortunately does not work for morbid obesity surgery because the lowest value that can be given to morbid obesity is ASA III with mortality rates of 1.8-4.5% [5] and morbidity rate of 14% [6].

The OS-MRS was first recommended with the aim of determining mortality for gastric by-pass surgery [2]. Later opinions stated that the OS-MRS could be used to determine morbidity in morbid obesity surgery. The results of the Longitudinal Assessment of Bariatric Surgery (LABS) Consortium are noteworthy in reporting it may determine mortality and adverse events by surgical type primarily [7]. Then Sarela, et al. proposed that the OS-MRS could be used to determine both mortality and morbidity [3]. Sarela, et al. showed that OS-MRS independently predicted the risk of postoperative adverse events after gastric band, Roux-en-Y gastric bypass, sleeve gastrectomy or biliopancreatic diversion. Additionally, an increase in OS-MRS class caused an increase of 300% in postoperative adverse effects. A later study by Lorente, et al. showed a significant correlation between the OS-MRS scale and morbidity, increasing from 7.3% in A class to 50% in C class [8]. Though these studies state that OS-MRS is effective in determining morbidity for morbid obesity surgery, a single-center series and systematic review by García-García, et al. in 2016 reported the OS-MRS was not more effective than Clavien-Dindo in determining postoperative adverse events and complications. This article had a sleeve gastrectomy case number of 18 (5.6%) [9]. Another article reporting 233 laparoscopic sleeve gastrectomy cases stated OS-MRS was not a useful tool in predicting risk of perioperative morbidity after bariatric procedures [10].

The area under the curve (AUC) in ROC is a practical method to determine diagnostic sufficiency of a diagnostic test, representing performance with a single value [11]. The larger the AUC, the better the test is at estimating the disease, with possible values of AUC varying from 0.5 (diagnosis not placed) to 1.0 (perfect diagnosis made) [12]. In our study of a 1103-case laparoscopic sleeve gastrectomy series, the statistical OS-MRS cut-off value was above 1 and appeared to be statistically significant for determining morbidity. However, the AUC was very close to 0.5, which shows this test has low reliability to determine morbidity for this surgical procedure.

The Clavien Dindo system is routinely used in many centers, in the literature for quality assessment, is included in national databases, and in high-quality RCTs. Considering its simplicity and reproducibility, a number of outcome studies have used this classification system, which focuses on the most severe complication [13-16].

In our study, we chose to compare OS-MRS with the Clavien-Dindo classification. There are other complication prediction classifications. One of the most important of these in recent times is the Comprehensive Complication Index (CCI®) requiring more high-volume studies to confirm its accuracy. For example, in the study by Clavien, et al. the CCI was shown to yield substantial additional value to the Clavien-Dindo classification in patients with more than one complication. Its value increases especially after major surgery and with inclusion of the observation time after surgery. This, however, does not justify a replacement of one system by the other as the Clavien-Dindo classification discloses the highest grade of complications and the type of complications [17]. Another study evaluated patients undergoing pancreatectomy and could not show the CCI was superior to the Clavien-Dindo [18]. However, though the CCI generally appears to be superior due to including more specific and minor complications, we chose Clavien-Dindo as the more traditional method [19,20].

The most important limitation of our study is that it is based on a retrospective assessment. It is debatable as to whether prospective assessment would obtain very different results; however, the efficacy of the article would increase. Another limitation is that the procedure is linked to experience over time. It is necessary to remember that as the number of cases increase, the possibility of complications reduce for this surgical procedure, as for any surgical procedure. The same condition applies to the anesthesiologist attending morbid obese patients. However, the large number of cases and surgery being performed by the same team, in addition to a single anesthesiologist administering and monitoring patients, act to fill these gaps.

In conclusion, OS-MRS may be used for mortality in laparoscopic sleeve gastrectomy; however, it is unreliable to determine morbidity.

Conflict of Interest

The author declares that they have no competing financial interests.

The author declares that they do not have any conflict of interest.

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None.

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