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ORIGINAL CONTRIBUTIONS

Patients with Schizophrenia Do Not Demonstrate Worse Outcome After Sleeve Gastrectomy: a Short-Term Cohort Study

Rami Archid[1] · Nicole Archid[1] · Tobias Meile[2] · Jonas Hoffmann[1] · Julia Hilbert[1] · Daniel Wulff[1] · Martin Teufel[3,4] · Michaela Muthig[3] · Markus Quante[1] · Alfred Königsrainer[1] · Jessica Lange[1]

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Abstract

Purpose The aim of this study was to compare surgical and psychiatric outcome and weight loss in schizophrenia patients with mentally healthy patients after sleeve gastrectomy.

Materials and Methods A cohort study design was selected, comprising patients with schizophrenia with mentally healthy patients who underwent sleeve gastrectomy and were adherent to a follow-up at least 12 months after surgery.

Results Seven schizophrenia (5 male, 2 female) and 59 (12 male, 47 female) mentally healthy patients were included in this study. A laparoscopic sleeve gastrectomy was performed safely in all 66 patients. The calculated excess weight loss (%EWL) showed no significant differences in both groups and reached 51.68 ± 15.84% for schizophrenia group and 60.68 ± 19.95% for mentally healthy group at 24-month follow-up ($p = 0.33$). The decrease in the HbA1c levels within 2 years after sleeve gastrectomy was similar in both groups ($p = 0.79$, 0.88, 0.82, 0.73 for surgery time, time of 6-, 12-, and 24-month follow-up respectively). The psychiatric status of the patients of the schizophrenia group was stable in all cases and no exacerbation of psychiatric symptoms was observed during time of follow-up. Furthermore, an overall significant improvement of the self-estimated mood and satisfaction was observed in both groups (Manova: $f = 1.26$, $p < 0.0001$).

Conclusions The results 2 years after sleeve gastrectomy in stable patients with schizophrenia and after an adequate psychological evaluation were encouraging and comparable to the outcome in mentally healthy patients.

Keywords Bariatric surgery · Obesity · Schizophrenia · Mental illness · Sleeve gastrectomy

Introduction

Globesity (global obesity) has grown to an epidemic situation menacing our health, our social and economic activities in all parts of the world. There is a big body of data showing a significantly increased risk for obesity among patients with severe mental illness.

A comparison of severe and persistent mental ill patients from a Maryland sample with participants of the Third National Health and Nutrition Examination Survey (NHANES III) showed an increased prevalence of obesity in men (29% vs. 17.7%) and women (60% vs. 28.5%) from the psychiatric group [1]. Higher obesity rates are basically contributing to the higher relative risk for comorbidities in mentally ill patients, especially for metabolic syndrome and consequently higher cardiovascular risk in this group of patients [2, 3]. Consequently, cardiovascular disease is one of the leading causes of mortality among patients with schizophrenia for example [4].

Antipsychotic drugs have considerable effects on weight gain and development of metabolic syndrome. These effects are well documented, especially for second-generation antipsychotics (SGAs). Ranges of weight gain between 1 and 3.5 kg over 1 year of treatment are reported for the use of aripiprazole, ziprasidone, amisulpride, quetiapine, and risperidone [5]. The use of

✉ Rami Archid
rami.archid@med.uni-tuebingen.de

[1] Department of General, Visceral and Transplant Surgery, Eberhard-Karls-University Hospital Tuebingen, Hoppe-Seyler-Str. 3-5, 72076 Tübingen, Germany

[2] Department of General, Visceral and Transplant Surgery, Bad Cannstatt Hospital, Stuttgart, Germany

[3] Department of Psychosomatic Medicine and Psychotherapy, Eberhard-Karls-University Hospital Tuebingen, Tübingen, Germany

[4] Clinic for Psychosomatic Medicine and Psychotherapy, University of Duisburg-Essen, LVR Clinic, Essen, Germany

olanzepine in the usual dose of 12.5–17.5 mg daily results in a mean weight gain of 12 kg over 1 year [6]. Nevertheless, some data describes an increased prevalence of obesity even in drug-naïve patients with schizophrenia [7].

The chronic and epidemic character of obesity requires a worldwide prevention program. However, conservative programs are very limited in their outcome, especially in advanced stages of disease. At the moment, bariatric surgery represents for morbid obese patients often the only effective therapy method, not only regarding weight loss, but also with a highly positive impact on metabolic and other obesity related comorbidities [8, 9]. These effects result in a significant improvement in quality of life and surviving when comparing surgery with conservatively treated obese patients [10].

There is a vast heterogeneity in practice regarding psychological evaluation of patients prior to bariatric surgery. A review of psychological evaluation in 81 bariatric surgery programs reported active symptoms of schizophrenia to be one of the most common contraindications for surgery [11]. Many studies suggested worse outcome of bariatric surgery in psychiatric patients [12–15], other reports found weight loss after bariatric surgery to be independent from psychiatric diagnoses like bipolar disorder or schizophrenia [16, 17].

There is a lack of studies evaluating the safety and outcome of sleeve gastrectomy in patients with schizophrenia. The aim of this study was to compare weight loss in patients with confirmed diagnosis of schizophrenia with mentally healthy patients after sleeve gastrectomy. It was hypothesized that patients with schizophrenia are likely to benefit similar as mentally healthy patients regarding weight loss after sleeve gastrectomy.

Methods

All patients who underwent sleeve gastrectomy in the time between January 2008 and December 2013 in a single institution were considered for inclusion in this study given the following criteria were fulfilled: confirmed diagnosis of schizophrenia based on ICD-10 diagnostic criteria, psychological stability during the last 12 months prior to surgery (all patients were psychologically evaluated preoperatively) and adherence to follow-up, at least 12 months after surgery. Exclusion criteria were psychological instability. Psychiatric hospitalization or suicidal risk over the past year was defined as criteria for psychological instability and patients meeting these criteria were referred to psychiatric treatment.

Study Design

To address the primary research question, a cohort study design was selected comprising two groups, the first including patients with schizophrenia and the second being a random control group of mentally healthy patients who underwent sleeve gastrectomy during the same period of time and were adherent to a follow-up at least 12 months after surgery.

Data Extraction

Demographic data included gender, age, and body mass index (BMI). Endpoints including excess weight loss, HbA1c levels in blood, and values for the self-estimated mood and satisfaction evaluated using a Numeric Rating Scale (NRS 1–10) were collected. Furthermore, clinical charts of the schizophrenia group were analyzed looking for signs of exacerbation of psychiatric symptoms after surgery. Additionally, psychiatric patients were asked 2 years after surgery about their satisfaction with surgery (Would they undergo surgery if they have the choice again, yes/no).

Statistic

Normality assumption was tested and assumed. Data were presented as means ± SD. Two-sample *t* test was used for comparing the means at baseline and every time of follow-up and repeated measures ANOVA was performed for comparing the course of BMI and HbA1c between both groups over follow-up time. Follow-up rates were compared using Fisher's exact test.

Results

Study Groups and Patient Characteristics

We identified 8 schizophrenia patients from our database, who underwent laparoscopic sleeve gastrectomy at our department in the time of the study between January 2008 and

Table 1 Patients characteristics

		Schizophrenia group ($N = 7$)	Mentally healthy group ($N = 59$)	*p* value
Gender	Male	5 (71.43%)	12 (20.34%)	0.003*
	Female	2 (28.57%)	47 (79.66%)	0.003
Age ± SD (years)		37.7 ± 7.7	44.9 ± 12.3	0.054
BMI ± SD (kg/m^2)		50.4 ± 2.79	50.54	0.91

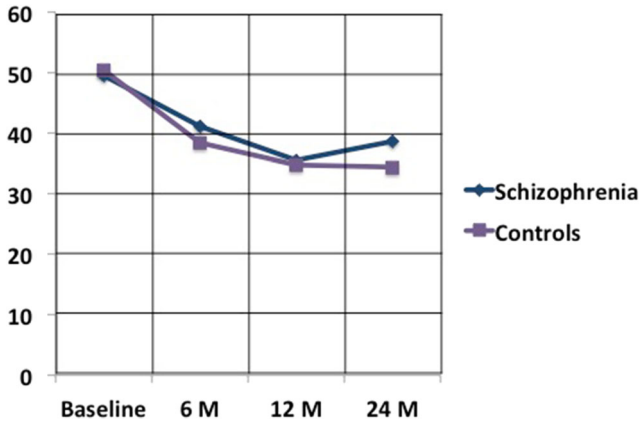

Fig. 1 Development of BMI in schizophrenia and mentally healthy patients within 2 years after sleeve gastrectomy

December 2013. Out of the 8 patients, 7 (5 male, 2 female) schizophrenia patients were adherent to the 1-year follow-up and were included in the schizophrenia group of the current study. The excluded female patient was only considered in the values for follow-up rates. The control group included 59 (12 male, 47 female) mentally healthy patients. The ratio of male participants was significantly higher in the schizophrenia group, compared to the control group ($p = 0.003$). Patients in the study groups showed no significant differences regarding age and BMI at time of surgery ($p = 0.054$, 0.91 respectively) (Table 1).

Surgical Outcome and Complications

A laparoscopic sleeve gastrectomy was performed safely in all 66 patients of this study. No surgical complications or conversion to open surgery were observed in both groups.

Weight Loss

Sufficient weight loss was seen in both groups (Fig. 1). As demonstrated in Table 2, there were no significant differences in BMI in the two groups at any time of follow-up ($p = 0.9$, 0.26, 0.34, 0.09 for surgery time, 6-, 12-, and 24-month follow-up respectively). The repeated measures ANOVA of BMI during the 2-year follow-up in schizophrenia and mentally healthy patients showed no significant group effect ($F = 0.60$, $P = 0.44$) and a clear time effect in both groups ($F = 2.15$, $p < 0.0001$), that was more pronounced in the control group (interaction effect for time × group, $F = 4.5$, $p = 0.006$).

The calculated excess weight loss (%EWL) showed no significant differences in both groups at 6-, 12-, and 24-month follow-up and reached 51.68 ± 15.84% for schizophrenia group and 60.68 ± 19.95% for non-psychiatric group at 24-month follow-up ($p = 0.33$).

Table 2 Results

		Schizophrenic group ($N = 7$)	Non-psychiatric group ($N = 59$)	p value
Adherence to follow up	6 months	6 (75%)	59 (100%)	0.012
	12 months	7 (87.5%)	59 (100%)	0.12
	24 months	6 (75%)	59 (100%)	0.012
BMI ± SD (kg/m^2)	Baseline	50.40 ± 2.79	50.54 ± 6.1	0.9
	6 months	40.83 ± 3.54	38.41 ± 5.07	0.26
	12 months	36.74 ± 5.95	34.66 ± 5.37	0.34
	24 months	38.51 ± 4.38	34.48 ± 5.69	0.09
%EWL ± SD (%)	6 months	38.89 ± 14.17	47.07 ± 12.76	0.14
	12 months	55.37 ± 22.24	60.04 ± 17.56	0.52
	24 months	51.68 ± 15.84	60.68 ± 19.95	0.33
HbA1c ± SD (%)	Baseline	6.72 ± 1.10	6.52 ± 1.49	0.79
	6 months	5.96 ± 0.85	5.87 ± 1.02	0.88
	12 months	5.55 ± 0.54	5.62 ± 0.85	0.82
	24 months	5.46 ± 0.40	5.62 ± 0.82	0.73
Satisfaction ± SD (NRS)*	Baseline	7.33 ± 2.51	5.00 ± 2.12	0.07
	6 months	6.66 ± 1.52	7.51 ± 1.92	0.45
	12 months	6.33 ± 1.52	6.98 ± 2.53	0.66
	24 months	8.25 ± 0.50	6.64 ± 0.33	0.001

*Numeric Rating Scale [0–10]

HbA1c Levels

The decrease in the HbA1c levels within 2 years after sleeve gastrectomy behaved similar in both groups (Table 2). There were no significant differences of HbA1c levels between both groups at any time of observation ($p = 0.79$, 0.88, 0.82, 0.73 for surgery time, time of 6-, 12-, and 24-month follow-up respectively).

Psychiatric Status

An overall significant improvement of the self-estimated mood and satisfaction was observed in all participants of the study (Manova: $f = 1.26$, $p < 0.0001$); interestingly, the self-estimated mood was 24 months after surgery significantly higher in the schizophrenia group (Table 2). The psychiatric status of the patients of the schizophrenia group was stable in all cases and no exacerbation of psychiatric symptoms was observed during time of follow-up.

Discussion

There is a lack of knowledge regarding the efficacy of weight-control treatments in patients with schizophrenia. A main reason for this might be the exclusion of severe mental ill patients from the largest studies. The majority of patients in this group are not receiving appropriate treatment for obesity and obesity related comorbidities like dyslipidemia, diabetes, and hypertension. For example, 88% of schizophrenia patients with dyslipidemia are receiving no lipid-lowering medications [18].

It may be quite difficult to adapt weight-control treatments to patients with severe mental illness and especially for patients with schizophrenia. Nevertheless, a RCT with lifestyle intervention of 64 older schizophrenia patients with diabetes mellitus resulted in a modest weight reduction of 2.3 kg compared to a mean weight gain of 2.7 kg in controls [19]. The low level of weight reduction is not unexpected regarding the poor outcome of non-surgical weight-control treatments even in mentally healthy patients.

There is very limited data about the effectiveness, feasibility, and safety of surgical treatment option for obesity in schizophrenia patients. Studies evaluating the efficacy and safety of LSG in psychiatric comorbid patients are very rare and the results are contradictory. The results are based on small groups of patient with heterogeneous psychiatric comorbidities including bipolar disorder, depression, anxiety and schizophrenia and described lower [14] or similar [20] weight loss in psychiatric compared to non-psychiatric patients (LSG) .

In our study, a sleeve gastrectomy was safely performed in 7 schizophrenia patients without any surgical complications during the follow-up time of 24 months post-surgery. At this time, every patient from the schizophrenia group ensured his satisfaction with the decision for bariatric surgery.

All of the seven patients involved in this study were defined as psychiatric stable during the pre-operative evaluation. Having no hospitalization in the last year, the lack of active substance abuse and the consideration as eligible for surgery by the evaluating psychologist are important criteria for psychiatric stability [21].

Surgical treatment of obesity requires high levels of compliance in both, preoperative and postoperative period. In our study, the schizophrenia group was adherent to follow up during the investigated period. 87.5% of the patients with schizophrenia went to the 1-year follow-up and 75% of them went to the 2-year follow-up, which speaks for a very good compliance in this group.

The seven schizophrenia patients in this study remained stable after surgery and no hospitalization or worsening of the psychiatric status was observed during the first 4 weeks after surgery. In our program, we avoided any interruption of psychiatric medication before and after surgery. Psychiatric instability mostly immediately after bariatric surgery and because of the interruption of psychiatric medications is reported in the literature [16, 22]. Presumably, inappropriate management of the antipsychiatric medication and lack of adaptation of their dosage after malabsorptive procedures to the new gastrointestinal function after surgery are responsible for decompensation of psychiatric problems after bariatric surgery [23]. In our center, we highly recommend restrictive procedures to psychiatric patients and perform in these cases sleeve gastrectomy whenever possible to avoid high levels of manipulation in the pharmacokinetics of the antipsychiatric drugs.

Further studies with larger sample size and long-term follow-up are needed to address treatment of obesity and related comorbidities in patients with schizophrenia. In our study, the results 2 years after sleeve gastrectomy in stable schizophrenia patients and after an adequate psychological evaluation were encouraging and comparable to the outcome in mentally healthy patients. The favorable outcome may reduce the cardiovascular risk which is a leading mortality factor in this group. The heterogeneity of the study groups and the selection bias in the collective of patients with stable schizophrenia are the major limitations of this study.

Compliance with Ethical Standards

This study was approved by the local ethic committee at the University Hospital of Tübingen, Germany.

Conflict of Interest The authors declare that they have no conflict of interest.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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