Outcomes of sleeve gastrectomy in patients older than 60 years: a multicenter matched case-control study

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Abstract

Introduction: *The prevalence of obesity is increasing according to the World Health Organization. Furthermore, global aging is increasing, especially in developed countries in Europe. Whether bariatric surgery should be performed in elderly people is still controversial.*
Aim: *To determine the clinical outcomes of sleeve gastrectomies (SG) in older central European patients. We compared the safety and efficacy of SG in patients older than 60 years with younger patients.*
Material and methods: *Eighty-nine patients older than 60 years, who underwent SG, were included in the study. Eighty-nine younger patients (aged 18–40 years) were matched according to body mass index (BMI) and comorbidities. The analyzed data included age, sex, total body weight, BMI, length of hospital stay, 30-day complications and improvement in comorbidities.*
Results: *There was no significant difference in the complication rate between the 2 age groups (p = 0.59). An improvement in hypertension was observed in 73.1% of older patients and in 69.2% of younger patients (p = 0.67). There was improvement in diabetes mellitus in 40% of older patients and in 31.1% of younger patients (p = 0.25). The ΔBMI after 12, 24 and 36 months was significantly lower in older patients than in younger patients (p = 0.002, p = 0.001; p = 0.043, respectively). Percent excess BMI loss (%EBMIL) after 12, 24, and 60 months was significantly lower in older than in younger patients (p = 0.001, p = 0.001, p = 0.028, respectively).*
Conclusions: *Better weight loss is achieved in younger than in older patients, while maintaining a similar effect on the risk of complications and improvement in comorbidities. Therefore, SG is safe and effective in older people.*

Key words: *older age, elderly, sleeve gastrectomy, bariatric surgery.*

Introduction

The prevalence of obesity in Europe and other parts of the world is increasing according to the World Health Organization [1]. Furthermore, global aging is increasing, especially in developed countries in Europe and the United States [2]. Consequently, an increasing number of older people will need treatment for obesity, as well as its comorbidities. Conservative methods, such as lifestyle modification, have poor long-term results for obesity. Therefore, bariatric surgery, which is an effective and durable treatment, is performed worldwide [3, 4]. Currently, sleeve gastrectomy (SG) is one of the most com-

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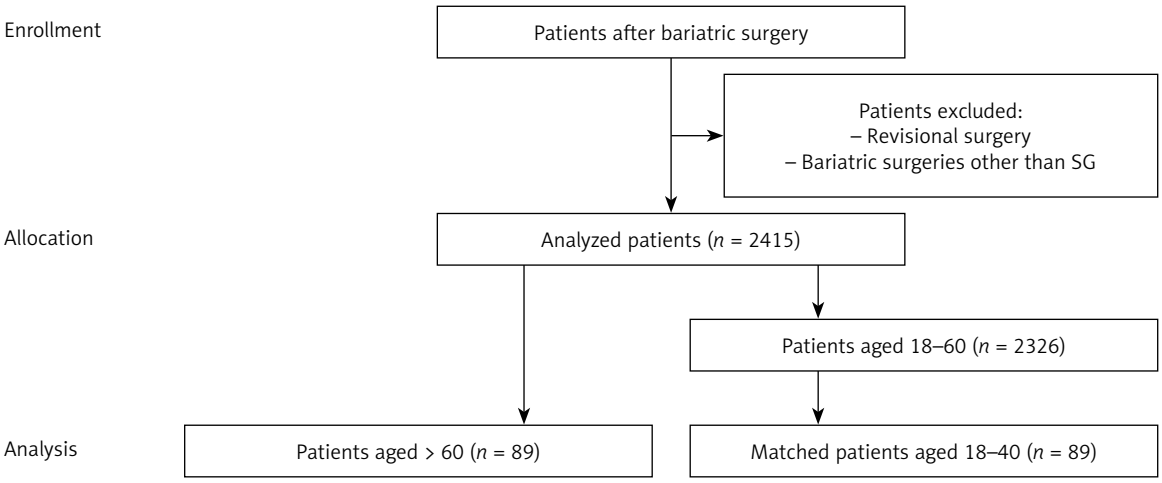

Figure 1. Flow chart of the study

mon bariatric procedures [5]. Restriction in gastric volume and changes in secreted hormones lead to satisfactory weight loss and resolution or at least an improvement in comorbidities.

Whether surgery should be performed in elderly people is still controversial. Older age causes difficulties in surgery and is related to an increase in perioperative complications and mortality [6]. Qualification of elderly people for bariatric surgery should be made by evaluating the risks and benefits. Nevertheless, the number of performed procedures among older patients is increasing [7, 8]. Complications, baseline general health status and life expectancy are taken into account when surgery is being considered. Recent reports have shown that bariatric surgery appears to be an effective therapy for obesity even in elderly people, especially because obesity is related to comorbidities such as diabetes mellitus or hypertension [9–14].

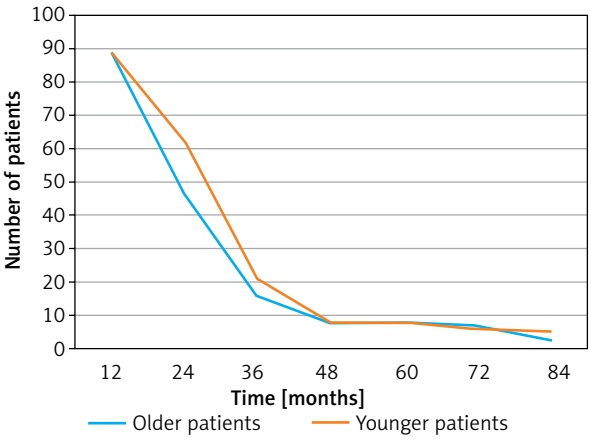

Figure 2. Number of patients during follow-up

Aim

This study aimed to determine the clinical outcomes of SG in older central European patients. We compared the safety and efficacy of SG in patients older than 60 years with younger patients.

Material and methods

A case-control study was performed in patients who underwent SG. Patients underwent surgery from 2009 to 2017 at four Polish high-volume bariatric centers. Eighty-nine patients were older than 60 years among 2415 patients who underwent surgery at this time. Eighty-nine patients were included as matched controls (aged 18–40 years) (Figure 1). All of the procedures were performed using the same surgical technique as described previously [15].

Cases and controls

Patients were followed up at 12 months and every year after surgery (Figure 2). The data that were analyzed included age, sex, total body weight and body mass index (BMI), length of stay in hospital (LOS), and complications. We also analyzed comorbidities such as diabetes mellitus (DM) and atrial hypertension (HT), patients' improvement at 12 months after surgery, change in BMI (ΔBMI) and percent excess BMI loss (%EBMIL) [16]. Complications were defined as adverse events that occurred within 30 days of the procedure. Complications were classified according to "Standardized outcomes reporting in metabolic and bariatric surgery" by Brethauer

et al. [16] Improvement was established as the reduction of medications or when the medications could be stopped [16].

Matching

The matching procedure was performed according to BMI (±1 kg/m^2) and comorbidities (DM, HT). The controls were selected for each case using an algorithm described by Kawabata (1 : 1 matching procedure) [17]. Cases without a suitable control were excluded from the study.

Statistical analysis

Analysis was performed using SAS software, University Edition (SAS Institute Inc., Cary, NC, USA). Continuous outcomes were analyzed using the paired *t*-test, or Wilcoxon signed ranks test. Dichotomous outcomes were analyzed using McNemar's test or Fisher's exact test [18].

Results

A total of 178 patients (89 matched pairs) were included in the study. Table I shows the characteristics of the patients.

Length of stay tended to be longer in patients older than 60 years than in younger patients, but this was not significant (p = 0.10). There was also no significant difference in the complication rate between the 2 age groups (p = 0.59). Bleeding during a 30-day observation time occurred in 2 (2.24%) older patients and 1 (1.1%) younger patient. Leakage was diagnosed in 1 (1.1%) younger patient and 3 (3.4%) older patients (Table II).

Twenty-four (26.97%) patients suffered from DM while 48 (53.93%) had HT in both age groups. An improvement in HT was observed in 73.1% of patients older than 60 years and in 69.2% of patients younger than 40 years (p = 0.67). There was also improvement in DM in 40% of older patients and in 31.1% of younger patients (p = 0.25, Table III).

The ΔBMI after 12, 24 and 36 months was significantly lower in patients older than 60 years. than in younger patients (p = 0.002, p = 0.001; p = 0.043, respectively). Similarly, %EBMIL after 12, 24, and 60 months was significantly lower in patients older than 60 years than in younger patients (p = 0.001, p = 0.001, p = 0.028, respectively) (Table IV). Despite a lack of significance, the tendency for lower body weight loss in younger patients was maintained in subsequent follow-ups (Figure 3).

Discussion

In this study, older patients were matched with younger patients with the same demographics to evaluate whether age was significant for outcomes from SG. Both age groups achieved similar outcomes in terms of complications, LOS and improvement in comorbidities. Younger patients tended to have greater body weight loss compared with older patients at follow-up.

A meta-analysis showed that young patients had better weight loss than did elderly patients [11]. A similar outcome was found in our study. Neverthe-

Table I. Characteristics of the patients

Characteristics	Older patients	Younger patients	*P*-value
Age [years]	63.3 ±2.73 (60–71)	32.8 ±5.46 (18–39)	< 0.001
BMI [kg/m^2]	46.1 ±6.1	46.0 ±6.2	0.2532
Sex:			
Women	53 (59.5%)	51 (57.3%)	
Men	36 (40.5%)	38 (42.7%)	
Comorbidities:			
DM	24 (40.1%)	24 (40.1%)	
HT	48 (81.4%)	48 (81.4%)	
LOS [days]	4.04 ±2.05	3.63 ±1.24	0.0985

Values are mean±SD or n (%).

Table II. Complications in patients

Complications	Older patients	Younger patients	*P*-value
General	8 (8.9%)	6 (6.7%)	0.5930
Leakage	1 (1.1%)	3 (3.4%)	0.3173
Bleeding	2 (2.24%)	1 (1.1%)	0.5637

Table III. Improvement in comorbidities

Comorbidities	Older patients	Younger patients	*P*-value
Hypertension	38 (73.1%)	36 (69.2%)	0.6698
Diabetes mellitus	18 (40%)	14 (31.1%)	0.2482

Table IV. Weight loss

Parameter	Older patients	Younger patients	*P*-value
12 months:			
n	89	89	
BMI	35.4 ±6.5	32.0 ±5.3	
ΔBMI	10.6 ±4.4	13.0 ±5.1	0.0015
%EBMIL	53.9 ±24.5	64.2 ±22.5	0.0014
24 months:			
n	46	62	
BMI	35.2 ±7.1	30.4 ±4.4	
ΔBMI	11.3 ±5.8	15.7 ±5.6	0.0002
%EBMIL	55.7 ±28.6	75.5 ±19.5	0.0003
36 months:			
n	16	21	
BMI	37.5 ±9.3	32.8 ±3.3	
ΔBMI	8.1 ±5.5	13.4 ±4.2	0.0425
%EBMIL	46.1 ±37.3	62.8 ±17.2	0.064
48 months:			
n	8	8	
BMI	40.1 ±10.9	32.9 ±3.4	
ΔBMI	6.7 ±8.2	14.1 ±5.8	0.0843
%EBMIL	34.1 ±35.0	62.4 ±17.9	0.0647
60 months:			
n	8	8	
BMI	40.2 ±11.5	30.5 ±2.9	
ΔBMI	6.5 ±8.9	16.5 ±6.1	0.0509
%EBMIL	33.3 ±38.0	72.9 ±17.3	0.0276
72 months:			
n	7	6	
BMI	38.7 ±10.7	28.8 ±1.7	
ΔBMI	8.0 ±7.5	17.9 ±5.2	0.3125
%EBMIL	41.1 ±36.8	81.2 ±9.2	0.2672
84 months:			
n	3	5	
BMI	43.7 ±14.9	27 ±2.2	
ΔBMI	6.3 ±10.3	20.4 ±5.7	1.000
%EBMIL	31.2 ±49.8	89.8 ±10.6	1.0

Values are mean ± SD or n.

less, SG is still beneficial in older patients. The total body water volume decreases in older people, as well as muscle fibers, which are associated with sarcopenia and frailty syndrome [19]. The majority of patients in our study were women. Ochner *et al.* found that menopause-associated changes may reduce postoperative results after bariatric surgery [20]. We have also found the reason for a smaller weight loss effect in the patients' motivation for the surgery. Younger patients are more concerned about a better appearance than resolution of comorbidities after surgery. Therefore, younger patients are more motivated to lose weight, but not for medical reasons [21]. Moreover, in older people, energy expenditure is lower and life is more static than in younger people [22].

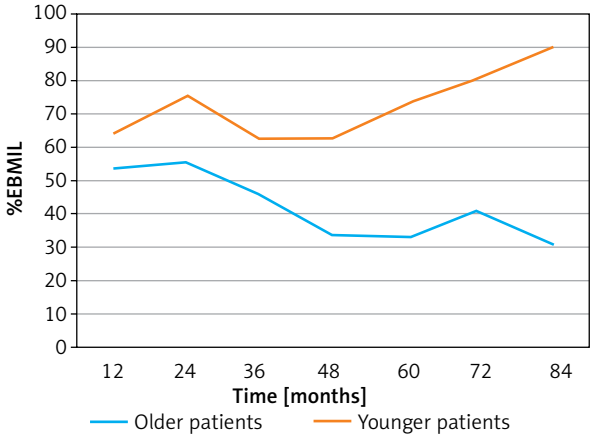

Figure 3. %EBMIL during follow-up

The study did not show any significant improvement in comorbidities between the groups, as previously reported [11]. Improvement, defined as withdrawal of medications or at least a reduction in consumed medicine, was observed in approximately 70% of patients with HT and more than one third of patients with DM. Similar results were found in recent randomized controlled trials [23, 24]. Older age may not be a negative factor for resolution of comorbidities. Reduction of medications can influence the quality of life. Even a decrease in taking drugs is a goal for successful surgery.

Furthermore, the complication rate was similar between the two age groups in our study. Despite the small sample size and matching procedure, our results may be generalized to the entire population, because similar findings were reported by other studies [25, 26]. Importantly, especially among elderly people, perioperative care appears to play a crucial role in improving postoperative outcomes. Recent developments in perioperative care and introduction of enhanced recovery after surgery (ERAS) protocols in

bariatric surgery and other surgical disciplines have led to faster recovery and reduction in postoperative morbidity [27–29]. The ERAS protocols have enabled elimination of some of the traditional risk factors for postoperative complications and prolonged length of hospital stay. Together with laparoscopic surgery, ERAS protocols are particularly beneficial in older patients [30–32]. However, most of the evidence for ERAS protocols is from other surgical disciplines, and this has not been confirmed for bariatric surgery. However, considering the pathophysiological background of ERAS protocols, these benefits should also be applicable to elderly obese patients [33].

Goals of surgery in the elderly population should include not only weight loss, but also improvement in physiological function and quality of life. Despite the physiological aspects not being analyzed in the study, bariatric surgery improves patients' quality of life and it is not related to weight loss [34, 35]. Further studies on this issue among elderly patients need to be performed.

Limitations of this analysis include the retrospective design of the study and the small sample size. According to the current Polish guidelines for bariatric surgery [36], procedures are recommended for patients aged 18–60 years, and those older than this age should be specially considered. The long-term follow-up results of patients older than 60 years who have bariatric surgery are unknown. There are the supposed reasons for the small sample size. Younger patients were carefully matched in our study so that the effect of age alone was examined. Our outcomes appear to overlap with similar previous studies [9–14]. Therefore our finding may be applicable to a larger population.

Conclusions

The study shows that patients older than 60 years benefit from bariatric surgery. Better weight loss is achieved in younger patients than in older patients, while maintaining a similar effect on the risk of complications and improvement in comorbidities. Therefore, sleeve gastrectomy should be considered as safe and effective in older people.

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Conflict of interest

The authors declare no conflict of interest.

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