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Original Article

The effects of laparoscopic sleeve gastrectomy on head, neck, shoulder, low back and knee pain of female patients

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Abstract: As the rise on the prevalence of obesity, it is related with physical impairment of joints, especially in the lumbar spine and knee joints. Losing body weight can reduce or eliminate pain of head, neck, shoulder, lumbar spine and knees. By performing a laparoscopic bariatric surgery we demonstrated a significant improvement on the pain by body weight reduction. In this study we aimed to explore the efficacy and safety of Laparoscopic Sleeve Gastrectomy (LSG) on the relief of pain on head and neck, shoulder, low back and knee among the severely morbid obese female patients. A total of 39 morbidly obese female patients who underwent LSG for morbid obesity were included in this study. Body weight, height, body mass index (BMI), head and neck, shoulder, low back and knee pain intensity were measured with Visual Analog Scale (VAS) before and after LSG at the 6th month. 39 morbidly obese female patients were enrolled to this study. The mean age of the patients was 37.69 ± 11.33 years. Preoperative and postoperative body weights were 127.3 kg and 91.21 kg, respectively. Mean height was 165.23 ± 5.78 cm. Preoperative and postoperative BMIs were 46.49 kg/m^2 and 32.33 kg/m^2, respectively. A significant correlation between preoperative and postoperative parameters was found according to BMI. Our data showed that LSG is an efficient and safe procedure on severely obese patients and showed a predictive remission of head and neck, shoulder, low back and knee pain intensity of female patients by analyzing with VAS during the first 6 months.

Keywords: Laparoscopic sleeve gastrectomy, pain, lumbar spine, knee, VAS, female

Introduction

Obesity is closely associated with the musculoskeletal complaints and pain. In the morbidly obese patients, the lumbar spine and the knee joints are the primary two load-bearing sites for pain onset. Bariatric surgery such as; Laparoscopic Sleeve Gastrectomy (LSG) can reduce the body fat and lower the mechanical pressure on these joints. Laparoscopic Sleeve Gastrectomy (LSG) is a popular bariatric surgery because of its positive results on body weight loss, BMI and having less comorbidities. Follow-up studies after LSG based on to reduce or eliminate the pain of head and neck, shoulder, low back and knee following this bariatric surgery in morbidly obese female individuals are lacking and has not been reported.

Mostly seen gender was the female at morbidly obese patients who underwent LSG for bariatric surgery at a ratio of 2:1 to 4:1 and was the group that also suffering joint pain. In this present study, we aimed to evaluate the efficiency of LSG by losing weight during the first 6 months for relief of pain on head and neck, shoulder, low back and knee among the severely obese female patients.

Materials and methods

Study design

This study was performed at the department of general surgery of Antalya Education and Research Hospital. The patients called and informed for the study and the pain intensity of head and neck, shoulder, low back and knee were measured by Visual Analog Scale (VAS) from all individual participants for who included in this article. All procedures performed in studies involving human participants were in accor-

Table 1. The preoperative (1) and postoperative (2) body weights, BMI and pain parameters

Descriptive Statistic						
Parameters	N	Mean	Std. Deviation	Minimum	Maximum	P*
Body Weight1	39	127.03	14.70	103	165	<0.001
Body Weight2	39	91.21	12.50	70	137	
BMI1	39	46.49	4.48	40.14	59.77	<0.001
BMI2	39	32.33	6.31	12.12	45.78	
A1	39	4.67	2.91	0	8	<0.001
A2	39	1.05	1.12	0	6	
B1	39	3.51	2.93	0	10	<0.001
B2	39	1.38	1.97	0	7	
C1	39	3.49	2.79	0	10	<0.001
C2	39	1.26	1.89	0	8	
D1	39	6.67	2.68	1	10	<0.001
D2	39	1.97	2.17	0	8	
E1	39	3.08	3.21	0	9	<0.001
E2	39	0.18	0.39	0	1	
F1	39	6.54	3.09	0	10	<0.001
F2	38	0.87	1.40	0	5	
G1	39	2.23	3.53	0	10	0.004
G2	39	0.79	1.36	0	4	
H1	39	3.95	2.69	0	8	<0.001
H2	39	0.82	1.59	0	6	
I1	39	3.15	3.46	0	9	<0.001
I2	39	1.31	2.04	0	6	
J1	39	2.72	2.96	0	8	0.009
J2	39	1.41	2.46	0	8	
K1	39	3.79	3.97	0	9	0.002
K2	35	1.37	2.57	0	9	
L1	39	3.49	3.62	0	9	0.001
L2	39	1.77	2.88	0	9	
M1	39	3.79	3.16	0	10	<0.001
M2	39	1.28	1.95	0	7	
N1	39	3.79	3.16	0	10	<0.001
N2	39	1.49	2.30	0	9	
O1	39	6.72	3.27	0	10	<0.001
O2	39	3.00	3.36	0	9	
P1	39	5.62	2.96	0	10	<0.001
P2	39	2.41	2.62	0	8	
Q1	39	5.77	2.57	0	10	<0.001
Q2	39	1.36	1.91	0	6	
R1	39	6.46	2.06	1	10	<0.001
R2	39	1.56	1.90	0	6	
S1	39	4.28	2.72	0	10	<0.001
S2	39	0.67	1.26	0	4	
T1	39	3.31	2.87	0	8	<0.001
T2	39	0.44	1.27	0	7	
U1	39	4.87	2.86	0	9	<0.001
U2	39	0.79	1.58	0	7	

dance 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. A total of 39 morbidly obese female patients, aged 19-62 years with a BMI ≥40 kg/m^2 were operated on from July 2013 to February 2014. Follow-up inspections were carried out at the 6th month. Body weight, height, BMI and lumbar spine and knee pain intensities were measured with Visual Analog Scale before and after LSG at the 6th month.

Visual analog scale questionnaire

At the preoperative and postoperative 6th months the patient intensity of knee and low back pain were measured with VAS of 23 questions. All patients completed 0-10 cm VAS anchored at no pain at all = 0 and very severe pain imaginable = 100 for the present pain intensity. The distance from the no pain (0) was measured in mm. The questions as follows:

A: knee pain, B: neck pain, C: shoulder pain, D: low back pain, E: pain at night any where, F: pain on movement, G: analgesic use, H: rigidity at neck and low back, I, J: right and left shoulder and arm pain, K, L: right and left manual or arm intervention to pain, M, N: right and left neck pain, O, P: head pain and frequency, Q, R, S, T: low back pain effects the walking, standing, sitting and driving, U: low back pain at sleep, V: quality of life for low back pain, W: pain affecting the working, X: change of work.

V1	39	5.62	2.31	1	10	<0.001
V2	39	1.00	1.30	0	4	
W1	39	5.67	2.61	0	10	<0.001
W2	39	1.67	2.52	0	8	
X1	39	5.08	2.81	0	10	<0.001
X2	38	1.37	2.08	0	6	

*p = significance level.

Table 2. It shows a significant relationship between parameters according to the preoperative and postoperative BMI of patients

CORRELATION	PARAMETERS	r*	CORRELATION	PARAMETERS	r*
BMI1	B1	0.88	BMI2	B2	0.40
	E1	0.72		E2	0.12
	F1	0.08		F2	0.70
	H1	0.98		H2	0.24
	Q1	0.51		Q2	0.87
	R1	0.79		R2	0.30
	S1	0.94		S2	0.12

*r = correlation coefficient.

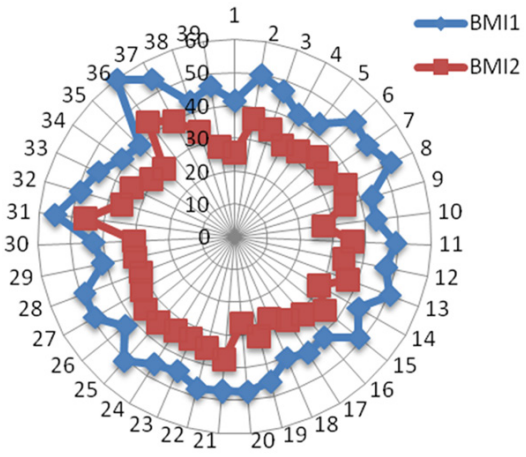

Figure 1. BMI radar image of patients before (BMI1) and after (BMI2) surgery.

Statistical analysis

For statistical analysis, SPSS 15.0 (SPSS Inc., Chicago, IL, USA) package program and Microsoft Office Excel 2010 version were performed. The One-Sample Kolmogorov-Smirnov test was used for compliance with the normal distribution of data. For the comparison of data Paired Samples Test, Wilcoxon test, Spearman's and Pearson's correlation tests were used. For the data descriptive statistical analysis: mean ± standard deviation and minimum-maximum values for numeric variables; numbers and percentages for categorical data were used. The level of P<0.05 was accepted as significant.

Results

The study enrolled on 39 morbidly obese female patients. The mean age of the patients was 37.69 ± 11.33 (19-62) years. Preoperative body weight was 127.3 kg (103-165) and postoperative 6th month body weight was 91.21 kg (70-137). The mean body height was 165.23 ± 5.78 cm (142-195). Preoperative BMI was 46.49 kg/m^2 (40.14-59.77) and postoperative 6th months BMI was 32.33 kg/m^2 (12.12-45.78). Statistical analysis of VAS pain intensity before and 6 month after the operation was statistically different. G (P = 0.004), J (P = 0.009), F (P = 0.002), L (P = 0.004) had a statistically significant difference level (*); other preoperative and postoperative parameters were observed between the apparent significant difference (P<0.001) (**Table 1**).

As the comparison, according to the BMI of patients there was a significant correlation between preoperative and postoperative parameters that was shown at the table. (**Table 2**) There was not found any significant correlation between other parameters.

BMI radar image of patients before and after LSG was shown in **Figure 1**.

Discussion

Obesity is the one of today's major health problems that was affecting some of the population all around the world. 315 million people who has a body mass index (BMI) greater than 30 are considered as obese worldwide [1, 2]. Obesity brings about with many health problems. One of these problems is the pain caused in the low back and lower extremities. Obesity leads to osteoarthritis in the musculoskeletal system that causing pain, and the development of osteoarthritis leads to muscle weakness in patients with gait disturbances. 5% increase in body weight increases the risk of developing osteoarthritis by 36%. Many mechanisms relat-

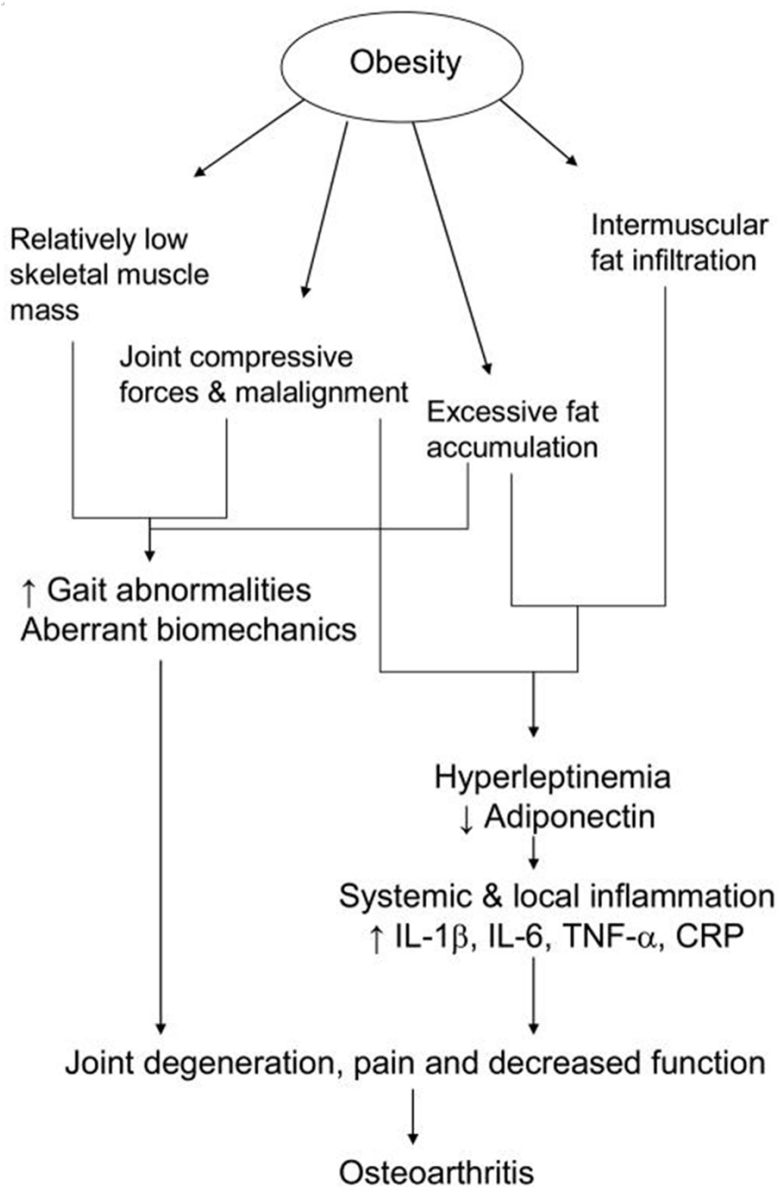

Figure 2. Potential obesity related pathways that contribute to osteoarthritis (3).

ed to the development of osteoarthritis in obese patients are summarized briefly at **Figure 2** [3].

The morbid obesity has been proposed to accelerate the damage to joints through with increased systemic inflammation [4]. Peltonen et al was also observed in a study showing the prevalence of hip and knee pain leading to work restriction in obese individuals than normal population [5]. In this study the obese patients make a job selection according to their body weight but after the LSG operation and losing at their body weights they ready to make all the work that was given to them.

Our study showed that patients who underwent LSG as a bariatric surgery to achieve a substantial body weight loss showed significantly a symptomatic relief of the pain of the joints; knee, shoulder, low back and also headache and neck pain at 6th months. As compared to baseline throughout the duration of this study showed a significant improvement on pain any where, pain on physical movement and sports, work chosen, reduce at analgesic usage and increase at the quality of life after six months postoperatively.

In a systematic review have been demonstrate an improved on pain of the hip and knee joint that was associated with osteoarthritis following a bariatric surgery with weight loss [6]. They conclude the bariatric surgery as part of a weight management with marked weight loss leading to improvement on pain of the hip and knee joints and also they showed the function in obese patients with osteoarthritis [6]. These findings are also supported by some authors by meta-analysis reporting on weight reduction and knee osteoarthritis. Interestingly, weight change alone could not predict change in the knee pain score. Messier et al. reported in their study of older obese patients who was showed a relief on pain and a functional improvement with modest weight loss and moderate exercise [7]. Christensen et al. showed in their study a reduction of body weight over 5.1% was followed by an improvement on the disability of the knee joint [8]. However, in obese individuals bariatric surgery such as LSG has been shown to produce marked weight losing. In this study we showed a significant reduc-

tion or elimination of pain intensity of hip, knee and shoulder.

Many studies have shown that a significant reduction of knee pain in obese patients with osteoarthritis after bariatric surgery. The dramatic improvement in the pain is especially within the first 3 months after surgery [9]. In this study we found a significant decrease on pain intensity of head, neck, shoulder, low back and also knee, 6 months after the LSG.

The lumbar region is the mostly searched region on the bariatric patients. One study examined the postoperative second year results of the obese patients who performed vertical banded gastroplasty and has been shown 14.3 kg/m^2 decrease on BMI with the improvement on all disabilities and pain resolving [10]. In our study at the end of the sixth month 14.16 kg/m^2 decrease on BMI was shown correlated with the relief of all body pain measured with VAS. However, Hooper et al. found a decrease on BMI from 51 to 36 kg/m^2 with a decreased frequency of musculoskeletal symptoms in the knee following post bariatric surgery [11]. We also found a significant relief in musculoskeletal symptoms at joints in our patients. Following laparoscopic adjustable gastric banding, BMI decrease from 43.3 to 37 kg/m^2 resulted with functional improvement and pain resolution by measuring scores according to the knee society score [12]. They also reported an increase on the width of the joint space after losing weight.

Vincent et al were studied in 2 groups of 45 patients and performed laparoscopic Roux-en-Y gastric bypass to 25 of them, while the other 20 was the control group. In comparison with the control group, walking and climbing stairs have been seen better in the surgical group, and a reduced rate of 54% of low back pain and 34% of knee pain were demonstrated [13]. In this study pain relief while walking, standing, sitting and driving a vehicle was also found statistically significant.

Conclusion

In conclusion, our study showed that LSG is an efficient and safe procedure on severely obese female patients and showed a predictive remission of overall head, neck, shoulder, low back and knee pain of female patients by analyzing with VAS during the first 6 months. Larger randomized controlled studies with longer term follow up are needed.

Disclosure of conflict of interest

None.

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