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Worsening Back Pain after Bariatric Surgery: The Impact of Acute Weight Loss on the Spine

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Abstract

Background: Obesity increases the risk of low back pain among overweight patients, while weight reduction should result in improving their symptoms.

Purpose: Our aim is to reveal a correlation between acute weight loss and buildup of back pain.

Materials and Methods: We conducted a retrospective study in which 30 obese (BMI ≥30 kg/m^2) patients presented with new onset or exacerbation of pre-existing low back pain and/or lower extremities pain after bariatric surgery. Data was collected from the medical records at the American University of Beirut Medical Center from the year 2000 till 2013. Magnetic Resonance Imaging (MRI) was used as diagnostic modality whereas Oswestry Disability Index (ODI) was used for outcome assessment.

Outcome: Worsening of preexisting low back pain or newly developed low back and/or leg pain were the presenting symptoms after bariatric surgery. Most patients had a history of acute weight loss in less than 3 months period.

Conclusion: Our findings do not comply with the concept of association between back pain relief and weight loss. We highlight the emergence of low back pain due to loss of intra-abdominal pressure, increase in spinal loading and decrease in spinal stability.

Keywords: Low Back Pain, Bariatric Surgery, Acute Weight Loss, Oswestry Disability Index

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Introduction

Obesity is a major risk factor associated with morbid medical conditions [1]. Back pain stands out as a significant complaint among such category of patients [2]. The rise of bariatric surgical procedures over the last few decades played an important role in reduction of body weight [3]. Spine stability is the main factor responsible for painless erect posture, which embodies several factors of which is the intra-abdominal pressure (IAP), a combination of visceral fat, abdominal fat and waist circumference [4-6]. All these factors regress and decrease with acute weight loss after bariatric surgery.

Overweight and obesity are known to be associated with a significantly higher prevalence of back pain among those aged 50 and above [7]. Low back pain (LBP) is reported as a serious complaint among obese patients [8]. The role of bariatric surgery has been acknowledged in reducing the incidence of low back pain [9,10]. Moreover, some patients reported weaning of this musculoskeletal associated co-morbidity [11].

The primary aim of this paper is to highlight the role of weight loss as a double edged entity, reported mainly in the literature as a LBP reliever, but sometimes acting in the opposite way, increasing the pain intensity and discomfort of the patients in addition to an estimation of the low back pain after the bariatric surgery.

Materials and Methods

We present a retrospective study of 30 obese patients with history of LBP and/or Leg pain prior to bariatric surgery, coming for worsening symptoms following the bariatric sleeve gastrectomy procedure, which is a surgical weight-loss procedure in which the stomach is reduced to about 25% of its original size, by surgical resection along the greater curvature resulting in a tube-like structure.

Table A: Socio-demographic characteristics of our population.

Variable	N (%)
Gender Male Female	(30) 18(60) 12(40)
Type of intervention Medical therapy Lumbar microdiscectomy Redo microdiscectomy Epidural injection	 9(30) 11(36.7) 6(20) 4(13.3)
Age Mean±SD	44.1±12.4
BMI Mean±SD	36.6±4.2
ODI (prior to losing weight) Mean±SD	23.6±18.4
ODI (post to losing weight) Mean±SD	40.2±12.7
ODI (post intervention) Mean±SD	20.7±9.1

Mean±SD: Mean (standard deviation)

Between the period extending from the year 2000 till 2013, 30 patients presented to our institution with a complaint of LBP and/or Leg pain that has worsened post bariatric sleeve gastrectomy surgery, an outcome that was contrary to what they initially thought. Charting was done in private clinic and medical records. Variables collection included participants' initial weight and ODI [12] prior to bariatric surgery, weight loss and ODI three months post sleeve gastrectomy, type of intervention for low back pain treatment divided into pharmacological treatment, epidural steroid injection or microdiscectomy. Pain was defined as new onset or already diagnosed LBP±radiculopathy that increased in nature or diagnosed post bariatric surgery following >20% weight loss. Clinical examination was performed by the same physician (senior author of this paper). Lumbosacral MRI was the diagnostic modality to assess the etiology of the LBP and/or Leg Pain. ODI was employed to assess and quantify LBP. "chronic low back pain" was defined as pain experienced for more than 30 days prior to admission [13].

Inclusion criteria for subject selection were obese patients who underwent sleeve gastrectomy (obesity defined as a BMI ≥30 kg/m^2), presenting with episode of low back pain greater than four weeks duration, with an increase of more than 20 percent in ODI, pain localized to the lumbar spine area confirmed by a diagnostic modality and presence of radiculopathy with dermatomal pain distribution with or without leg weakness. Exclusion criteria included psychological disorders, desire for secondary gain, litigation, addiction on prescription of narcotics and referred pain of visceral or somatic origin.

The patients were divided into three different groups depending on the treatment modality they received for the relief of their symptoms. 17 patients underwent lumbar microdiscectomy, 9 patients received pharmacological and physical therapy treatment, and 4 patients underwent epidural steroid injection for pain relief. These different interventions depended on the patient's symptoms, signs and MRI findings. The ODI was used to assess the outcome for the patients with lumbar spine disorders, being a newly formed disc or worsening of a previously herniated disc. Follow up was done at 2 weeks, 1, 3, 4 and 6 months, and at 1 year following the initial presentation. Approval from our ethics committee (Institutional Review Board) was granted before startup of the study.

Statistical analysis

Data entry and analysis were performed using the Statistical Package for the Social Sciences Version 22.0 (SPSS). Means with their standard deviations and percentages were used to describe continuous and categorical variables, respectively. Statistical bivariate analysis was performed. Paired Samples T test was used to compare means prior and after weight loss and Fisher's Exact Test to compare categorical variables. A p value < 0.05 was considered statistically significant.

Table B1: Association between ODI prior weight and post weight loss.

	Mean±SD	Pvalue
ODI prior weight loss	23.6±18.47	<0.001
ODI post weight loss	40.17±12.72	

Table B2: Association between ODI post weight loss and ODI post intervention.

	Mean ±SD	Pvalue
ODI prior weight loss	20.73±19.10	<0.001
ODI post weight loss	40.17±12.72	

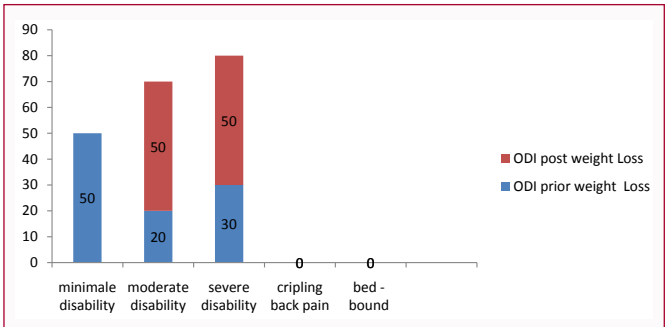

Figure A: Percentage ODI prior weight and post weight loss.

Results

Mean age of our subjects was 44.2±10.2. BMI ranged from 30.3 to 45.0, with a mean of 36.2. 60% of our participants are male and 40% are female. All our patients underwent sleeve gastrectomy. The Mean acute weight loss was 17.43+/-9.1 (Table A). The bivariate analysis showed a significant difference between pre-sleeve and post-sleeve ODI, which was assessed with ODI means 23.63±18.47 and 40.17±12.72 respectively (P value < 0.001) (Table B1). A positive association was obtained between post-sleeve ODI and post-intervention (pharmacologic, epidural or microdiscectomy) ODI, which has worsened between 30 and 60 days post-op, with ODI means 40.17±12.72 and 20.73±9.10, (p value < 0.001) (Table B2) (Figure A), however no significant difference was found between the different subcategories of intervention type and ODI post weight loss.

Discussion

Obesity is a contributor factor to LBP [13,14], for which bariatric surgery was suggested as an alleviating surgical intervention [11,15,16]. In our study, patients who underwent bariatric surgery with resultant acute weight loss over a short period of time had back pain that was either new in onset or worsened compared to current one. This was attributed to the formation of new disc herniation or to the aggravation of a previously existent one (Figure B).

Intra-abdominal pressure (IAP), a combination of visceral fat, abdominal fat and waist circumference, was suggested as a contributor factor for spinal stability [8].

It has been reasoned that an increase in IAP unloads the spine by generating upward force on the rib cage via diaphragm as well

downward force on the pelvic floor, by producing an extensor moment on the lumbar spine that lessens the erector spinaes activities [17,18]. This elevated IAP is observed during activities of running, jumping and weight lifting [19]. A study conducted by Hodges et al. [18] provided an *in vivo* model and role of the IAP on the stability of the spine area; it shows that the pressure is generated by a combination of abdominal, diaphragmatic and pelvic floor muscles.

The mechanical stability of the lumbar spine must be maintained at all times to prevent its buckling and subsequent injuries when the spine is loaded during physical activities [20]. Cholewicki et al. [21] conducted both an anatomical biomechanical and *in vivo* studies confirming the role of IAP on spinal stablily, while Hodges et al. [22] confirmed the attributed role of stability to IAP and not truncal muscles by using electrodes stimulating the phrenic nerves and measuring the stiffness of the spine. He eventually concluded that the stiffness was positively correlated to increase in IAP [18]. A possible intra-abdominal pressure mechanism for stabilizing the lumbar spine, from which it was deduced that any reduction in IAP will lead to a state of disequilibrium in the spine, and disproportionate loading on the vertebral bodies and disks [23]. Furthermore, following bariatric surgery, the decrease in IAP, creates spinal disequilibrium, a forward bending of the lumbar spine [24], and a degree of kyphosis, which in turn causes unequal weight bearing on the disks and eventual herniation, low back pain, and radiculopathy.

We should mention the limitations of our study such as the small sample size, the lack of a control group, the retrospective nature of the data collection, the short term follow up of one year and the lack of long term follow ups. Further studies, with larger sample size should perform multivariate analysis to eliminate the confounding effects of several risk factors associated with low back pain. It would also be interesting to record anatomical or biomechanical observations on patients who have versus those who don't have back problems after bariatric surgery in order to find variables which can predict the occurrence of back pain.

Conclusion

Abrupt loss of weight following bariatric surgery was alternatively correlated with a worsening low back pain. More studies should be conducted assessing this topic, taking into consideration a prospective case control nature, including a larger cohort population.

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