

Correlation between Bariatric Surgery and MSK

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Received: May 10, 2023; **Published:** June 15, 2023

Abstract

The research is designed to address the influence of bariatric surgery on the musculoskeletal system and indicate whether it is positive or negative. Basically, it is a theoretical and systematic review study, which aim to analyze several studies in relevance to the topic of interest to achieve the main objective of research. It depends on international surgical communities to observe the desired impact of bariatric surgery on MSK. On the other hand, there were studies disagreed the main hypothesis as it claims that this type of surgery increase the damages within MSK system but there were large number of studies that supported the undeniable benefits of the association. Also, it impacts on other chronic diseases as for example diabetes, cardiovascular, kidney, etc. and lowers the probabilities of early death. Overall, the generated association improves the quality of life through enhancing the physical and mental health.

Keywords: *MSK System; Bariatric Surgery; Musculoskeletal; Physical Activity; Weight Loss; Obesity*

Abbreviations

MSK: Musculoskeletal System; FDA: Food and Drug Administration; PA: Physical Activity; LAGB: Laparoscopic Adjustable Gastric Banding; LSG: Laparoscopic Sleeve Gastrectomy; RYGB: Roux-en-Y Gastric Bypass; BPD/DS: Biliopancreatic Diversion with Duodenal Switch; WHO: World Health Organization; BMI: Body Mass Index

Introduction

Surgical operations have been considered beneficial as a solution for a large number of diseases on the global level. In relevance to orthopedic a number of primary modifiable risks were identified and probable intervention is introduced to present the desired results. Moreover, obesity has been considered a threatened chronic disease as it assists in developing other comorbidities in individuals including the musculoskeletal system diseases and disorders. For that, bariatric surgery has been developed over the years to confront the obesity and associated pain. The procedure of surgery involves number of approaches to be performed based on the inputs of case to result similar outcomes that is mainly loss of weight and decrement in the pain of musculoskeletal system for example in addition to other beneficial results. The focus of research is to address the hypothesis of the association between the bariatric surgery and musculoskeletal system through a systematic review for several studies in relevance.

Literature Review

The healthy weight for humans indicate that individual is a result of balancing between the consumed food and the required calories to be burn through different physical activities. In contrast, the loss of weight means that an individual isn't burning calories or it must be decreased to be within healthy range [1]. Therefore, the process of significant loss for weight depends heavily on the musculoskeletal system, which involves bones, muscles, tendons, ligaments, and soft tissues. The system in return enable individual to move and perform different activities that are essential in the loss of weight [2].

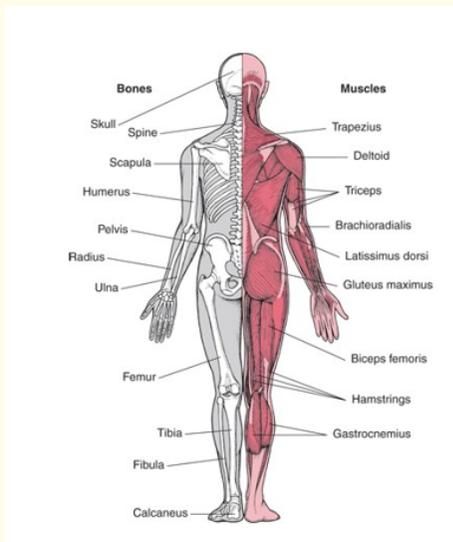


Figure 1: MSK system.

Subsequently, the mid of 1960 has introduced the first effective operation for weight loss to confront the failure of natural ways, which is mainly it is a restrictive and malabsorptive gastrointestinal procedures known as gastric bypass. First operation was through single loop anastomosis then, it has been developed to use the vertical banded gastroplasty but it has been excluded from the options because it was associated to late complications as gastric outlet obstruction and mesh erosion [3]. Moreover, Nguyen and Varela have supported Celio and Pories in their claim of first application for surgery. Therefore, it has mentioned that in 1979 another operation has developed, which had used different type of gastric partitioning and small intestinal reconstruction termed biliopancreatic diversion and modified later to include duodenal switch within surgeries. Then, in the 2001 was the beginning of current bariatric surgeries as the FDA has provided approval for using laparoscopic adjustable gastric banding (LAGB) to be used in the USA. Initially laparoscopic sleeve gastrectomy (LSG) is used in approach divided into two stages as secondly the Roux-en-Y gastric bypass (RYGB) or using biliopancreatic diversion with duodenal switch (BPD/DS). The approach intends to reduce morbidity and mortality in patients who suffer high-risk with extreme obesity [4].

Along with these explanations, surgeries in general require a recovery period to ensure patients return into their normal life in short time and follow up with the results of surgery. Multiple studies have addressed the usage of bariatric surgery in particular in the weight loss cases to observe probable complications, required actions for speed recovery, and desired final results. In Lossi., *et al.* study a bariatric surgery on fifty women from different ages was reported through using particular procedure in relevance, which is RYGB. The duration

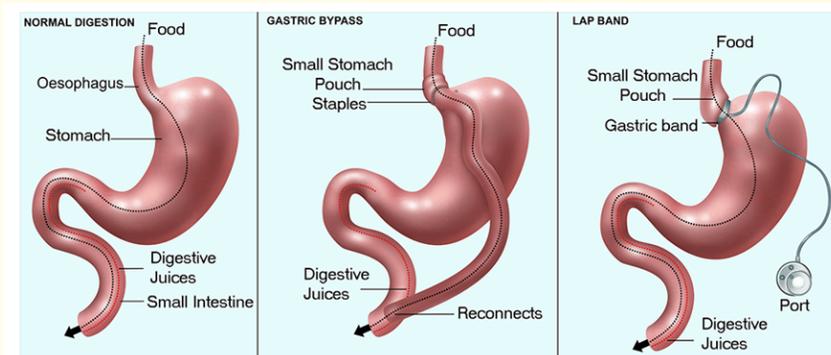


Figure 2: Different approaches for bariatric surgery.

for study was for 12 months and included several measurements as tracking musculoskeletal function changes, recovery time, and short musculoskeletal function assessment. Results were positive as the main objective was achieved as most patients effectively lost weight and improved musculoskeletal function specifically in morbidly obese patients. On the other hand, the study has mentioned that retrieved outcomes impact also as an adjunct to improve global functional outcome and rehabilitation potential in case if patients suffer from musculoskeletal disease or injury [5]. The Elkhani, *et al.* study has supported previous claim as it highlights the obesity as a risk for musculoskeletal disease. It was a systematic review study, which results in significant improvements within musculoskeletal diseases symptoms after performing required bariatric surgeries [6]. Moreover, Hooper, *et al.* study has indicated that patients suffer from musculoskeletal issues because of the obese subject but it decreases due intervention of bariatric surgeries, which also assist in losing weight effectively in almost 48 cases as a baseline and assessment was through year [7].

Holanda, *et al.* have focused on obesity and considered it as chronic disease characterized by excessive accumulation of fat, which causes in return other diseases as diabetes, cardiovascular diseases, kidney diseases, musculoskeletal disorders, and mortality. Sequentially, bariatric surgery has been defined as an effective treatment to confront the severe obesity with various benefits including weight loss, improvement in metabolic, and cardiovascular conditions. But, in contrast, the systematic review study has highlighted the fact that surgical intervention causes musculoskeletal damages in the long term [8]. Another study has supported the appearance of issues in relevance to musculoskeletal was Calenzani, *et al.* that indicates a number of cases have suffered from pain in musculoskeletal system either in ankle, feet, knees, or lower back. In return, it has an impact on the physical activities of patients specifically in obese subjects [9].

Previously, studies have mentioned that bariatric surgery has undeniable results including the positive impact on musculoskeletal system. As Sampalis, *et al.* study observed through comparison of number of cases, which were treated with bariatric surgery that weight has reduced with lower rates to risks of cardiovascular, musculoskeletal conditions, and morbidity [10]. Due to Ryder, *et al.* examination of bariatric surgery has a significant correlation to MSK. The observation of study took two years post surgery to highlight the achievement of the study's main objective. Impact of surgery isn't limited to the improvement of MSK system and reduction in associated pain it involves other benefits as lowering chronic pain, reduction in early mortality, and improve quality of life for patients. Moreover, the study has emphasized on the different physical activities specifically walking during and after surgery to assist in reducing MSK pain. Additionally, it has a direct impact on improving cardiometabolic health beside other factors that has effect on health risks for the long term [11]. Speck, *et al.* have emphasized on the importance of PA to ensure success of obtained surgery and also it plays a critical role in reducing

MSK pain. The study also highlighted on the importance of PA through preoperative and postoperative to ensure the pain is reduced for speed recovery from surgery [12].

Sivas., *et al.* evaluated in the study the PA for patients pre and post surgery and noticed slight improvement in association to the significant impact on MSK system. In contrast, gaining weight and confronting obesity causes MSK disorders as it increases stress on the bone structure. Other benefits were noticed as improvement in quality of sleep, decreasing fatigue and psychological distress, in addition reduction in depression probability and in return causes eating disorder [13]. The study of Natvig has supported the previous study as it observes the impact of bariatric surgery on physical and mental health respectively. During experimental study on 51 patients with different range of age, gender, and other demographic variables some interesting results were addressed. Results have shown that pain in MSK system is associated directly to the physical activities and indirect to mental health. Moreover, weight associated issues have positive correlation toward MSK system as it increases biomechanical load on joints, ligaments, and muscles that in return triggers pain in the whole system. Additionally, the study has mentioned that pain in MSK system has an affect on mental well being because it induces depressive symptoms that leads eventually to low life quality and functionality. Subsequently, it plays critical role in raising other comorbidities that in worst cases lead to mortality. But, the study has mentioned a note that the mentioned symptoms are relevant to patient's health evaluation [14].

On the other hand, Chen., *et al.* has focused on the back pain as a part of MSK system through systematic review, which also indicate that it impacts on enhancing the quality of life and reduction in disability probabilities [15].

Discussion

Relevant studies have related the bariatric surgery to the musculoskeletal system as it aims to reduce the occurrence of associated disorders and pain. The surgery influences on the overall health specifically through the extreme obesity as it consider the main reason for surgery decision.

Physical activity and mental health

Through analysis of relevant study for the topic of interest the impact of bariatric surgery extend the MSK system but also has an affect on both physical and mental health. According to Ugrinic., *et al.* physical activity can be defined as any form of body movement including exercises, training, and competition. On the other hand, mental health may be identified as the state that relates emotional, psychological, and social conditions to be well being [16]. Due several studies the physical activities are essential in postoperative speed recovery for patients as for example walking in return it also assists in reducing the associated pain within MSK system. Along with that there are indirect influence on the mental health as it aims to reduce depression, psychological disorders, fatigue, and eating disorders that usually causes the problem of obesity in the early stages. Obviously, the physical and mental health is an international concern for humans as it presents health society. During post surgery both are highly important to ensure high life quality for individuals and decrease the probability of early mortality case.

The obesity cases

Obesity is recognized as global epidemic and a major concern for WHO in international societies. It is identified as chronic disease that leads to overweight and increases the risk of other serious comorbidities as diabetes, cancer, cardiovascular, stroke, etc. and it worst cases it causes immediate mortality. The previous studies have focused heavily on the extreme obesity as it considered the main cause for bariatric surgery intervention. The weight of individuals mainly depends on the BMI, which is consider as a kind of measure to several health condition as for example status of weight. It ranges from underweight, normal, overweight, obesity, and morbid obesity. Yet, the consideration of research is regarding the obesity and morbid. These two cases indicate the necessity of bariatric surgery as through years it is considered the effective solution to patients who suffer from obesity condition. Moreover, the surgery impact on obesity patients

regardless of the degree and in return has beneficial results as improvements in musculoskeletal function or overcome the injuries and relevant diseases to MSK system. Obviously, there is a positive association as obese causes pain and damages in musculoskeletal as well as using bariatric surgery assists in losing weight sufficiently and improve functionality of MSK.

Relation of bariatric surgery to MSK system

Clearly, the main focus of research is to address the relation between bariatric surgery and musculoskeletal system. Many studies have supported the initiation of hypothesis and the presented benefits within the topic of interest. Through critical analysis for the related studies it appears that bariatric surgery involved mainly three different approaches to perform the surgery and it includes RYGB, LAGB, and normal that is known as gastric bypass. Procedures for these operations are different slightly but the observed results are similar, which assists in losing weight for patients. Yet, most surgeries globally are using RYGB approach to perform the bariatric surgery.

Furthermore, the observed results indicate a significant improvement in recovery speed and time besides enhancing the functionality of MSK system. Not only improving functionality but also lower diseases, injuries, and disorders in relevance to the MSK system. Along to the significant impact on the system it improves the physical health for individuals because the recovery depends on walking, which influenced by the ability of MSK system to function effectively. In return, the whole surgery has extended its benefits to create positive impact on reducing early mortality, improve quality of sleep, reduction in eating disorder, and in general enhance quality of life. Also, it influences on the mental health as it decreases the depression symptoms and appearance of other mental diseases.

On the other hand, some studies have disagreed that bariatric surgeries have only positive impact on MSK system. The disagreement in the beginning has indicated that obesity has a huge influence on the system as it increases the biochemical load on joints, ligaments, and muscles, which in some cases causes related injuries and diseases. Number of cases have suffered from pain in a part of MSK system as ankle, feet, knees, or lower back and mentioned that pain has impact heavily on the PA of individuals. Furthermore, studies have highlighted the fact that surgical intervention could assist in decreasing the weight of patients but associated fats in moderate obesity remains that cause damages on MSK system lasts for a long term. In some cases, BMI remain same for the patient's body that in return impact on the whole MSK system or a part of it.

Although, studies have differ in observing the benefits and disadvantages of impact of bariatric surgery on MSK system but the beneficial results have exceeds the deficiencies and consider the operation an essential intervention to overcome the obesity issue worldwide.

Conclusion

In conclusion, performing bariatric surgery mainly aims to confront the obesity subject through assisting patients to achieve the goal of weight loss. Moreover, the surgery has been performed using different approaches to provide the best results for patients and retrieve desired results. Furthermore, the operational procedure through observation has introduced undeniable results as the significant influence on decreasing the probabilities of diabetes, cardiovascular diseases, kidney diseases, musculoskeletal disorders, and eventually mortality. Mainly, the bariatric surgery has influenced on the MSK system positively through enhancing its functionality and ability to perform different physical activities efficiently. So, through the research, the association between bariatric surgery and musculoskeletal system has been addressed to be positive and present an effective solution for resolving the global issue of obesity.

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Volume 14 Issue 6 June 2023

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