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Original Research Article

Impact of Obesity on the Orthopedic Spine Surgical Procedural Time and Hospital Stay: King Saud University Hospital Experience

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Abstract

Obesity poses one of the most serious public health challenges of the 21st century. The present study aimed to assess the surgery duration, postoperative complications, and length of hospital stay. The present retrospective cross-sectional study was conducted in the Department of Orthopedics and Spine Division, College of Medicine, King Khalid University Hospital, during the period January 2016 to July 2019. This study evaluated the data of patients with spondylolisthesis who underwent transforaminal lumbar interbody fusion (TLIF) at this tertiary hospital. We recruited adult patients with grade II degenerative spondylolisthesis who were admitted electively for transforaminal lumbar interbody fusion (TLIF). There were Sixty-nine patients included, of whom thirty eight were obese. The encountered complications were wound infection and deep venous thrombosis in two and three patients respectively. Seven patients had suboptimal wound healing. None of the patients developed pulmonary embolism or deep infection. Moreover, two patients needed readmission and reoperation with wound irrigation, debridement, and closure. The surgery duration was the only dependent variable that showed a substantial increase in the odds ratio among obese patients. The surgery duration was significantly longer when operating on obese patients. However, obesity was not associated with higher rates of postoperative complications or increased hospital stay.

Keywords: Obesity, Hospital stay, Spondylolisthesis, Transforaminal interbody fusion, Spine Surgery

INTRODUCTION

The majority of the patients who undergo orthopedic spinal surgery are obese (McClendon et al., 2014). Spinal surgery has been established asmajor orthopedics surgical specialty. It plays a significant role in improving the quality of life for many patients suffering from spinal diseases such as scoliosis, spinal stenosis, degenerative disk disease, and many more. Obesity increases the risk for perioperative complications (McClendon et al., 2014; Turki et al., 2015). There is a conflict in the literature regarding the impact of obesity on surgical duration and corresponding hospital stay. Some studies revealed that obesity has no impact on the duration of surgical operation, susceptibility to developing complications, and the length of hospital stay (Turki et al., 2015), while other

studies report the opposite (McClendon et al., 2014).

We have defined obesity according to World Health Organization recommendations. Individuals with a BMI between 25 and 29.9 kg/m^2 are classified as overweight. Those with a BMI between 30-34.9 kg/m^2 are considered class-I obese, 35-39.9 kg/m^2 are class-II obese, and those with BMIs >40 kg/m^2 are considered class-III morbidly obese (Jackson and Devine, 2016). Obesity poses one of the most serious public health challenges of the 21st century. Obesity is a common problem in Saudi society, with a prevalence of 28.7% to 35.5% (Al-Nozha et al., 2005; Memish et al., 2014). Given the change of lifestyle in the Saudi community during the last decade, it is reasonable to assume that the prevalence will increase (Al-Nozha et al., 2005; Memish et al., 2014; Al-Baghli et al., 2008). This study aimed to evaluates the impact of obesity on the development of perioperative complications, the corresponding duration of surgery, and hospital stay length.

MATERIALS ANDMETHODS

Study design and settings

The present retrospective cross-sectional study was conducted in the Department of Orthopedics and Spine Division, College of Medicine, King Khalid University Hospital, during the period January 2016 to July 2019.

Inclusion and exclusion criteria

The inclusion criteria involved all the patients with grade IIdegenerative spondylolisthesis who were admitted electively for TLIF. All BMI >30 Kg/m^2 were considered obese and <30 kg/m^2 non-obese. Patients who underwent spine surgery previously for any other reason and patients with relatively decreased starting hemoglobin levels (<10mg/dl) were excluded from the study.

Subject selection

We thoroughly reviewed the charts of 112 patients, and sixty-seven patients were selected who matched the inclusion and exclusion criteria. They were operated at King Khalid University Hospital, Riyadh, Saudi Arabia, for spondylolisthesis and underwent transforaminal lumbar interbody fusion (TLIF). The differences noted between obese and nonobese patients in terms of surgery duration need a blood transfusion, postoperative complications, and hospital stay length. The data sheet included patients' general characteristics such as age, gender, body mass index [BMI], surgery duration, length of stay, and postoperative complications. We also recorded the distances from lamina to skin silhouette and spinous process to skin silhouette on x-ray and MRI images for more accurate measurements of the subcutaneous fat at the site of surgical entry.

Ethics Statement

Institutional Review Board, College of Medicine, King Saud University approved the study (E-15-1593).

Data Analysis

The IBM SPSS Statistics analyzed the collected data for Windows, Version 21.0. (Armonk, NY: IBM Corp.). Descriptive analysis was performed for all variables. The normality of distribution was tested for all numeric variables using the Shapiro-Wilk test. The non-parametric Mann-Whitney you test was utilized to compare differences in radiological distances between obese and nonobese patients. Before running any logistic regression analyses, data regarding obesity was dichotomized based on a BMI cutoff value of thirty. We performed univariate and multivariate logistic regression to evaluate the impact of obesity, among other risk factors, on surgery duration, postoperative complications, need for blood transfusion, and the total length of stay in the hospital. P-values less than 0.05 were considered significant.

RESULTS

We included sixty-nine patients who fulfilled the inclusion criteria, of whom thirty seven were obese. Figure 1 shows the distribution of patients according to their genders. We had thirty (43.5%) males and thirty-nine (56.5%) females.

Figure 2, shows the Patient distribution according to their obesity grades. There werethrity-eight (55 %) obese patients while thirty-one (45%) were non-obese.

Figure 3, shows the involvement of different age groups. Majorty of our patient were in middle age – elderly group which comprised 75% of the total patients. There were twelve (17%) patients which were >65 years old, twenty-three patients (33%) were 56-65 years old while seventeen patient (25%) were in the age group of 46-55 year age. Remaining 25 % of our patients were relatively younger at presentation.

Table 1 compares radiological measurements between obese and nonobese patients. Figure 4, shows various complications and their occurance. The encountered complications were wound infection and deep venous thrombosis in two (3%) and three (4%), respectively. Seven (10%) patients had delayed wound

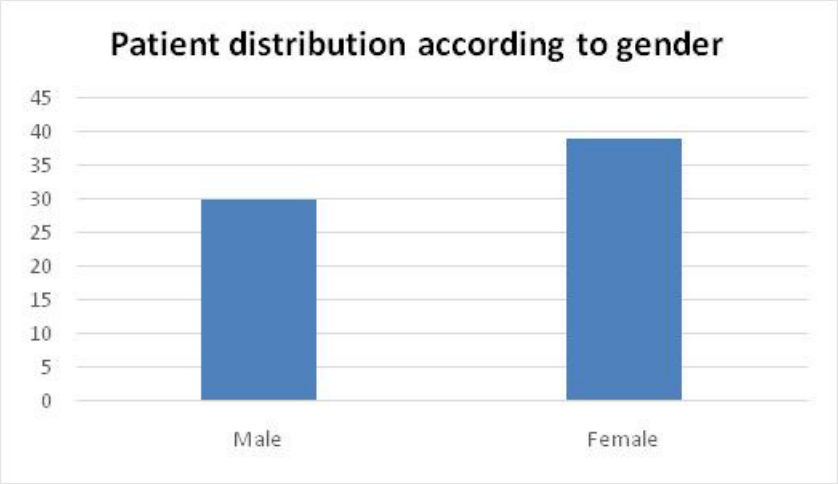

Figure 1. Patient distribution according to gender

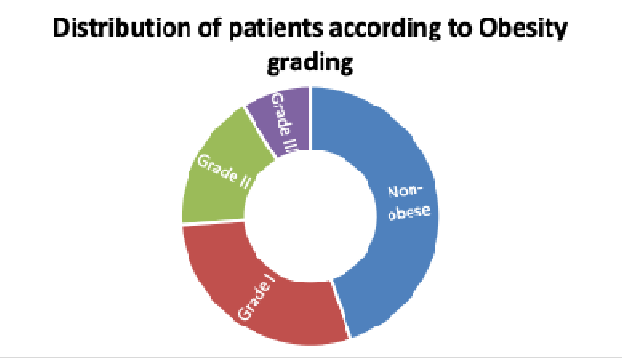

Figure 2. Distribution of patients according to obesity grading

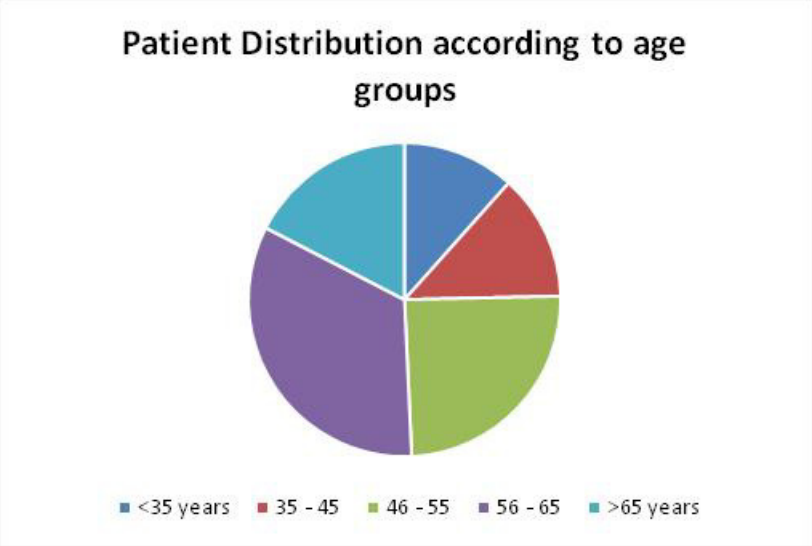

Figure 3. Patient distribution according to age groups

Table 1. Differences in radiological measurements between obese and non-obese patients.

Radiological measurements	Obese		Non-obese		p-value*
	Mean	Median	Mean	Median	
MRI - Skin to spinous process (in cm)	5.12	4.75	2.97	2.75	<.001
MRI - Skin to lamina (in cm)	7.57	7.56	5.07	5.11	<.001
X-Ray - Skin to spinous process (in cm)	5.40	5.00	3.67	3.35	.001
X-Ray - Skin to lamina (in cm)	8.96	8.80	6.64	6.40	<.001

*Obtained through Mann-Whitney U test

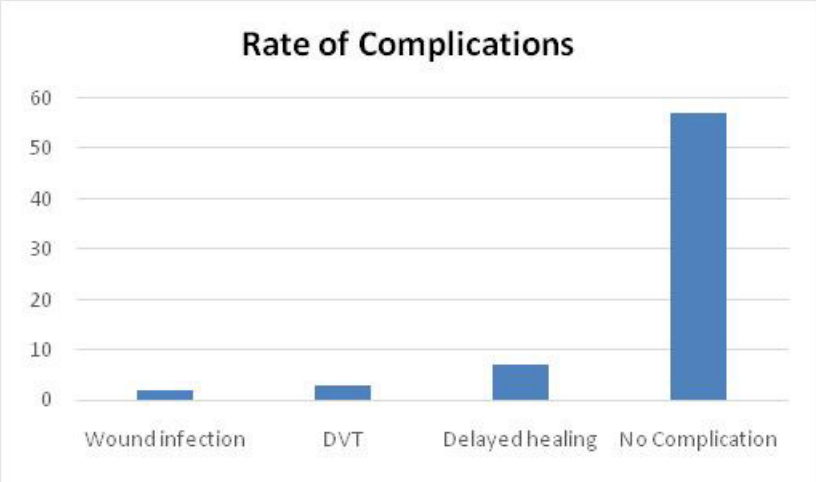

Figure 4. Rate of complications

Table 2. Univariate logistic regression for risk factors of duration of surgical operations.

Risk	Odd ratio	95 % CI	P value
Obesity	3.55	1.27 - 9.92	0.016
Age	0.98	0.94 - 1.02	0.232
Gender	0.86	0.33 - 2.37	0.765

Table 3. Multivariate logistic regression for risk factors of duration of surgical operations.

Risk	Odd ratio	95 % CI	P value
Obesity	1.85	0.57 - 5.94	.303
Age	0.97	0.93 - 1.01	.179
Gender	1.11	0.35 - 3.53	.858

healing. Two of our patients needed readmission and reoperation for wound debridement, irrigation, and closure. None of the patients developed pulmonary embolism or deep infection. There were no significant differences between obese and nonobese patients.

The surgery duration was the only dependent variable that showed a significant increase in the odds ratio among obese patients, as shown in Table 2.

However, the odds ratio increase was not significant (Table 3). The blood transfusion rate was 7.2%, with no significant difference between the obese and nonobese patients.

DISCUSSION

Obesity poses one of the most serious public health challenges and economic burdens. The prevalence of obesity is variable between the countries and the region. This variation shows the importance of environmental

and sociocultural determinants of diet and physical activity. During the last decade, the Saudi community is facing the increasing challenges of overweight and obesity (Al-Nozha et al., 2005; Memish et al., 2014; Al-Baghli et al., 2008). It leads to a burden on the Saudi health care system and economies. The present study findings reveal that surgery duration substantially increased among obese patients.

Andreshak et al. (1997) assessed the perioperative and postoperative outcomes of lumbar spine surgeries in 159 obese and nonobese patients. Their results revealed no significant differences between obese and nonobese patients regarding operative time (3.8 hours versus 3.2 hours), blood loss (723 mL versus 605 mL), and length of hospital stay (5.6 days versus 5.8 days, respectively). In a study conducted from 2003 to 2007 in California, the duration of hospital stays, cost, and complication rates in 84,607 average weight and morbidly obese spinal arthrodesis patients were reviewed. There was a significant difference between the average hospital stay in normal-weight patients (3.5 days) and in morbidly obese patients (4.8 days) who underwent spinal fusion surgery (Kalanithi et al., 2012).

In a 112-patient study by (McClendon et al., 2014) to evaluate the impact of BMI on hospital stay and complications after spinal fusion, obese patients in the study had a more extended hospital stay. A retrospective study by Tomasino et al. (2009) evaluating the effect of minimally invasive spinal surgery in obese and nonobese patients by operative results and patient outcomes involved 115 obese and nonobese patients from 2004 and 2007. They did not observe any significant differences between obese and nonobese patients in operative time and amount of blood loss. Rosen et al. (2008) investigated the relationship between BMI and surgical outcomes after lumbar spine fusion surgery by evaluating the medical records of 110 patients between September 2002 and June 2006. A BMI >30 Kg/m^2 was not associated with increased blood loss, operative time, and hospital stay length. Peng et al. (2009) reviewed 74 patients with anterior retroperitoneal lumbar disc procedures prospectively to assess the perioperative outcomes of anterior retroperitoneal lumbar surgery in obese and nonobese patients. The authors reported no significant difference in the amount of blood loss or length of hospitalization between obese and nonobese patients.

Some studies showed that obesity is significantly associated with high incidence rates of postoperative DVT, surgical site infections, and surgical revisions (Fineberg et al., 2013; Jiang et al., 2014; Soroceanu et al., 2015; Higgins et al., 2016; Patel et al., 2007), while others suggest no significant association (Yoo et al., 2014; Buerba et al., 2014). Our results demonstrate that obesity is not significantly associated with high incidence rates of postoperative DVT, surgical site infections, and surgical reoperations. Increased thickness of the subcutaneous tissue and skin to lamina distance, noticed among obese patients, were not associated with an increased risk of infection. On the contrary, Mehta et al., (2012) reported significant risk factors for developing surgical site infection.

Limitations of the study

In the short comings of the study we want to include that as all the surgeries were performed by the same surgeon therefore it can not represent majority, a multicenter studty may prove to be better representative of the results.

CONCLUSION

The duration of surgery was significantly longer when operating on obese patients.However, obesity is not associated with higher rates of postoperative complications or increased hospital stay.

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Conflict of Interest Disclosure

I certify that there is no actual or potential conflict of interest concerning this article.

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