

THE ROLE OF FLUOROSCOPIC PROCEDURES IN THE DETECTION OF EARLY COMPLICATIONS POST SLEEVE GASTRECTOMY

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Abstract:

Background: The prevalence of obesity is increasing worldwide, including in some developing countries with previously very low prevalences (WHO, 1998). The result of chronic positive energy balance, obesity is associated with many chronic diseases, such as diabetes, heart disease, hypertension and some forms of cancer (WHO, 1998). The sleeve gastrectomy operation is a very effective procedure to help overweight patients achieve a substantial and long term weight loss. It works by restricting the portion sizes and the types of food that the patient can eat. Diagnosing of post sleeve gastrectomy early complications is done using fluoroscopy to identify normal radiographic findings and possible complication after sleeve surgeries by using fluoroscopy.

Methodology: This study is Prospective hospital-based Study using data from a private obesity center, with an aim of diagnosing the postoperative complications after sleeve gastrectomy using fluoroscopy on patients whose ages between (18-55) years old during the period from January to December 2023. Data was collected by check list from using Picture Archive and Communication System (PACS), based on patient's records and data collection sheet. This study depends on the practical scanning using fluoroscopic unit for detection of upper gastrointestinal series (UGS).

Results: The result of complications frequency for post sleeve gastrectomy showed that (61) patients approximately (70%) were without complications while (26) patients has had complications Out of 87 patients, who underwent UGS. **Conclusion:** Patients underwent sleeve gastrectomy should undergo thorough preoperative nutrition assessment and instruction conducted by a registered dietitian.

Keywords: sleeve gastrectomy, postoperative complications, fluoroscopic detection, upper gastrointestinal series (UGS).

INTRODUCTION:

Obesity is defined by the World Health Organization (WHO, 1998) as “a condition of abnormal or excessive fat accumulation in adipose tissue, to the extent that health may be impaired” Chronic positive energy balance normally precipitates the accumulation of excess adipose tissue. This positive energy balance is believed to be influenced by a number of environmental and physiological factors, such as high-fat diets and/ or decreased physical activity. How these factors are manifested in developing countries is central to the recent increase of obesity in countries undergoing an economic transition. As the economies of developing countries continue to improve, the risk of becoming obese increases across all socioeconomic classes as a result of improved access to food, decreased physical activity, and the consumption of “western” diets.

These factors create an environment that may predispose people to becoming overweight or obese. In particular, it has been found that although urbanization and related dietary changes improve health to a certain extent, they place a city-dweller at risk of certain health problems, including obesity. The question has also been raised as to what extent under nutrition early in life may predispose a person to becoming obese^(1,2). Dietary changes associated with urbanization are related to the fact that rural dwellers tend to be more self-reliant in obtaining food and also tend to eat traditional diets that are high in grains, fruit and vegetables, and low in fat. Once they arrive in urban areas, these same people tend to rely more on external forces for sustenance, resulting in a shift from production of their own food to the purchase of processed foods.⁽³⁾ Together with these changes it has been reported that groups moving from rural to urban areas experience an increased intake of energy, sugar, refined grains and fat⁽⁴⁾. This dietary profile, referred to as a “western” diet, has been reported to be associated with diabetes, heart disease and excessive caloric intake and obesity^(1,2, and 5).

People living in lower socio-economic situations who have recently moved to large cities tend to find work primarily as day labourers or factory workers. They leave behind continuous, physical labour and adopt sedentary, sporadic work⁽⁵⁾. While some people are able to carry out work that may actually increase their daily physical activity, this is generally not the case. A low level of physical activity has been indirectly associated with weight gain and obesity in several developed countries. It is thought that physical activity, the one controllable component of total energy expenditure, accounts for 15-30 percent of daily energy expenditure. Thus, a person experiencing a change in labour practices may see a decline of as much as 1000 calories per day, which translates into more than a 50 percent reduction in physical activity. This decline in total energy expenditure, if not accompanied by a reduction in energy intake, may result in weight gain and potential obesity. There are many methods to lose weight such as diet, exercising and bariatric surgeries including sleeve gastrectomy.

The stomach is the most dilated part of the digestive tube, having a capacity of 1000–1500 ml in the adult. It is situated between the end of the esophagus and the duodenum – the beginning of the small intestine. It lies in the epigastric, umbilical, and left hypochondrial regions of the abdomen, and occupies a recess bounded by the upper abdominal viscera, the anterior abdominal wall and the diaphragm. It has two openings and is described as having two borders, although in reality the external surface is continuous. The relationship of the stomach to the surrounding viscera is altered by the amount of the stomach contents, the stage that the digestive process has reached, the degree of development of the gastric musculature, and the condition of the adjacent intestines. However, borders are assigned by the attachment of the peritoneum via the greater and lesser omentum, thus

dividing the stomach into an anterior and posterior surface⁽⁶⁾. Obesity is a complex, multifactorial disease that develops from the interaction between genotype and the environment. However, it involves the integration of social, behavioral, cultural, physiological, metabolic, and genetic factors⁽⁷⁾.

These conditions substantially increase the risk of morbidity from hypertension, dyslipidemia, type 2 diabetes, coronary artery disease, stroke, gallbladder disease, osteoarthritis, sleep apnea and respiratory problems, as well as cancers of the endometrium, breast, prostate and colon^(11,12). Higher body weights are also associated with an increase in mortality from all causes^(13,14).

A side from the medical complications, obesity is also linked to psychosocial problems such as low self-esteem, discrimination, difficulty finding employment, and reduced quality of life^(15,16).

Obesity is diagnosed when body mass index (BMI) is 30 or higher. The body mass index is calculated by dividing weight in kilograms (kg) by height in meters (m) squared.

If BMI score is less than 18.5, it is within the underweight range, If BMI score is 18.5 to <25, it is within the normal, If BMI score is 25.0 to <30, it is within the overweight range, If BMI is score 30.0 or higher, it is within the obese range.

Obesity is usually subdivided into some classes, i.e.: Class 1: BMI score of 30 to < 35, Class 2: BMI score of 35 to < 40, Class 3: BMI score of 40 or higher. Class 3 obesity is sometimes categorized as severe, or morbidly obese^(17,18).

Sleeve gastrectomy operation Weight-loss surgery

The sleeve gastrectomy operation is a very effective procedure to help overweight patients achieve a substantial and long term weight loss. It works by restricting your portion sizes and the types of food that the patient can eat. The sleeve gastrectomy can sometimes be used as a two staged process. This could be the case if the anaesthetic risk of surgery is too great to begin with, and further weight loss is required. Some patients will go onto have further weight loss surgery such as a gastric bypass. In order to understand the operation, it may help to have some knowledge of the digestive system⁽⁶⁾.

The sleeve gastrectomy reduces the stomach by approximately 75% into a banana shape. It is done by stapling down the stomach and removing the remainder of the stomach. The new stomach will hold up to 200ml of fluid at any one time.

This means that the amount of food you will be able to eat will be much smaller and you will feel full quicker. The smaller stomach still works in the same way⁽⁷⁾.

To maximize the weight loss it is important that the patient make life long dietary and lifestyle changes. There is no point considering this procedure unless you are fully committed to following the dietary and lifestyle advice provided. Gastric sleeve surgery, also known as the sleeve gastrectomy, has become a popular choice for patients seeking excellent weight loss in a straightforward procedure that doesn't require the maintenance and long-term complication rates⁽⁸⁾. The risk of postoperative bleeding has been reported to be between 1% and 6% after Sleeve Gastrectomy^(9,10). The source of bleeding can be intra- or extraluminal. Intraluminal bleeding from the staple line usually presents with an upper gastrointestinal bleed. Common symptoms include hematemesis or melena stools. Gastric leak is one of the most serious and dreaded complications

of Sleeve Gastrectomy. It occurs in up to 5% of patients following LSG several classifications exist based on the radiologic findings and time of diagnosis ^(19,20 and 21). Intra-abdominal abscess is another possible complication after LSG. It usually presents with symptoms of abdominal pain, fever/chills or nausea and vomiting. Formation of stricture is another potential complication occurring after SG. Although kinking of the stomach following SG has been reported, the most common site of stenosis is at the incisura angularis ^(22,23). Nutritional deficiencies frequently occur following bariatric surgery. The causes are multifaceted, primarily due to reduced absorption and diminished oral intake. Studies have indicated that the prevalence rates of deficiencies in vitamin B12, vitamin D, folate, iron, and zinc are 3%, 23%, 3%, 3%, and 14%, respectively, after sleeve gastrectomy ⁽²⁴⁾.

Gastroesophageal reflux disease (GERD) is frequently observed among individuals who have undergone bariatric surgery. It is recognized that laparoscopic sleeve gastrectomy (LSG) is associated with a decreased occurrence of reflux following the procedure. ⁽²⁵⁾

METHODOLOGY:

2.1 Study Participants:

This study is Prospective hospital-based Study using data from private obesity center, with an aim of diagnosing the postoperative complications after sleeve gastrectomy using fluoroscopy on 87 patients who are between the ages of (18-55) years old during the period from January to December 2023. The study was carried out in the private center on Patients presenting with marked obesity not responding to medical treatment or diet and underwent sleeve gastrectomy. The effectiveness of the Gastrografin swallow examination is primarily dependent on the preparation of the patient. It is recommended that patients maintain NPO (nothing by mouth) status prior to the procedure. Patients require medication on the morning of the examination, they are advised to seek guidance from their physician in advance. Additionally, patients are requested to refrain from smoking on the morning of the test, as this may compromise the precision of the results. The gastrografin swallow examination is performed the day after sleeve gastrectomy to identify any potential leaks, blockage or other post operative complication.

Before the examination, the technologist inquires about various factors, including the patient's allergies and any medications they may be taking

At the commencement of the examination, the patient instructed to ingest 75 ml of gastrografin. The radiologist utilize a fluoroscopy unit, which is an X-ray machine, to observe the esophagus and stomach. The patient positioned facing the tube, and a control X-ray will be performed. Subsequently, the patient asked to fill their mouth with gastrografin. Following this, the patient will swallow, and fluoroscopy will be activated at a rate of 2-3 frames per second to monitor the passage of gastrografin from the mid-esophagus to the stomach. A series of cine images captured until the contrast material reaches the duodenum in the anteroposterior position.

Method of collecting data:

Data was collected by check list from private obesity center using Picture Archive and Communication System (PACS), based on patient's records and data collection sheet. This study depends on the practical scanning. Concern was taken verbally from patients and the private obesity center to perform the study.

4- Results:

Out of eighty-seven patients, aged between (18-55) years old who underwent SG in a private obesity center during the year 2023 were eligible for this study. Diagnosed formerly known as post sleeve gastrectomy using fluoroscopy and diagnosed by demographic characteristics (clinical history, age, gender, BMI and complications). Through practical survey and data collection sheet of patient's records showed the results which are presented as the following:

- Age distribution data.
- Gender distribution.
- The Frequency of diabetes.
- The results of post sleeve gastrectomy complications.
- BMI distribution.
- BMI classes versus gender.
- BMI classes versus age.

Age distribution data:

The result for age distribution showed that the age group between (21-30) years old had the biggest distribution with percentage of (40%).

Table(1): The age distribution for study sample:

Age	Frequency	Percentage
10-20Y	9	10.3%
21-30Y	35	40.2%
31-40Y	28	32.2%
41-50Y	12	13.8%
51-60Y	3	3.5%
Total	87	100%

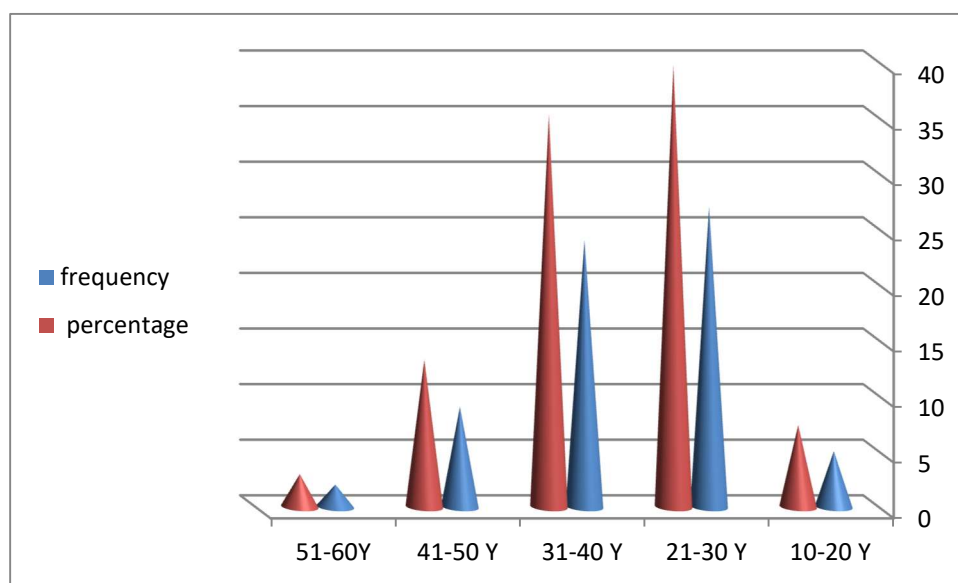


Fig (1): The age distribution for study sample.

Gander distribution:

The result of gender distribution showed that male patients were (55) more than female patients (32).

Table (2): The gender distribution for study sample:

Gender	Frequency	Percentage
Male	55	63%
Female	32	37%
Total	87	100%

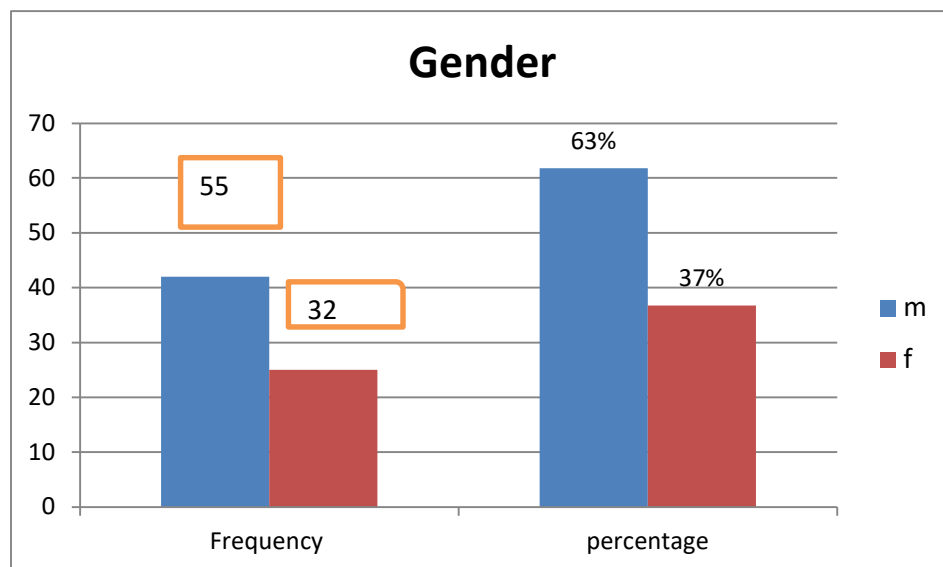


Fig (2): The distribution of male and female for sample.

The Frequency of diabetes:

The results for diabetes mellitus Frequency shows that diabetic patients were (25).

Table(4-3): The Frequency of diabetes mellitus:

Diabetes	Frequency	Percentage
Yes	25	28%
No	62	72%
Total	67	100%

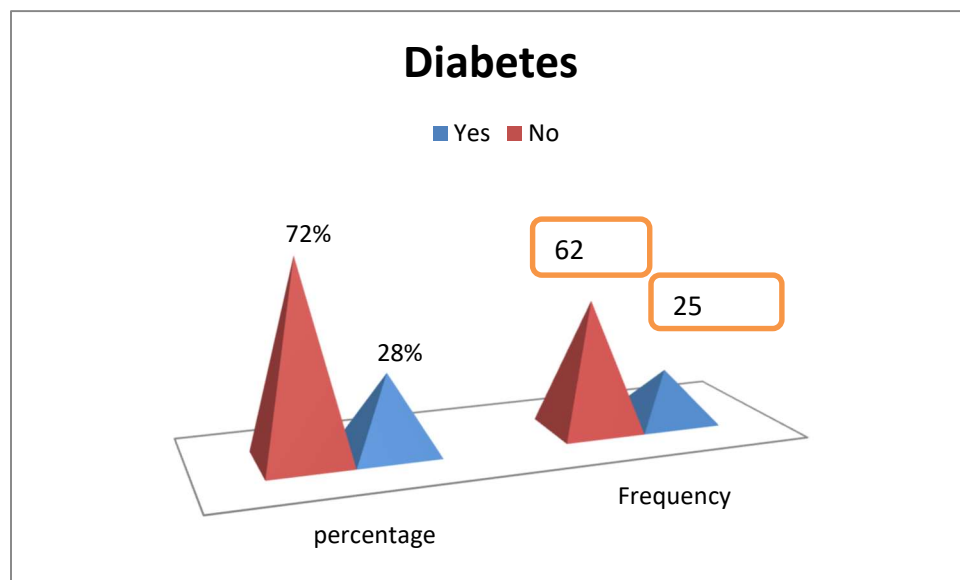


Fig (3): The Frequency of diabetes mellitus.

The results of post sleeve gastrectomy complications:

The result for post sleeve gastrectomy complications frequency showed that (66) patients were without complications while focal narrowing, out pouching, thrombosis, arterial bleeding and large fundus were complications of post sleeve gastrectomy.

Table (4): The frequency of complication post sleeve gastrectomy:

Finding	Frequency	Percentage
No complications	66	75.9%
Reflux	9	10.4%
Leak	5	5.8%
Focal narrowing	2	2.3%
Out pouching	1	1.1%
Thrombosis	1	1.1%
Arterial bleeding	1	1.1%
Fundus is large	2	2.3%
Total	87	100%

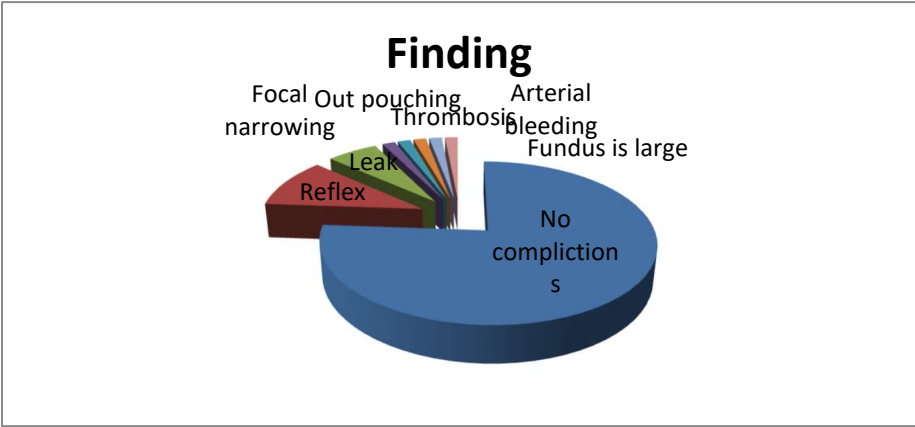


Fig (4): The frequency of post sleeve gastrectomy complications.

BMI distribution:

The result for BMI distribution showed that, the BMI more than (40)(class iii) had the biggest frequency with percentage of (85%).

Table (5) The BMI classes for study sample:

BMI classes	Frequency	Percentage
30-35	13	15%
35-40	13	15 %
<40	61	70%
Total	87	100%

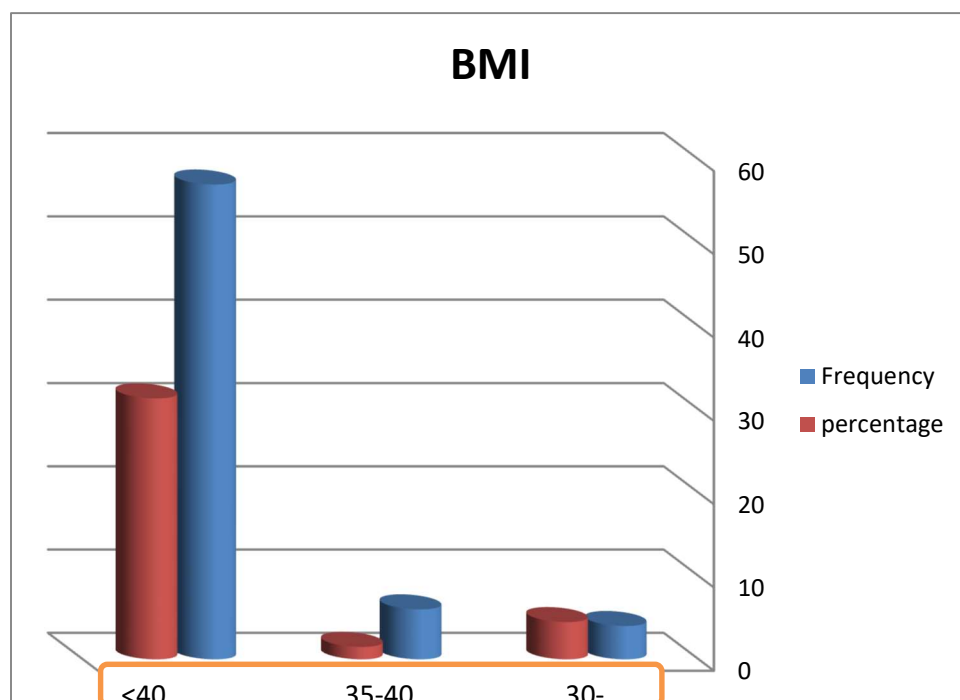


Fig (5): The BMI classes for study sample.

BMI classes versus gender:

The result of BMI classes versus gender showed that the BMI class 3 achieved more in male patients (54%) than female patients (31%).

Table(4-6): The frequency of BMI classes versus gender:

BMI	Frequency	male	percentage	Female	Percentage
30-35	13	3	5.5%	10	31.3%
35-40	13	6	10.9%	7	21.8%
<40	61	46	83.6%	15	46.9%
Total	87	55	100%	32	100%

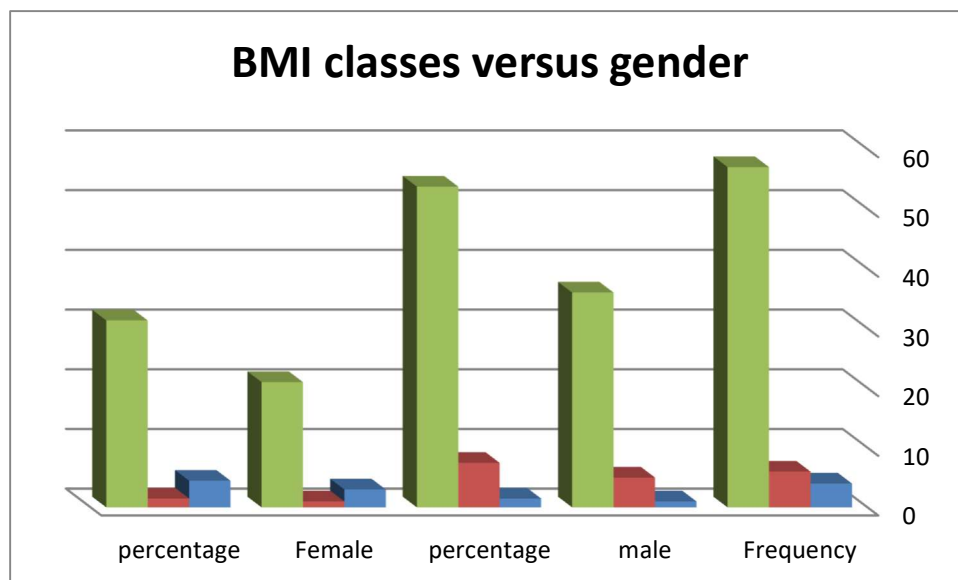


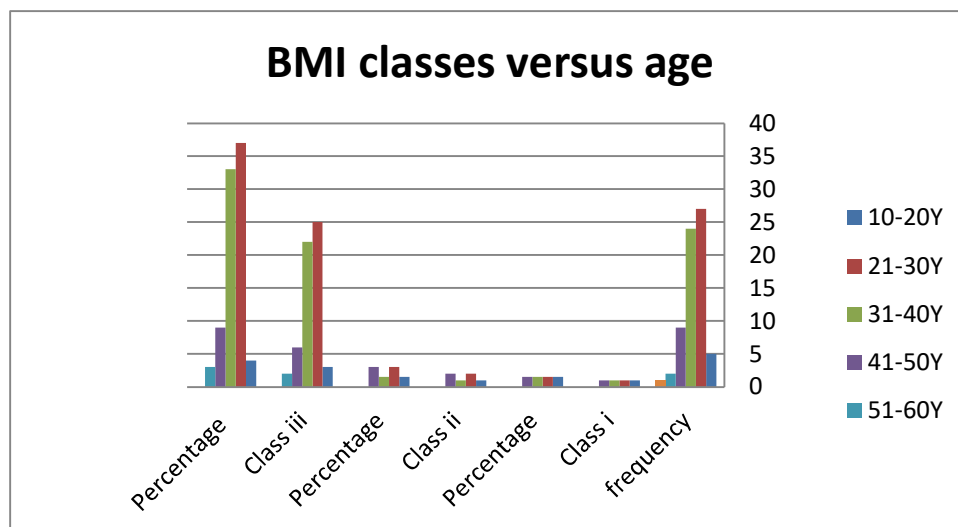
Fig (6): The frequency of BMI classes versus gender.

BMI classes versus age:

The result of BMI classes versus age showed that the age group between (21-30) in class 3 had the biggest frequency with percentage of (37%).

Table (7): The frequency of BMI classes versus age:

Age group	frequency	Class i	Percentage	Class ii	Percentage	Class iii	Percentage
10-20Y	6	1	1.5%	2	3%	3	4.5%
21-30Y	35	1	1.5%	2	3%	32	43.3%
31-40Y	28	0	0	1	1.5%	27	36.5%
41-50Y	12	1	1.5%	2	3%	9	13.5%
51-60Y	3	1	1.5%	2	3%	3	4.5%
Total	87	4	4.5%	9	13.5%	74	85%



Fig(4-7): The frequency of BMI classes versus age.

Discussion:

From data collection and data analysis the researcher found that out of 87 patients who underwent sleeve gastrectomy (55) patients (63%) of them were male and (32) were female with percentage of (37%), their ages were between (18-55). the researcher observed that the patients aged from (10-20) were 9 patients (10.5%), the patients aged from (21-30) were 35 patients (40.5%), the patients aged from (31-40) were 28 patients (32.2%), the patients aged from (41-50) were 12 patients (13.8%), the patients aged from (51-60) were 3 patients (3.5%). The age distribution showed that the age group between (21-30) had the biggest distribution with percentage of approximately (40%).

In this study I found that nineteen patients (28%) had diabetes mellietus which was the almost type 2. In a study done by Sheetal Malhotra in 2014, 76 percent of surgery patients were able to reduce their use of diabetes medications, compared with only 26 percent of patients in the nonsurgical group. It doesn't agree with our study that (76%) of patients were able to reduce their use of diabetes medications ⁽²⁶⁾.

The complications of post sleeve gastrectomy frequency were as follow (66) patients with (75.9%) were without complications while patients with Reflux were (9) patients with (10.4%), patients with leak were (5) patients with (5.5%) and (1) patient with (1.1%) for each one of the following complications: focal narrowing, out pouching, thrombosis, arterial bleeding and large fundus. A study done by nahid hamouigary in 2006 on 118 patients, showed that 18 patients (15.3%) had postoperative complications. It agrees with this study that most patients didn't have any complications ⁽²⁶⁾.

The BMI classes of sleeve gastrectomy were distributed as the following: (13) patients (15%) with class I (30-35) and class ii (35-40) while the remainder (61) patients with percentage of (70%). In the same study done by nahid hamouigary, the BMI was high with 73% of patients having a BMI>50. It agrees with our study that most of the patients had a BMI>50 ⁽²⁶⁾.

Finally, the research compare between BMI classes versus gender, and found that the class I (30-35) were 13 patients (3 male , 10 female (5.5%), (31.3%) respectively). Class ii (35-40) were

also 13 patients (6 male, 7female (10.9%), (21.8%) respectively). Last class greater than (40)MBI were 61 patients (46 male, 15 female (83.6%), (46.9%) respectively). High incidence of patients was observed in the BMI class iii which achieved in male more than female .

The researcher also compared between BMI classes versus age, and found that the age group between (10-20) were 6 patients (1 class ii, 2 class and 3 in class iii 1.5% .3% and 4.5% respectively), the age group between (21-30) were 35 patients (1 class i, 2 class ii, 32 class iii 1.5%, 3% and 43.3% respectively), the age group between (31-40) were 28 patients (1 class ii, 27 class iii 1.5%, and 36.5% respectively), the age group between (41-50) were 12 patients (1 class i, 2 class ii, 9 class iii 1.5%, 3% and 13.5% respectively), the age group between (51-60) were class iii with 3 patients (4,5%). High incidence of patients was observed in the age group between (21-30) in class iii had the greater frequency with percentage of (43.3%).

Conclusion:

Out of 87 patients, aged between (18-55) who underwent LSG, were eligible for this study. Diagnosed formerly known as post sleeve gastrectomy using fluoroscopy and diagnosed by demographic characteristics.

- Age distribution data:

The result for age distribution showed that the age group between (21-30) had the biggest distribution with percentage of (40%).

- Gender distribution:

The result of gender distribution showed that male patients were (55) more than female patients (32).

- Frequency of diabetes:

The results for diabetes Frequency showed that patients with diabetes were (25) patients.

- The results for post sleeve gastrectomy complications:

Post sleeve gastrectomy complications frequency showed that (66) were without complications while focal narrowing, out pouching, thrombosis, arterial bleeding and large fundus were complications of post sleeve gastrectomy.

- BMI distribution

BMI classes for study sample:

-The frequency BMI classes versus gender:

The BMI class 3 achieved in male (83.6%) more than female (46.9%).

-The frequency of BMI classes versus age:

The age group between (21-30) in class 3 had the biggest frequency with percentage of (43.3%).

Recommendations for Sleeve Gastrectomy

Similar to any weight loss operation, patients undergoing sleeve gastrectomy should undergo a thorough preoperative nutrition assessment and instruction conducted by a registered dietitian. Surgical candidates should be assessed for the following:

1. Understanding of basic nutrition and food principles. Patient should have a general understanding of food and nutrition. For example, knowledge of which foods are sources of protein, fat, and carbohydrate; understanding how baking, boiling, frying, pureeing, etc., affect food value and consistency.

2. Ability to make dietary changes. Patients who have made changes to their eating in the past by following some type of dietary program are likely to be better prepared to make the necessary changes for surgery. Patients who have never followed any eating guidelines which made them think about what they are putting in their mouths, or who have never kept and written records of their intakes, will likely benefit from additional preoperative nutrition visits to begin practicing certain behaviors and to learn how to become more mindful of their eating.

3. Anticipated compliance with postoperative regime. Patients should verbalize motivation “do what it takes” to lose weight and demonstrate a willingness to comply with the guidelines set by the surgical program professionals.

Additionally, patients should be taught the post-operative regime and be encouraged to follow up regularly to ensure that they are on track to forming habits that will be appropriate for maintaining a healthy weight lifelong.

The researcher recommend that patients begin to make certain changes in their eating patterns before undergoing surgery. The best examples of this are:

1. Eating slowly and chewing thoroughly.
2. Learning how to eat and drink separately.
3. Taking vitamins daily.
4. Eating 3 meals daily.
5. Keeping a food journal to increase mindfulness of their eating.

Beginning to make these changes prior to their operation will minimize the sometimes overwhelming thoughts that occur to patients immediately post-op, it will also allow patients to embark on surgery more confident in knowing how they will conduct their eating, both soon after surgery and for the rest of their lives. The mind-body connection: a confident, well-instructed patient preoperatively turns into a compliant, successful post-op patient with a better chance of obtaining a favorable surgical outcome.

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