

OBESITY:A REVIEW

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Summary

Obesity is the new age disorder. Leads to Various allied dysfunctions may lead to death. It's increasing and increasing, more over its ratio increasing Day by Day, in adults, children worldwide. In upcoming years it will contribute to immature death than any other cause. Obesity is an independent risk factor for various diseases. In This article will discuss the causes, problems, and solution to obesity.

Keywords: obesity, causes, physical activity, problems, cures.

Introduction

Obesity has made impact globally as epidemic disorder in both developed and developing countries over the last few years which are because of its rapidly increasing prevalence and association with a wide range of diseases increased attention by physicians and other health care professionals. In modern days obesity is based on Body Mass Index. Body Mass Index (BMI) is a simple mathematical calculation used to determine whether a patient is overweight or not. An obey person has accumulated so much body fat that it might have a negative effect on their health. If a person's bodyweight is at least 20% higher than it should be considered obese. If Body Mass Index (BMI) is between 25 and 29.9 it is considered overweight. If BMI is 30 or over then it is as considered obese¹.

Obesity and over-weight are caused by a chronic imbalance between energy intake and energy expenditure. High intake of dietary fat also causes obesity. Poor exercise and sedentary lifestyle are the main causes for obesity. Obesity has several adverse health effects and can even lead to premature death². Obesity is associated with many health problems including high blood pressure, high blood cholesterol, heart disease, diabetes, gall bladder stone and certain types of cancer and more. To reduce weight there are several methods including, change in life style, change food composition and its quantity³. Other includes medication such as, Catecholamine. Or in morbidly obeys cases Weight Loss Surgery can be done. Obesity is associated with many health problems including coronary heart disease, diabetes, kidney failure, osteoarthritis, back pain and psychological damage. The strong association between obesity and cancer has only recently come to light⁴.

BMI (BODY MASS INDEX)

In today's fast-paced world, hectic schedules have resulted in people missing their meals and depending upon a diet of junk food. Combine this with reduce physical activity and severe lack of exercise lead to prevalent of 'obeys-era'. So, it is very important to maintain Body Mass Index (BMI) in a normal range and take immediate steps to recover the normal phase². Body Mass Index (BMI) is ratio of weight to height. It is basically calculated to determine whether you are underweight, healthy, overweight or obese. The BMI¹⁸ is a statistical measurement derived from height and weight. Although it is considered to be a useful way to estimate healthy body weight, but it does not measure the fat percentage in body⁵. The BMI measurement can sometimes be misleading –For ex. a muscleman may have equal or high than that of fatty. However, in general, the BMI measurement can be a useful indicator for the 'average person'³.

BASIC FORMULAE¹⁸

$$\text{BMI} = \frac{\text{Weight in Pounds}}{(\text{Height in Inches})^2} \times 703$$

$$\text{BMI} = \frac{\text{Weight in Kilograms}}{(\text{Height in Meters})^2}$$

After Calculating Your BMI

After you have calculated your BMI, judge it against the following parameters:

- A BMI of less than 18 indicate- under nutrition and underweight.
- A BMI of less than 18.5 indicate- thin for height.
- A BMI between 18.6 and 24.9 indicate- a healthy weight.
- A BMI between 25 and 29.9 indicate- overweight phase.
- A BMI of 30 or greater indicates obesity. In such a case, it is advisable to consult a doctor right away and follow a strict diet plan.

HEALTH DANGERS OF OBESITY

Obesity is definitely spreading all over world, and much research has gone into the health dangers involving obesity. Obesity substantially increase the risk of morbidity from hypertension, dyslipidemia, type 2 diabetes, coronary artery disease, stroke, gallbladder disease, osteoarthritis, and sleep apnea and respiratory problems, as well as cancers of the endometrium, breast, prostate, and colon.² Higher body weights are also associated with an increase in

mortality from all causes. Obese individuals may also suffer from social stigmatization and discrimination.³

To Have a quick look of obesity on this major problem they can be listed as t from this there is many more risk associated with obesity such as,

- **High blood Pressure³**

High blood pressure is twice as common in obese adults

- **Type 2 Diabetes^{2,6,18}**

More than 80% of people with Type 2 Diabetes are overweight.

- **Heart Disease and Stroke^{6,7}**

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People who are overweight are more likely to suffer from high blood pressure, high levels of triglycerides (blood fats) and LDL cholesterol (a fat-like substance often called the "bad cholesterol"), and low levels of HDL cholesterol (the "good cholesterol").

- **Cancer**

Being overweight may increase the risk of developing several types of cancer, including cancers of the colon, esophagus, and kidney. Women who gain more than 20 pounds between the age of 18 and midlife have double the risk of developing breast cancer after menopause.^{8,9}

- **Sleep Apnea**

Sleep apnea is a condition in which a person stops breathing for short periods during the night. The risk for sleep apnea is higher for people who are overweight. A person who is overweight may have more fat stored around his or her neck.¹⁰This may make the airway smaller. A smaller airway can make breathing difficult, loud (snoring), or stop altogether.¹¹

- **Osteoarthritis**

Osteoarthritis is a common joint disorder. Extra weight may place extra pressure on joints and cartilage, causing them to wear away. Further risk of arthritis increases by 9-13% for every 2 pounds of weight gain¹².

- **Liver Disease**

People who have diabetes or "pre-diabetes" (when blood sugar levels are higher than normal but not yet in the diabetic range) are more likely to have fatty liver disease than people without these conditions. And people who are overweight are more likely to have diabetes.¹³

This can be listed as:

1. High blood pressure, which may then also lead to:

- i. Headaches
- ii. Ear noise & buzzing
- iii. Tiredness
- iv. Shortness of breath
- v. Excessive sweating
- vi. Confusion
- vii. Vision changes
- viii. Nose bleeds
- ix. Blood in urine
- x. Kidney damage / failure
- xi. Strokes

2. Elevated serum cholesterol levels
3. Elevated LDL ("bad" cholesterol) levels
4. Decreased HDL ("good" cholesterol) levels
5. Elevated triglyceride levels
6. Elevated blood glucose
7. Decreased blood oxygen
8. Decreased testosterone levels
9. Heart disease and Strokes,
 - i. Heart attack
 - ii. Congestive heart failure
 - iii. Sudden cardiac death
 - iv. Angina
 - v. Arrhythmia
 - vi. Chest pain
 - vii. Brain hemorrhage
 - viii. Paralysis
10. Cancers including (but not limited to):
 - i. Endometrial cancer
 - ii. Colon cancer
 - iii. Gall bladder cancer
 - iv. Prostate cancer
 - v. Kidney cancer
 - vi. Esophageal cancer
 - vii. Uterine cancer
 - viii. Breast cancer
 - ix. Ovarian cancer
 - x. Pancreatic cancer
11. Asthma
12. Snoring
13. Obstructive sleep apnea
14. Osteoarthritis
15. Cataracts
16. Erectile dysfunction
17. Impotence
18. Infertility
19. Loss of libido
20. Irregular menstrual cycles
21. Gestational diabetes
22. Type Two Diabetes, potentially resulting in:
 - i. Slow healing of cuts & wounds
 - ii. Abnormally frequent urination
 - iii. Increased thirst
 - iv. Nerve damage
 - v. Blurred vision
 - vi. Heart Disease
 - vii. Kidney Disease
 - viii. Stroke

- ix. Blindness
- x. Erectile dysfunction
- xi. Amputations
- 23. Pregnancy and birth complications
- 24. Increased need for Caesarean sections
- 25. Birth defects for the infant such as:
 - i. Spina Bifida
 - ii. Low blood sugar
 - iii. Brain damage
 - iv. Seizures
 - v. Neural tube defects
 - vi. Omphalocele
 - vii. Heart defects
- 26. Depression
- 27. Gall bladder disease²⁵
 - i. Gall stones
 - ii. Abdominal pain
 - iii. Back pain
- 28. Incontinence
- 29. Increased surgical risks
- 30. Tinnitus
- 31. Fatty liver disease
 - i. Cirrhosis of the liver
 - ii. Severe liver damage / failure
- 32. Insulin resistance syndrome¹⁹
- 33. Reduced immune function
- 34. Swollen joints / fluid retention
 - i. Muscular aches and pains,
 - ii. Neck
 - iii. Shoulders
 - iv. Chest
- 35. Biomechanical injuries & faults, including:
 - i. Sunken arches / flat foot
 - ii. Heel spurs
 - iii. Plantar fasciitis
 - iv. Shin soreness
 - v. Creaking knees
 - vi. Achilles tendonitis
 - vii. Calcific tendonopathy
 - viii. Sprained ankles
 - ix. Bone chips
- 36. Gout
- 37. Social and career ostracism & discrimination which may result in loneliness, poverty, sexual frustration
- 38. Periodontal disease
- 39. Restless Legs Syndrome

CAUSE FOR OBESITY

- Obesity and over-weight are caused by a chronic imbalance between energy intake and energy expenditure.¹⁴
- High intake of dietary fat also causes obesity.
- Poor exercise and sedentary lifestyle are the main causes for obesity.
- Complex behavior and psychological factors also cause over-eating and thus lead to obesity.
- Metabolic errors in energy utilization may favor fat accumulation.^{15, 6}
- Obesity in childhood and adolescence can lead to adult obesity.
- Genetic factors¹².
- Age progression.
- Imbalanced function various gland(Adrenopause).⁶
- Smoking, alcoholism.^{16,17}

CONTROL OVER OBESITY

It always said that, 'Prevention is better than cure'. You must take precautions rather following treatment after increase in weight. Once you are obese it is difficult to treat yourself. Overweight and obesity are serious medical problems that affected most of adult population¹⁸. Both conditions require appropriate and effective management by suitably trained members of a multidisciplinary team. The aims of treatment for overweight and obesity should be modest weight loss maintained for the long term, with treatment methods and goals being decided for each individual after careful assessment of the degree of overweight and any associated co-morbid conditions¹⁹. The first-line strategy for weight loss and its maintenance is a combination of supervised diet, exercise and behaviour modification. These approaches must be pursued throughout treatment even when adjunctive therapies are used.²⁵

HOW TO PREVENT OBESITY

Be Active

Simple activities, such as climbing the stairs instead of using lifts, morning and evening walk in the park and swimming, can bring about tremendous changes in your lifestyle. Such activities will not only help you burn excess fat, but also help you stay active. Start doing light to moderate exercises for thirty minutes, five times a week⁸. Switch over to the tough exercises, once you have gained stamina and strength. You may also join a health club or gym and socialize with like-minded individuals²⁰.

Keep a Check on Your Weight

Monitor your weight regularly. Weigh yourself at least once a week. This will help you figure out how much extra flab you have lost by doing simple activities or workout. In case you are being inactive and not eating healthy, you will be aware of the weight gain at an early stage. This will prevent your weight gain from being too much to get off²¹.

Drink Plenty of Water

Drinking lots of water will help your body detoxify all the impurities present in the system. Doctors recommend that drink at least 8-10 glasses of water a day. Having a glass of warm water in the morning, with half a lemon squeezed in it, is also a good idea. Remember, water cleanses and rejuvenates skin as well²².

Stay Away From Junk Food^{12, 14, 19}

One of the prerequisites of staying healthy is avoiding junk foods. The smart way to stay away from junk food is not to buy them at all! Avoid frequenting the fast food chains. Keep junk food out of your house as well.

Eat Slowly & Only When You Are Hungry

Do not cut any of the three meals per day. Rather, divide them into small meals, stretched over a gap of 2-3 hours. At the same time, cut off high-calorie snacks in between the meals. Eat small portions of food and do not gulp them down. Do not stuff yourself with food when you are not hungry. Eat only when body signals to have food. Eat slowly because the stomach takes some time to feel 'full'¹⁶.

Diet^{2, 13}

Diet should be balanced, with fruits, vegetables and whole grains included in it. An obese adult should have at least five servings of low-sugar fruits and vegetables on a day. A vegetable serving shall include one cup of raw or one and half cup of cooked vegetables. One piece of fresh fruit and one and half cup of canned fruit are included in a serving of fruit. An obese should avoid fruits and vegetables that are high in calories, like mango.

Some measures that to be followed for reducing weight-

1. Avoid excess eating, eating during indigestion or just after taking pervious meal.
2. Avoid day sleeping; sleep in the night after one hour of your dinner.
3. Do regular exercises like brisk walking (at least), running, swimming etc.
4. Avoid sedentary and lethargic lifestyle.
5. Avoid eating excess sweets. Have low fat/skim dairy products. Avoid product like chocolates, ice creams, cheese, paneer, sugar etc.
6. Take non-vegetarian food like chicken, fishes, eggs, meats etc. in moderate quantity.
7. Remove fat from meat & skin from chicken.
8. Try to minimize excess oil & ghee in cooking, Use a non-stick pan for cooking.
9. Avoid hydrogenated vegetable oils, Instead of frying things try to consume roasted things & change your cooking techniques a little.
10. Grill or bake food instead of frying, cook vegetables without fat by steaming and boiling.
11. Use low fat spreads and chutney on bread instead of butter and cheese.
12. Don't consume excess alcoholic drinks or water on empty stomach.
13. Avoid aerated drinks and excess water after meal.
14. Intake of fat and carbohydrates should be restricted.

MEDICATION FOR OBESITY

Home Remedies for Obesity

- The easiest and effective remedy to fight obesity would be to have 10 grams of honey, along with a glass of warm water. Consume this in the morning, on an empty stomach. If found effective, the dose can be increased with time.
- You can also mix juice of half a lime and one teaspoon of fresh honey in a glass of Luke warm water. Have this early in the morning, followed by every few hours intake.
- Consuming 10-12 fully grown curry leaves every morning, for 3 months, is found beneficial in dealing with the problem of obesity.
- Have one or two tomatoes, on an empty stomach, every morning. This has been found to be effective in curing obesity¹⁴.

- In a glass of boiling water, add ginger and lemon slices. Steep for some time and strain the water. Have this decoction when warm. Not only would it treat obesity, it would also control overeating tendency.
- In a cup of water, add 3 tsp lime juice, ¼ tsp powdered black pepper and 1 tsp honey. Have this concoction regularly, once a day, for 3 months.
- Soak a handful of jujube or Indian plum leaves overnight. Strain the water in the morning and consume on an empty stomach. It will prove beneficial in curing obesity.
- Include loads of cabbage in your diet. You can have its leaves raw or boiled. You can also make a vegetable out of it or use it in salads.
- Take out fresh carrot juice, add a little water and churn it in a blender. Filter the juice and drink it.
- Include French beans, jackfruits, grapes, figs, peaches, phalsa and guava in the diet.
- Having green tea has been found to be beneficial in treating obesity. You can also consume tea made from dandelion root.
- In a cup of lukewarm water, add ½ tbsp honey and ½ tsp holy basil paste. Consume this every day, for treating obesity¹⁵.
- Horse gram can help cure obesity. Soak 1-2 tbsp horse gram in a glass of water and keep it overnight. Filter the concoction the next morning and have it on an empty stomach.
- Make ginger paste and add a small amount to honey to it. Consume this along with ½ tsp natural guggul. It will prove effective in treating obesity²³.

AYURVEDIC APPROACH

The Ayurvedic approach to drugs in general is quite different from what we've been used to. Herbal supplements can be of great benefit in weight control without the negative side effects of conventional drugs. With the diet therapy alone, the treatment of obesity is incomplete. Diet can avoid the further possibilities of obesity, but the fat has to be treated and the defective metabolism must be corrected, which is done by Ayurvedic medicines. These medicines improve fat metabolism in an obese individual. Once a person's metabolism is correct it is easy for him to maintain his weight.

Some useful remedies –

1. Use of guduchi, devadaru, musta, triphala, takrarishta (a fermented preparation of butter milk) and honey is recommended.
2. Powder of yava and amalaka is an excellent formulation for the same.
3. Shilajita along with the juice of Agnimantha works well.
4. Take honey water early in the morning.
5. Take powder of Vidanga, Sunthi, Yavakshara, Yava, Aamalaki and 'Loha (iron) Bhasma'.

Some generally used preparations for obesity are as follows: Triphala Guggulu, Amrutadya Guggulu, Arogya Vardhini, Chandraprabha vati , Shilajit vati^{11,23}.

ANTI OBESITY MEDICATION

History

Obesity was a symbol of richness, now fact of being obey and its adverse effect come in sight. In ancient days, In Bharat the first described attempts at producing weight loss are those of Soranus of Ephesus, a Greek physician, in the second century AD. He prescribed elixirs of laxatives and purgatives, as well as heat, massage, and exercise. This remained the mainstay of treatment for well over a thousand years. It was not until the 1920s and 1930s that new

treatments began to appear. Based on its effectiveness for hypothyroidism, thyroid hormone became a popular treatment for obesity in otherwise healthy people²⁴.

Amphetamines became popular for weight loss during the late 1930s. They worked primarily by suppressing appetite, and had other beneficial effects such as increased alertness. Use of amphetamines increased over the subsequent decades, culminating in the "rainbow pill" regime. This was a combination of multiple pills, all thought to help with weight loss, taken throughout the day. In 1967/1968 a number of deaths attributed to diet pills triggered a Senate investigation and the gradual implementation of greater restrictions on the market. Meanwhile, phentermine had been FDA approved in 1959 and fenfluramine in 1973. The two were no more popular than other drugs until in 1992 a researcher reported that the two caused a 10% weight loss which was maintained for over two years. *Fen-phen* was born and rapidly became the most commonly prescribed diet medication¹⁰. Dexfenfluramine (Redux) was developed in the mid-1990s as an alternative to fenfluramine with less side-effects, and received regulatory approval in 1996. However, this coincided with mounting evidence that the combination could cause valvular heart disease in up to 30% of those who had taken it, leading to withdrawal of Fen-phen and dexfenfluramine from the market in September 1997.

ANTI-OBESITY DRUGS^{2, 3, 4, 5, 7}

If diet and exercise are ineffective alone, anti-obesity drugs are a choice for some patients. Some prescription weight loss drugs are stimulants, which are recommended only for short-term use, and thus are of limited usefulness for extremely obese patients, who may need to reduce weight over months or years.

Orlistat

Orlistat reduces intestinal fat absorption by inhibiting pancreatic lipase. Orlistat may cause frequent, oily bowel movements (steatorrhea), but if fat in the diet is reduced, symptoms often improve.

Sibutramine

Sibutramine is an anorectic reducing the desire to eat. Sibutramine may increase blood pressure and may cause dry mouth, constipation, headache, and insomnia.

Rimonabant

Rimonabant is a recently developed anti-obesity medication. It is cannabinoid (CB1) receptor antagonist that acts centrally on the brain thus decreasing appetite. It may also act peripherally by increasing thermogenesis and therefore increasing energy expenditure. These drugs not only cause weight loss, but prevent or reverse the metabolic effects of obesity, such as insulin resistance and hyperlipidemia.

Metformin

In people with Diabetes mellitus type 2, the drug metformin (Glucophage) can reduce weight.

Exenatide

Exenatide (Byetta) is a long-acting analogue of the hormone GLP-1, which the intestines secrete in response to the presence of food. Among other effects, GLP-1 delays gastric emptying and promotes a feeling of satiety. Some obese people are deficient in GLP-1, and dieting reduces GLP-1 further. Byetta is currently available as a treatment for Diabetes mellitus type 2. Drawbacks of Byetta include that it must be injected twice daily, and that it causes severe nausea

in some patients, especially when therapy is initiated. Byetta is recommended only for patients with Type 2 Diabetes.

Pramlintide

Pramlintide is a synthetic analogue of the hormone Amylin, which in normal people is secreted by the pancreas in response to eating. Among other effects, Amylin delays gastric emptying and promotes a feeling of satiety. Many diabetics are deficient in Amylin. Currently, Symlin is only approved to be used along with insulin by Type 1 and Type 2 diabetics. However, Symlin is currently being tested in non-diabetics as a treatment for obesity. A drawback is that Symlin must be injected at mealtimes.

MECHANISMS OF ACTION

Anti-obesity drugs operate through one or more of the following mechanisms:

- Suppression of the appetite. Catecholamines and their derivatives (such as amphetamine-based drugs) are the main tools used for this. Drugs blocking the cannabinoid receptors may be a future strategy for appetite suppression.
- Increase of the body's metabolism.
- Interference with the body's ability to absorb specific nutrients in food. For example, Orlistat (also known as Xenical and Allī) blocks fat breakdown and thereby prevents fat absorption. The OTC fiber supplements glucomannan and guar gum have been used for the purpose of inhibiting digestion and lowering caloric absorption

Anorexics are primarily intended to suppress the appetite, but most of the drugs in this class also act as stimulants (dextedrine, e.g.), and patients have abused drugs "off label" to suppress appetite (e.g. digoxin)²⁵.

Drugs not suitable for the management of overweight and obesity²⁵

1. There is no evidence that bulk forming agents (eg methyl cellulose) have any beneficial long-term action for weight reduction
2. Diuretics, human chorionic gonadotrophin (HCG), amphetamine, dexamphetamine and thyroxine are not treatments for obesity and should not be used to achieve weight loss.
3. Under no circumstance should thyroxine be prescribed for obesity in the absence of biochemically proven hypothyroidism.
4. Metformin and acarbose may be useful in the management of the obese non-insulindependent diabetic patient: they have no proven efficacy for obesity alone and are not licensed for such use.

CONTRAINDICATIONS^{25, 26}

Centrally acting drugs are not recommended for patients who are concurrently taking other selective serotonin re-uptake inhibitors. It is therefore crucial to confirm that such drugs have not already been prescribed. It is probably also unwise to co-prescribe with tricyclic antidepressants, monamine oxidase inhibitors and lithium, all of which may potentiate the central effects of serotonin with adverse results. Combination therapy with anti-obesity drugs is contraindicated because of the absence of evidence for synergy between the two drugs, and lack of information about safety.

In The Elderly and Children²⁷

There is limited information about the use of anti-obesity drugs in patients over the age of 75 years. For that age group, the accepted practice is to aim for weight maintenance rather than weight loss. Neither sibutramine nor orlistat is used in children.

Surgery for Reduction of Weight

Weight Loss Surgery is one of the safest methods to get rid of the excess body fat that accumulates because of obesity. Though most of us have heard about the term 'Obesity', very few actually know what it exactly is. Obesity is the name given to the condition where the accumulation of fat in a person's body exceeds its skeletal and physical standards. As per the National Institutes of Health (NIH), when a person's body weight increases to 20 percent more than what his ideal weight should be, it becomes a health risk²⁸.

Liposuction for Fat Control

Liposuction (also called lipoplasty, suction lipectomy, or "fat modeling") is a surgical procedure designed to sculpt or contour one or more areas of the body, by removing localized deposits of fat that have not responded to diet and exercise treatment. Lipoplasty is typically performed to remove body fat from the abdomen, hips, buttocks, thighs, knees, upper arms, chin, cheeks and neck. Liposuction is frequently combined with plastic cosmetic surgery such as facelift, neck lift with platysmaplasty, abdominoplasty (tummy tuck) and lower body lift. Liposuction is the most commonly performed cosmetic surgery procedure in North America. More than 400,000 liposuctions were performed in 2005. During the past 15 years, liposuction operations have expanded to include new techniques like ultrasound-assisted lipoplasty (UAL), the tumescent technique, and the super-wet technique. These new fat-reduction procedures have enabled plastic surgeons to provide more precise fat-removal results and quicker recovery times. Health complications after lipoplasty are relatively low, the most common problems being: infection, allergic reactions to anesthesia, friction burns, and damage to organs, fluid accumulation, blood clots, excessive fluid loss, and extended healing time²⁹.

Liposuction Operation

A tube is then introduced into the area, moved around to loosen the fat which is then sucked out of the body through the tube. More specifically, a narrow tube or "cannula" is inserted through a small incision to the skin. The cannula is then moved through the fat layer to break up the fat cells. Finally, the excess fat is suctioned out by a vacuum pump (aspirator) or syringe. The use of "micro-cannula" (very small cannula) permits very precise body contouring through much smaller incisions²⁶. During the operation body fluid is removed along with the fat to overcome loss of fluid patients are fed intravenous fluids during and immediately after lipoplasty surgery.

The procedure can be conducted under general or local anesthesia. The issue of "stitching" is handled differently by different surgeons. The problem with liposuction is that although the incisions are small, the amount of fluid that must drain out through them is relatively large. Thus, some surgeons opt to leave the incisions open, to optimize and expedite fluid drainage, while other surgeons partially stitch them, or delay stitching until most of the fluid has drained out - viz, about 1 or 2 days²⁸.

TYPES OF LIPOSUCTION SURGERY^{24, 29, 30}

There are several methods of liposuction, categorized by the amount of fluid injected into the site and by the way the fatty tissue is broken down prior to being removed. In all methods liquefied fat is suctioned out by a vacuum pump.

Wet Liposuction

A small amount of fluid is injected into the area then the amount of fat is to be removed. The fluid contains anesthetics, epinephrine and saline solution. lidocaine is the choice of drug to anesthetize the local area, epinephrine to contract the blood vessels and minimize bleeding. This injected fluid helps to loosen the fat cells and reduce bruising. "Dry Liposuction" used to be performed, but is no longer a recommended method of suction lipectomy.

Super-Wet liposuction

During superwet lipoplasty, the amount of water injected is about the same as the volume of fat to be removed. Typically, this is the preferred technique for removing larger amounts of fat tissue, as it carries less risk of hemostasis problems and fluid overload as is seen with the tumescent method. Duration is 1-3 hours, according to the size of the treated area. It may require, intravenous sedation as well as the local lidocaine, or a general anesthesia.

Tumescent Liposuction

During tumescent lipoplasty, a large amount of fluid is injected, as much as 3-4 times the volume of fat which is to be suctioned out. The larger quantity of fluid (containing sterile dilute salt water, adrenaline, and anesthetic liquid) helps to separate the muscle and the fatty tissue, thus creating more space for the surgeon to move the cannula to break up the fat cells. Duration of this operation is roughly 4 hours - longer than normal due to the extra fluid introduced. Because so much fluid is used in tumescent liposuction, this method is not generally used to remove large quantities of fat.

Ultrasound-assisted Liposuction (UAL)

During ultrasound-assisted lipoplasty, also called ultrasonic liposuction, a special cannula is used. This transmits ultrasound vibrations from a generator to the area of excess fat. As the tip of the cannula comes into contact with the fat cells it breaks them up and emulsifies (liquefies) the fat. The fat, now in liquefied form, can then be removed using low-pressure suction. This low pressure suction-method causes fewer traumas to the surrounding areas. In general, ultrasound lipoplasty reduces operation time, decreases tissue trauma, and reduces blood loss.

Power-assisted Liposuction (PAL)

During power-assisted lipoplasty a specialized cannula with mechanized movement is used, to remove the number of manual movements made by the plastic surgeon. The more controlled cannula movement involves less discomfort for the patient and a reduced risk of puncturing internal organs.

Water-assisted Liposuction (WAL)

This is a very new technique. During water-assisted lipoplasty, a thin fan-shaped water beam is used to loosen the fat tissue. The water is continually added and almost immediately aspirated (removed) through the same cannula. This liposuction technique leads to less water being present at the site and therefore less swelling. The cannula movements, helped by the water beam, are gentler. Patients undergoing this kind of surgery should be physically healthy. Lipoplasty offers best results to those with good skin elasticity. Those patients have localized pockets of surplus fat around the hips and buttocks, thighs, inner knee, back, abdomen, upper

arms, cheeks, jowls, chest area, and waist, as some fat deposits in certain areas may not respond to normal weight loss methods. Patients should be non-smokers.

THE LIPOSUCTION MAINLY AIMS AT ^{27, 31}

1. To remove the correct amount of fat
2. To minimize the effect of the cannula and aspirator suction processes on neighboring tissue such as blood vessels and connective tissue.
3. To maintain the correct fluid balance of the patient both during and after the surgery.
4. To cause the least discomfort to the patient both during and after the lipoplasty procedure.

WEIGHT LOSS SURGERY – INTRODUCTION

Weight Loss Surgery ^{20, 21} though a single term; encompasses a number of procedures within its boundaries. The procedure that will be used as a part of the surgery differs from individual to individual, depending upon the level of obesity and the health problems, if any, faced by an individual.

The best way is to consult a bariatric surgeon, who will be able to guide you to the right procedure as well as the approximate cost which starts from Rs. 1.5 lakhs (INR) onwards. Though other sources like, people who have undergone similar surgery or health magazines or internet, may provide you with information about the procedure, they will not give you a clear view as to which surgery will be safe for you. Just like any other surgery, weight loss surgery also has risks and complications attached to its positive effects. It is better to be well informed about all the risks of weight loss surgery well in advance. Before going in for the surgery, you will also be required to sign a consent form, which says that you have understood all about the surgery, its merits and demerits, and are ready to go for it. With time, the surgical procedures have improved, bringing about an improvement in results and minimization of risks ³².

BASIC PROCEDURES OF WEIGHT LOSS SURGERY ^{20, 21}

There are basically two procedures involved in the weight loss surgery, used for curing obesity, namely:

- **Restrictive Procedures**

In the restrictive procedures used for weight loss surgery, the aim is to decrease the food intake of the individual.

- **Malabsorptive Procedures**

In the malabsorptive procedures, the digestion is altered in such a way that the food gets digested very poorly. In the other words, it is incompletely absorbed and gets eliminated in the stool.

Vertical Banded Gastroplasty (Restrictive Procedure)

Vertical Banded Gastroplasty is a restrictive procedure of obesity weight loss surgery. It involves stapling of the upper stomach, near the esophagus, for around 2½ inches (6 cm). This results in the creation of a small pouch, with an outlet that is controlled by a band or ring. This band/ring is responsible for slowing down the draining of the food and ultimately, leading to creation of the feeling of fullness. As a result, the patient eats less and is able to reduce weight easily.

Laparoscopic Adjustable Gastric Banding (Restrictive Procedure)

Laparoscopic Adjustable Gastric Band procedure is form of the restrictive weight loss surgery procedure. In this, a band is positioned around the uppermost part of the stomach. The placement of the band results in the division of the stomach into two portions, of which one is small and the other is larger. This results in the regulation of the food, which ultimately creates a feeling of fullness in a person and he doesn't feel the need to eat large quantities of food. There is no alteration of the natural digestive process.

Biliopancreatic Diversion (Malabsorptive Procedure)

In the Biliopancreatic Diversion also, the size of the stomach is reduced and a stomach pouch is created. However, the size of the pouch is much larger as compared to those under the restrictive procedures. The structure of small intestine is changed, with the result that the bile and pancreatic juices get diverted and get combined with food closer to its middle or end. The ultimate result is that absorption of nutrients and calories gets reduced and this leads to weight loss.

Gastric Bypass Roux-en-Y (Combination of Restrictive & Malabsorptive Procedure)

The Gastric Bypass Roux-en-Y procedure is a sort of combination of the Combined Restrictive & Malabsorptive Procedure. In this surgery, apart from creating a pouch, malabsorption is added. The effect is that there is a time lapse in addition of the bile and pancreatic juices to the nutrients. The person, on whom surgery has been done, gets a feeling of fullness and satisfaction early and consumes less food.

LIFE AFTER SURGERY

Diet after Weight Loss Surgery

After the surgery, you need to change your eating habits permanently as alterations made to your gastrointestinal tract cannot tolerate the earlier eating habits and it is also necessary for successful weight loss. The dietary guidelines post surgery may vary from surgeon to surgeon. It is possible to hear some different guidelines from other person, but keep in mind that such guidelines could be different depending on the type of procedure and surgeon. Always follow your surgeon's guidelines and eat accordingly. Here are given some commonly acknowledged dietary guidelines for a healthy diet after weight loss surgery³³.

- Once you begin in taking solid food, not forget chewing your food properly and eat bite by bite. Wait for 2-3 minutes after swallowing and putting the next morsel in your mouth because your digestive system will not be strong enough to digest steaks or chunks of meat, if not chewed properly.
- While eating, avoid drinking any fluids as they will make you feel full sooner than you have consumed adequate food. And moreover, such consumption can cause vomiting or dumping syndrome, and can also make you feel hungry earlier after a meal.
- Avoid eating desserts and other items made of sugar, in case they contain over 3 to 5 grams per serving size.
- Don't take carbonated or aerated drinks, milk shakes, fatty foods, high-calorie nutritional supplements and foods having no nutritional value.
- Don't consume alcohol in any form.
- Avoid munching between the meals.

Going Back to Work after Weight Loss Surgery³⁴

The ability to pick up where you left off, before surgery levels of work, entirely depends on your physical condition, the nature of work and the type of weight loss surgery you underwent. After laparoscopic gastric bypass, nearly all patients get back to their work within 1 to 3 weeks while people who undergo an open procedure take about six weeks.

Birth Control and Pregnancy

The women of childbearing age are strongly recommended to use the most effective forms of birth control, during the first 16 to 24 months after bariatric surgery. It is really important so as to prevent fetal damage, during any stage of pregnancy.

Long-Term Follow-Up after Weight Loss Surgery

The short-term effects of bariatric surgery have been dealt with, but the long-term effects are still need to be discussed. It is important to keep a check on nutrition and body system. Depending on your diet after surgery, nutritional deficiencies may occur over the years. And eventually, you are required get check-ups done periodically for Anemia, Vitamin B12, Folate and Iron Levels. Follow-up tests will be done yearly in any case and more frequently, if specified.

Plastic Surgery Procedure after Weight Loss Surgery

Majority of the patients, who undergo this surgery, lose a lot of weight. However, there are other problems that come along with this surgery. Patients, at times, are left with heavy flab and loose muscles. For such situations, bariatric plastic surgery procedures or lipoplasty (liposuction) is a technique that can bring back the normal shape to the body. It's done to enhance looks, appearance and confidence. Moreover, this surgery is not easy and frequently entails exchanging one cosmetic problem (like loose skin) for another (could be scars). It is always preferable to seek advice from your surgeon before going for any treatment.

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