

Obesity: A Review Of Its Implications And Considerations In Oral And Maxillofacial Surgery

Wasiu Lanre Adeyemo,¹ Babatunde Olamide Bamgbose²
and Titilope Adenike Adeyemo³

¹Department of Oral & Maxillofacial Surgery,
College of medicine, University of Lagos.

²Department of Oral Pathology, Radiology and Medicine,
College of Dentistry, University of Iowa, USA.

³Department of Haematology and Blood Transfusion,
Lagos University Teaching Hospital, Lagos.

Correspondence to: W. L. Adeyemo,

ABSTRACT

Obesity is defined as the accumulation of fatty tissue to such a level that overall health might be adversely affected. It is a complex, multifactorial metabolic condition which develops from interactions of genetic and environmental factors.

The prevalence of obesity is increasing at an alarming rate in many parts of the world including developing countries. Subsequently, increasing number of obese patients is expected to present for oral and maxillofacial treatment. Such treatment includes routine oral and maxillofacial procedures (teeth extraction, fracture fixation, biopsies), specific corrective procedures for snoring and obstructive sleep apnea, and intermaxillary fixation for weight reduction. Obese patients provide a unique challenge because of their body habitus, medical conditions, and physiologic response to treatment, all of which have significant consequences on the surgical procedure being performed. Therefore, the oral and maxillofacial surgeon needs to be aware of these associated medical and surgical issues and take them into consideration when treating these patients. This article reviews the clinical and surgical implications that obesity has on the delivery of oral and maxillofacial surgical and anaesthetic care.

Key words: Obesity; maxillofacial practice; review

INTRODUCTION

Obesity is defined as the accumulation of fatty tissue to such a level that overall health might be adversely affected.^{1,2} It is a complex, multifactorial metabolic condition which develops from interactions of genotype (genetic factors) and environment (environmental factors).³ It is a disorder in which diet, sedentary life and genetic predisposition, all play a part.⁴ Obesity appears to be worldwide and in many countries has reached sufficient proportions to be considered epidemic.⁵ In fact, the high prevalence of overweight and obesity among Americans has prompted the US Department of Health and Human Services to declare excessive weight as a "neglected health problem".⁶ The international Obesity Task Force (IOTF) asserts that causes of obesity epidemic

are twofold: excess intake of food and beverages with high energy load and an environment that restricts one's opportunities for physical activity which results in a universally sedentary state.^{7,8}

The prevalence of obesity is increasing at an alarming rate in many parts of the world.⁸ In white population living in the west and north of Europe, Australia, and the United States, the prevalence of obesity is similarly high in men and women. In Black-Americans and in countries with relatively low gross national product, such as those in Central and Eastern Europe, Asia, Latin-America, and Africa, the prevalence is 1.5 to 2 times higher among women and in group with relatively low socioeconomic status.^{6,9,10} In Nigeria, not much has been written on obesity, although, it has been reported to be commonly seen among the affluent business executives and middle-aged females with a sedentary life-style.⁴ It is also seen among those in the catering profession who are exposed to food preparation and consumption.⁴ In Nigeria and other developing countries, obesity is not generally regarded as disease until complication sets in.⁴ In fact, a mild degree of obesity is socially acceptable in African culture as a sign of affluence.⁴

Although, there is presently no established figure for the prevalence of obesity in Nigeria,⁴ anecdotal evidence suggests that the general public (especially the affluent ones) is becoming less active and becoming prone to adverse health affects of obesity and overweight. Subsequently, increasing number of obese patients is expected to present for oral and maxillofacial treatment. Such treatment includes routine oral and maxillofacial procedures (teeth extraction, fracture fixation, biopsies), specific corrective procedures for snoring and obstructive sleep apnea, and intermaxillary fixation for weight reduction. Such patients provide a unique challenge because of their body habitus, medical conditions, and physiologic response to treatment, all of which have significant consequences on the surgical procedure being performed.¹⁰ Therefore, the oral and maxillofacial surgeon needs to be aware of these associated medical and surgical issues and take them into consideration when treating these patients. In addition, this article reviews the clinical and surgical implications that obesity has on the delivery of oral and maxillofacial surgical and anaesthetic care.

Screening for Obesity

Screening for obesity is simple, noninvasive, and quick. There are several anthropometric parameters that may be used, the simplest of which are height and weight.¹¹ The definitions of overweight and obesity can be derived by calculating the body mass index (BMI). BMI has become a universally accepted measure of degree of overweight and obesity. BMI is equal to (weight in kilograms)/(height in metres²).¹² A BMI between 20 and 24.9 kg/m² is usually considered normal for most individuals (Table 1). A person is considered overweight with a BMI between 25 and 29.9 kg/m², and obesity is classified as greater than or equal to 30 kg/m² (Table 1). Morbid obesity is defined by a BMI of greater than 40, or between 35 and 40 when other medical conditions such as high blood pressure and diabetes are present.⁶ Although these parameters offer an estimate of body weight, BMIs do not indicate the composition of this weight. Some individuals who have a large percentage of muscle bulk and less fat distribution may have a weight within "obese range" and not be considered obese.¹⁰ Other established screening parameters for obesity and overweight are Waist Circumference (WC) and Waist-To-Hip Ratio (WHR).

Obesity and Health Related Issues

Obesity influences a broad range of physiologic parameters that eventually cause a large number of medical problems that result in increased morbidity and mortality.¹⁰ The morbidity and mortality is directly related to the degree of overweight or obesity (Table 2). Scientific evidence has established a strong relationship between obesity and a minimum of 15 conditions that, left untreated, contribute to early death. Weight loss of a modest 10% of body weight in an overweight patient can improve some obesity-related medical conditions including diabetes and hypertension.⁶ Other obesity-related medical conditions include coronary heart disease, cardiovascular disease, osteoarthritis, rheumatoid arthritis, cancers (breast, oesophagus, gastric, cardiac, colorectal, endometrial, renal cell), gall-bladder disease, infertility, sleep apnoea.^{4,9,13} Estimates from the National Audit Office from the United Kingdom in 2001 based on extensive literature review showed increased risk of different medical condition in obese patients (Table 3). It is known that an increase in weight loss causes a decrease in complications of obesity and an increase life span.^{4,14}

Obesity and its Implications in Oral and Maxillofacial Practice

Overweight and obese patients present the oral and maxillofacial surgery with anaesthetic, surgical, practice ergonomics, and potential postoperative problems that distinguish heavy patients from other patient cohorts.⁶ Therefore, the operative team must be alert to the increased potential for airway obstruction, poor surgical visibility and accessibility, and the influence of intercurrent diseases on intraoperative and postoperative outcomes. Also, obese and overweight patients are not compatible with standard size office equipment (surgical chairs, monitoring cuffs, wheel chairs) that are designed for small patients.⁶ Obese and overweight patients tend to be less mobile, may depend on wheelchair transportation, and may pose a challenge to establish peripheral intravenous

access. Therefore, patient flow in the ambulatory setting may be disrupted when slow moving and physically impaired patients with poor IV access sites are present. This must be anticipated and planned for.

In addition, outpatient and inpatient anaesthesia will require patients to be in recumbent or supine position on either the dental chair or operating table which will predispose them to increased work of breathing, hypoxemia, and increased metabolic demands.¹⁰ This is due to the fact that obese patients are known to experience periods of hypoxemia.¹⁵ Elevated intra-abdominal pressures and difficulty expanding the thoracic cavity leads to incomplete inflation of the lungs. These changes in the lung volume lead to closure of small airways and cause ventilatory/perfusion defects (V/Q mismatch). The V/Q mismatch eventually leads to hypoxemia and hypercapnia.¹⁵ Obese patients also have a corresponding increase in metabolic demand at rest.¹⁰ The increased work of breathing also causes a higher metabolic rate, requiring more energy and oxygen utilization. This situation is aggravated when the patient is in a supine position. This increased risk for increased work of breathing is a concern when oral and maxillofacial surgery is performed.^{6,10} In addition, obesity-hypoventilation syndrome results when chronic hypoventilation exists because of the large weight preventing full expansion of the lung fields.¹⁵ Hypercapnia is the cardinal sign of obesity-hypoventilation syndrome. The normal central response to high levels of CO₂ does not exist, the work of breathing is severely elevated, and respiratory efficiency and lung compliance are dramatically reduced. These patients are an extremely high anaesthetic and surgical risks.¹⁶ Obese oral and maxillofacial surgery patients can develop severe hypercapnia during sedation for outpatient procedures because of positioning and the administration of opiates.¹⁰

Many adult patients with obstructive sleep disorder are obese/overweight and should be identified as much higher anaesthetic risk. Surgeons should be cautious scheduling obese patients for conscious and deep sedation when oropharyngeal examination indicates that the base of the tongue obliterates visualization of the palatal arches and the planned surgery is expected to contribute to airway obstruction.⁶

Obesity and Maxillofacial Practice Management Considerations

Due to the fact that obese patients present with unique characteristics when compared with their non-obese cohorts, surgeons should have increased awareness of the overweight problem of their patients and added precautions should be implemented when treating them. Diagnostic and treatment procedures must be modified.

History and Review of the Systems and Preoperative Evaluation

A thorough history and review of systems is imperative when an obese/overweight patient present to the clinic. Questions should help elicit any systemic complication attributable to the excess weight. Discussion should include questions about general fatigue, weakness, daytime somnolence, and any sleep disturbances that may be warning signs of obstructive sleep apnea.¹⁰ Questions should focus on systemic signs and symptoms. Patients should be asked about any chest pain, shortness

of breath, dyspnea on exertion, orthopnea, paroxysmal nocturnal dyspnea, coughing, or peripheral oedema. Positive responses may indicate compromised cardiac function such as right-sided heart failure. A history of difficulty breathing or dyspnoea during normal activities will only worsen during sedation.¹⁰ Any heightened concerns should prompt a cardiology consultation. Questions should also be asked about symptoms of diabetes such as polyuria, polydipsia or polyphagia. A diagnosis of diabetes followed by proper medical management will benefit the patient in terms of lifelong healthier living and short-term success with improved wound healing.¹⁰

Examination of the airway, along with evaluation of range of cervical motion and head and neck extension is also important. Patients with limited mouth opening and limited range of cervical motion as often seen in obesity may pose a significant challenge during intubation for general anaesthesia. Preoperative anaesthetic evaluation should therefore, be sought to assess possible difficulty with intubation.

Intraoperative considerations

Obese and overweight patients who will require surgery with local anaesthesia with sedation or general anaesthesia will need additional care for safe treatment and successful outcomes.¹⁰ Inherent to the safe and effective practice of surgery is the surgeon's ability to visualize and have ready access to the surgical site. Operations are more likely to proceed smoothly when the surgical team is comfortably positioned around the patient.⁶ Morbidly obese patients have been reported to require longer operative times than non-obese patients.¹⁷ Poor posture and poor visibility translates into increased risk of surgical adventures, increased operating time, and physical and mental stress on the OMS surgical team.^{10,17}

Premedication that is commonly given to patients for anxiety can be given to the obese patient, but narcotics should be avoided. Opiates will suppress the respiratory drive and induce hypoxemia.¹⁰ Premedication also may include agents to prevent aspiration. Obese patients have a high gastric content and higher gastric volumes. Medication can be given to help reduce the risk of aspiration and also promote forward flow of gastric fluid.¹⁰ Additional preoperative medications should include any appropriate prophylactic antibiotics and anti-inflammatory steroids.¹⁰

The positioning of obese patients should maximize pulmonary mechanisms during surgery. If possible supine and Trendelenburg positions should be avoided.¹⁰ During surgical procedures, patients should be sitting upright or positioned in reverse Trendelenburg. All pressure points should be padded. If the patient does not adequately fit in the surgical chair or operating room table, additional support should be provided. Prevention of venous thrombosis and subsequent pulmonary embolism can be achieved with pneumatic compression stockings, subcutaneous heparin, and early ambulation.¹⁰

Delayed postoperative recovery due to pulmonary atelectasis following general anaesthesia is not uncommon in morbidly obese patients.¹⁸ Therefore, if inpatient anaesthesia and surgery are anticipated; early consultation with the anaesthetist should be requested. However, if outpatient treatment is scheduled, proper

resuscitative equipment should be available. Oxygen is critical before, during, and after surgery. Short, simple surgical procedures are best performed under local anaesthesia. Longer and more complicated surgeries may be managed better in an inpatient setting.

Postoperative considerations

Although, obesity as a risk factor for postoperative complications following an oral and maxillofacial procedure has not been widely studied, it is considered a risk factor for increased complications in several other surgical specialties.¹⁹⁻²² Blood loss at a total hip replacement is reported to be greater in obese patients compared to non-obese patients.¹⁹ Obese patients undergoing breast reconstruction with free transverse rectus abdominis myocutaneous flaps had significantly higher total flap loss and other complications compared to normal-weight patients.²³ Morbid obesity has also been associated with increased pulmonary atelectasis after general anaesthesia.¹⁸ Therefore, postoperative use of an incentive spirometer will help prevent atelectasis.¹⁰

Table 1:
Categories of BMI¹¹

Category	BMI (Kg/m ²)
Underweight	<18.5
Normal weight	18.5-24.9
Overweight	25-29.9
Obesity (Class I)	30-34.9
Obesity (Class II)	35-39.9
Extreme obesity (Class III)	≥40

Table 2:
Body Mass Index and associated Health Risks⁹

Classification	BMI (Kg/m ²)	Associated Health Risks
Underweight	< 18.5	Low (but risk of other clinical problems increased)
Normal range	18.5-24.9	Average
Overweight	25-29.9	Increased
Obese class I	30-34.9	Moderately increased
Obese class II	35-39.9	Severely increased
Obese class III	40 and above	Very severely increased

Table 3:
Estimated Increased Risk for the Obese of Developing Associated Disease Based on Literature Review (Adapted from Seidell⁹)

Disease	Relative Risk	
	Women	Men
Type 2 diabetes	12.7	5.2
Hypertension	4.2	2.6
Myocardial infarction	3.2	1.5
Angina Pectoris	1.8	1.8
Osteoarthritis	1.4	1.9
Stroke	1.3	1.3
Gall Bladder Disease	1.8	1.8
Cancer of the Colon	2.7	3.0
Ovarian Cancer	1.7	-

CONCLUSIONS

Obese patients attending oral and maxillofacial clinics present a unique characteristic when compared with a cohort of patients with normal weight because of their body habitus, medical conditions, and physiologic response to treatment, all of which have significant consequences on the surgical procedure being performed. They present a unique challenge to oral and maxillofacial practice. Therefore, the oral and maxillofacial surgeon needs to be aware of these associated medical and surgical issues and take them into consideration when treating these patients.

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