CASE REPORT

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Bariatric Surgery as a Treatment for Obstructive Sleep Apnoea, Diabetes Mellitus, Hypertension and Asthma–A Case Report

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ABSTRACT

Obstructive Sleep Apnea (OSA) is linked to hypertension, ischemic heart disease, stroke, diabetes and sudden cardiac death. The standard treatment using positive airway pressure (PAP) device may not be tolerated in many patients and therefore alternative options should be explored including bariatric surgery, which have beneficial impacts on other medical co-morbidities as well. OSA is associated with obesity and there is a positive correlation between increasing BMI and sleep apnea.

Weight loss by any method is a well-documented treatment for OSA. We report a case of an obese gentleman with poorly controlled asthma and found to have severe obstructive sleep apnea on the background of hypertension and type 2 diabetes. Bariatric surgery cured his OSA and improved the control of all of his other medical comorbidities.

Key Words: Bariatric Surgery, Obstructive Sleep Apnea, Positive Airway Pressure

Introduction

Obstructive Sleep Apnea (OSA) is characterized by frequent episodes of upper airway collapse during sleep, causing recurrent arousals, intermittent hypoxaemia, sleep fragmentation and poor sleep quality. OSA is an independent risk factor for hypertension, diabetes mellitus, cardiovascular diseases and stroke, leading to increased morbidity and mortality. The prevalence of OSA have been estimated between 2% to 10% worldwide (1), and 2% to 4% in Malaysia (2). OSA may require treatment with ventilatory aids such as positive airway pressure (PAP) machines. Surgical treatment of OSA is an option. Bariatric surgery, and the weight loss they produce, result in improvements in various measurable parameters of OSA (3). We report a case of an obese gentleman with poorly controlled asthma and found to have OSA on the background of hypertension and diabetes. Bariatric surgery cured his OSA and improved his other medical comorbidities.

Case Report

We report a case of a 55 year-old gentleman who was referred to our out-patient chest clinic for poorly controlled asthma. He was a lifetime non-smoker. He was morbidly obese and diagnosed with asthma since childhood, and has underlying type II diabetes mellitus, hypertension, chronic urticaria and generalised anxiety disorder. His asthma treatment included combined inhaled corticosteroid and long acting beta agonist (salmeterol/fluticasone 250/50 mcg), theophylline and montelukast, and dual oral hypoglycaemic agents for his diabetes.

During clinic assessment, his asthma control test (ACT) score was 8/25, despite being on high dose combined inhaled corticosteroid and long acting beta agonist. His spirometry reading during his first visit was FEV1 of 1.40L (48.6%), FVC of 1.78L (49.9%) and FEV1/ FVC ratio of 78.6%. Post bronchodilator spirometry readings revealed a positive reversibility of 17% which is diagnostic of asthma The spirometry also showed that he had concomitant restrictive ventilatory pattern, likely due to his obesity.

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Despite being on appropriate treatment for asthma, good compliance and acceptable inhaler technique, his asthma was still poorly controlled, with frequent exacerbations and multiple emergency visits for nebulisers. His weight was also increasing, and his wife reported that he snored loudly during sleep, with occasional witnessed apnea. He also complained of daytime somnolence and morning headaches with multiple near misses accidents on the road. His Epworth Sleepiness score (ESS) was 12 which indicate significant daytime somnolence.

On examination, his blood pressure was 144/88mmHg, with heart rate of 100/minute. His oxygen saturation was 97% under room air. His weight was 109 kg, with height of 168cm, and his body mass index (BMI) was 38.6 kg/m2. His neck circumference was 17 inches, with Mallampati score of 3 and tonsillar hypertrophy grade 1. The diabetic control was poor with HbA1c of 9.4% (Normal < 6.5 %). He was under dermatologist care for chronic urticaria and psychiatrist for anxiety disorder. His asthma was poorly controlled for the past few years with symptoms of daily nocturnal cough, needing rescue inhaler about once or twice a day with frequent ED visits for nebulisers. However, there was no previous hospital admission needing intubation or ICU care.

His polysomnography (PSG) results showed total apnea/hypopnea Index (AHI) was 41/hour which indicated severe obstructive sleep apnea (OSA), nadir oxygenation of 70%, with maximum duration of apnea of 38 seconds. Upon further history, he revealed that he is claustrophobic ever since he was stranded in a train in Hong Kong 15 years ago, which was made worse by a motor-vehicular accident 6 years back. He would experience severe anxiety symptoms manifested as giddiness, sweating and palpitation when he is in a bus, plane, lift or an enclosed dark room. The symptoms will resolve once he is in an open space. He was not able to tolerate positive airway pressure (PAP) ventilation despite reassurance and support from the technicians. In view of his complicated background, and his inability to tolerate PAP, he was subsequently referred to an endocrine surgeon who concurred that he should benefit from bariatric 'Roux-en-Y' surgery which he underwent successfully.

Two months after the surgery, he was reviewed in chest clinic, and his OSA symptoms of snoring, daytime somnolence, witnessed apnea and morning headache had resolved. His post-operative PSG result revealed tremendous improvement with total AHI 8/hour. His ESS score has also improved from 12 to 4. Post-operative ACT was 21/25 with no more asthma exacerbations, nocturnal symptoms, nor ED visits for nebuliser and he rarely needed to use salbutamol inhaler at home. Subsequently, his asthma treatment was titrated down to inhaled budesonide 400ucg twice daily. He had lost 20 kg and diabetic control also has similarly improved, with HbA1c of 6.4% (Normal < 6.5 %).

Discussion

Studies have shown that nearly 100% of morbidly obese men and 60–70% of women have obstructive sleep apnea (OSA) (6). Morbid obesity is defined as having weight of 100 pounds over his/her ideal body weight, has a BMI of 40 or more, or 35 or more and experiencing obesity-related health conditions, such as high blood pressure or diabetes (7). In our case, the patient clearly fits in the definition of morbid obesity by weighing 109kg with BMI of 38.6 kg/m2 and suffered from asthma, diabetes mellitus and hypertension. A polysomnography (PSG) study is used to establish the diagnosis and parameters for continuous positive airway pressure (CPAP) therapy (6). As per our patient, he fits into the diagnosis of severe OSA as defined by his AHI of 41 per hour from his initial PSG.

The goal of OSA treatment is to alleviate airway obstruction during sleep. The standard first-line OSA treatment involves positive airway pressure (PAP) devices, which deliver compressed air into the airway to keep it open. Many patients do not tolerate PAP for many reasons, including discomfort, skin irritation, noise, and 'claustrophobia'. In our patient, he was unable to tolerate his PAP treatment due to his 'claustrophobia', which developed during multiple past traumatic incidents in public transport and motor vehicle accidents.

Because adherence is often an issue in OSA treatment, additional patient education or interventions are warranted. Alternative therapeutic strategies include surgical interventions to remove obstructive tissue, positional therapy, pharmacologic treatment, and weight-loss interventions for obese patients (4). Bariatric surgery as an adjunctive treatment, has demonstrated a sustainable and greater degree of weight loss in comparison to conventional therapy alone. This is especially true in sleeve gastrectomy and Roux-en-Y gastric bypass (5). In our case, he has opted for a bariatric 'Roux-en-Y'

(RYGB) surgery. In the Roux-en-Y Gastric Bypass Procedure, a smaller stomach pouch will be created by the surgeon, and a Y-shaped section of the small intestine will be directly attached to the pouch. Food intake will then "bypasses" much of the small intestine resulting in less calorie and nutrient absorption. The smaller pouch makes patients feel more full while consuming less food. Other types of bariatric surgical procedures available include 'gastric sleeve surgery' (SG) and 'the duodenal switch procedure' (DS) (8).

Among possible complications that might happen post 'Roux-en-Y' surgery can be divided into early and late complications. Among known early complications are anastomotic leaks, stenosis, twists, or kinks of the luminal caliber giving features that can be likened to esophageal dysmotility. Post-operative bleeding that may requires intervention occurs in up to 11% of cases in both the RYGB and SG. Venous thromboembolism, specifically pulmonary embolism is the most common cause of mortality after these procedures which usually occur 3 weeks after the surgery. However, the rate of occurrence post RYGB is low.

Late complications post bariatric surgery includes 'adjustable gastric band complications'. Most band complications are related to mechanical problems with the band itself (e.g, band slippage and band, balloon, or tubing breakage). Other and more serious late complications include band erosion, acute obstruction, ischemia, and megaesophagus or pseudoachalasia. Band slippage may also occurs when one wall or side of the stomach slips through the orifice of the band, resulting in a larger than normal gastric pouch superior to the band. Other late complications include 'band erosion' which is a rare a surgical emergency. Erosions occur in a relatively small percentage of patients, ranging from 0.31% to 1.96% (10). Megaesophagus or pseudoachalasia, gastric bypass, gallstone disease, marginal ulceration, perforation, bleeding from marginal ulcers, small bowel obstruction and intestinal hernia are amongst the few other possible late complications post bariatric surgery (11). However, none of these complication happen to our patient and he recovered well post RYGB surgery with resolution of all his other chronic medical issues.

Post operatively, he underwent close follow ups and monitoring under the care of the treating surgeon, and upon full recovery, 2 months post op, he visited our clinic for re-assessment of his OSA and other medical illness. Time needed to repeat PSG post bariatric surgeries varies between 6 to 8 weeks, depends on the treating centers. In our case, the PSG was repeated 8 weeks after the bariatric surgery. Comparing his new self and old self, our patient has shown that his OSA symptoms has improved significantly as evidenced by improved ESS score and AHI from PSG. His asthma symptoms were much better as evidenced by significant improvement in his ACT score, as well as his diabetic control improvement, as signifies by the improved HBA1C score. He has yet to achieved peak weight loss as literature have shown that the steepest inclination degree of weight loss is seen in the first 6 months post bariatric surgery and plateaus after 12 months (12). He managed to lose 44kg of his weight with his new weight of 65kg, and an ideal BMI of 23kg/m^2.

Our case illustrates a patient who was unable to tolerate PAP because of his claustrophobia, and subsequently underwent bariatric surgery which successfully treated his OSA symptoms, and indirectly improves his asthma, diabetic and blood pressure control.). This case supports the consideration of bariatric surgery in OSA patient, especially those who cannot tolerate PAP and have other chronic medical co-morbidities.

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