

A rare case of pulmonary complication after laparoscopic sleeve gastrectomy in an obese patient, associated with central venous catheter malposition: a case report

Abstract

Introduction: Surgical intervention for morbid obesity possesses a first-line treatment and it is widespread worldwide. Obese patients have a high chance of postoperative complications and mortality is significantly raised with higher BMI levels. In addition to this, the altered anatomy of obese patients characterizes the central venous catheter insertion as a difficult procedure.

Case presentation: In our case report we present a 52-year-old woman who admitted in our surgical department in order to be treated surgically for morbid obesity. All of her preoperative evaluation tests were absolutely normal. The patient was treated with laparoscopic sleeve gastrectomy. On postoperative day 2 the patient presented with acute dyspnea and low oxygen saturation.

Diagnosis: After evaluation with computed tomography of the thorax an excessive right pleural effusion was diagnosed and the patient was treated with thoracic tube insertion. There was a fully recovery and the patient discharged after a couple of days.

Conclusion: High mortality and morbidity after laparoscopic sleeve gastrectomy is a crucial parameter for postoperative complications in obese patients. High suspicion and wide spectrum of differential diagnosis results in early prevention and solution of the problem.

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Introduction

Morbid obesity is an entity that is widespread worldwide. The past few decades the "Eastern type" lifestyle leads to a significant increase in body weight of both man and woman and especially adolescents and young adults.¹ Surgical intervention as a solution of this disease has been established as the gold standard type of therapy with great postoperative results.² As all types of surgical procedures, bariatric surgeries have their consequences and complications. They may in overall be rare but refer to young people and have a significant impact in medical community.³ Thus, high suspicion of complications postoperatively is essential in order to prevent and reduce the mortality and morbidity rate. Herein, we present an interesting case of an early postoperative complication in an obese female patient after laparoscopic sleeve gastrectomy.

Case presentation

In our case we present a 52-year-old woman who admitted in our surgical department in order to be treated surgically for morbid obesity. She had been evaluated to have a body mass index (BMI) of 42kg/m²,⁴ without any accompanying pathologic characteristics. So, according to the American Society for Metabolic and Bariatric Surgery she had the green light for surgical treatment.⁵ She had a clear medical history and she was a non-smoker. All of her preoperative evaluation tests, blood tests results, heart ultrasound and spirometry were within normal parameters.

The surgery was planned to performed as an elective one and not in an emergency basis. The preoperative evaluation of ASA score for this

patient was ASA III because of the morbid obesity that she had with BMI of 42kg/m²,^{6,7} while she was classified as stage 2 according to Edmonton Obesity Staging System (EOSS stage 2).⁸

In the operating room, the anesthesiologist team placed a central venous catheter (right internal jugular vein catheterization) in order to have a better venous access and intravenous fluid management. The catheterization of the vein was guided by an ultrasound device and the catheter was placed without any complications or difficulties.

We performed a laparoscopic sleeve gastrectomy. The operative time was 120 minutes. During surgery the patient was hemodynamically stable and the recovery from the anesthesia was uncomplicated. On postoperative day 1, the patient was stable with normal vital signs but oliguric. Clinically, she seemed dehydrated so she had 1lt of normal saline 0.9% intravenously. She was fully modulated and fully covered with low molecular weight heparin as prophylactic therapy adjusted to her body weight. On postoperative day 2 the patient complained for mild shortness of breath with normal vital signs and saturation of oxygen at 98-99%. Clinically, on auscultation of the lungs there were reduced breath sounds on the right pulmonary base. At the same night, the patient presented a sudden deterioration with acute dyspnea hypoxemia and saturation of oxygen 80-85% with fraction of inspired oxygen at 21%. The supplementation of oxygen corrected the saturation levels around 95-96% but there were no signs of clinical improvement. The respiratory rate was 22-25 breaths per minute and on auscultation breath sounds were totally absent over the right hemithorax. The analysis of arterial blood gases revealed only hypoxemia with partial pressure of oxygen 57mmHg without elevated levels of CO₂. With these findings the patient was diagnosed

with acute respiratory failure type I and we conducted the appropriate investigation to find the cause. It is worth mentioning that the patient did not have any clinical signs of deep vein thrombosis and that she had one more liter of normal saline intravenously because of the persistent and unexplained oliguria.

The computed tomography of the lungs with intravenous contrast excluded pulmonary embolism and revealed a huge accumulation of fluid on the right pleura cavity that causes total atelectasis of the right lung. The interesting part of this image was that the central venous catheter was not in the right internal jugular vein but in the right internal mammary vein.

The patient was treated with the placement of an interpleural chest tube that selected an amount of almost 2 liters of clear fluid, the analysis of which revealed a transudate pleura effusion. This fluid gave us the impression of clear crystalloid fluid instead of a transudate pleura effusion, because of the extremely low levels near to zero of total protein, albumin and LDH. More precisely the levels of total protein, albumin and LDH of the pleura fluid were 0.1 g/dl, 0.0 g/dl and 42 IU/L respectively.

The patient was fully recovered after the chest tube placement with reversion of hypoxemia and with a clear chest x-ray the day after the intervention. Two days later she was discharged with no clinical or laboratory pathologic findings.

Discussion

Obesity and metabolic syndrome are both clinical entities that tend to increase in young population worldwide. Obesity is defined by excessive fat accumulation into the adipose tissue and more specifically into the abdominal adipose tissue to an extent that is extremely dangerous to health(4). The prevalence of obesity is characterized by a constantly high-rate increased disease, around the globe. In 2015, roughly 604 million adults had obesity worldwide. Since 1980, the prevalence of obesity has doubled in more than 70 countries and has continued to increase in most other countries as well(9). Rates of increase were similar between males and females in all age groups and were highest during early adulthood(9). Additionally, in 2015, at all socioeconomic levels and for all age groups, the prevalence of obesity was higher for females than males.⁹

Obesity, as a chronic condition has a serious impact in most of viable systems of the human body. It impairs the cardiovascular system and increases the rate of cardiovascular events like ischemic heart disease. Obesity is also associated with diabetes mellitus type 2, sleep apnea, fatty liver disease and a variance of mental health issues and social disturbances.¹⁰

Body mass index also known as BMI is a widely used parameter that characterizes the extent of unnecessary fat accumulation into the body, thus it correlates the body weight in kilograms (kg) according to the height of a patient in meters (m). Elevated BMI is also associated with increased cardiovascular danger and lower overall survival.¹¹ According to BMI scoring a patient is categorized in one of three different classes of obesity, where class I being someone with BMI 30-34.9 kg/m², class II with BMI 35-39.9kg/m² and class III with BMI over 40kg/m². Class III obesity is also referred as extreme, massive or severe obesity with the most serious consequences in health condition.¹¹

The solution of this serious and multifactorial disease is losing weight. The reduction of BMI index seems to reverse most of the lethal conditions that are associated with obesity and have been mentioned above. Surgical intervention for weight loss is supposed to be the

most effective and long-lasting type of therapy and in correlation with dietary instructions and exercise it possesses the gold standard of definite therapy for morbid obesity.¹⁰

Thus, the number of surgical interventions in order to cure obesity is increased worldwide. Laparoscopic sleeve gastrectomy and laparoscopic gastric by-pass are the most famous procedures, whilst, as mentioned above increased BMI is blamed for a significant number of postoperative complications. As a consequence of this, medical community must be aware of them in order to prevent and reduce the mortality rate in a patient group that in most of cases refers to young people.

For all the reasons that have been mentioned above, there are in the literature, numerous of classifications that evaluate the severity of obesity and predict the perioperative and postoperative complications.

The American society of Anesthesiologists grading system (ASA score) is a widely used tool that evaluates the preoperative health of surgical patients and at some point, predicts the possibility of postoperative complications.⁷ In our patient, the ASA score classification was III and categorized her as one who has severe systemic disease that is not incapacitating.⁷ The patient was classified as ASA III because of her morbid obesity with a BMI 42kg/m², a situation that increases the possibilities for severe postoperative complications. Moreover, there is a more specific grading system about obesity and bariatric procedures the so-called Edmonton Obesity Staging System (EOSS) that classifies obesity considering the patient's medical, mental, and functional symptoms and allows the clinician to describe the morbidity and functional limitations associated with excess weight.¹² Clinicians are able to identify individuals with obesity at elevated risk for mortality.¹³ Furthermore, it offers improved clinical utility for assessing obesity-related risk and prioritizing treatment. Surgery for obesity and metabolic disorders is therefore strongly recommended in EOSS ≥ 2 . According to the data above our patient was classified as stage 3 EOSS as a consequence of her limited function and well-being impairment. Thus, regarding the fact that Edmonton Obesity Staging System evaluates the prediction of morbidity and mortality in obese patients independent of BMI and metabolic syndrome, our patient was eligible for surgery with a high chance of postoperative complications.¹⁴

Postoperative complications after bariatric surgery are distinguished as early that occur within 3 days of surgery and as late that occur 10 days or more after the procedure. In general, pulmonary complications are characterized as early and are suspected to be observed during the postoperative in-hospital care.¹⁵ In our case, as we discussed previously our patient has been categorized as ASA III and EOSS stage 3, a high-suspicion candidate for postoperative complications. In order to prevent the possibilities, the patient was early-mobilized and treated with low-molecular weight heparin according to her weight. On postoperative day 2, her clinical presentation and our high suspicion led us to be quick an investigate her symptoms with computed tomography of the thorax, in order to exclude all pulmonary complications regarding pulmonary embolism, despite the fact that is a complication that most commonly occurs later after surgery.

The patient was diagnosed with a pulmonary complication, although the complication was not one of the most common and serious. On the computed tomography of the thorax, an extended right pulmonary effusion was detected and accidentally the tip of the central venous catheter was depicted to be on the right internal mammary vein. Regarding our high suspicion of complication in this patient we diagnosed her problem soon but we didn't have in mind or in our differential diagnosis a complication as a result of central venous

catheter malposition. The altered anatomy of an obese individual may increase the chances of a malposition. The central venous access is essential in obese patients because of the difficulty in peripheral venous system as a result of the increased adipose tissue in the arms and hands.¹⁶ Thus, we keep in mind that central venous catheter complications may be more common in obese patients.

From all possible complications after central venous catheter insertion, pneumothorax, hematomas, arterial injury, arrhythmias, thrombosis and infection remain the most common. Malposition of the catheter into small branches like internal mammary vein is extremely rare and only few case reports have been published in the literature.¹⁷

Anatomically, internal mammary vein arises from the innominate vein and follows a course downwards along the posterior part of the anterior thoracic wall just lateral to the sternum. If the insertion of the catheter occurs via the right internal jugular vein into the superior vena cava (SVC), the right internal mammary vein overlies SVC. Consequently, on a typical posterior-anterior chest x-Ray, the tip of the catheter seems to be on the right atrium and only a lateral imaging can give some more information.¹⁷

In our case, we believe that the extensive pleural effusion occurred by diffusion of fluid into the cavity and not by vein injury. The fluid after the thoracic catheter insertion was crystalloid with no signs of blood in it. Also, there were no signs of pneumothorax or position of the catheter into the thoracic cavity.

In the literature, there are some review articles suggesting that ultrasound guided central venous catheter placement and chest x-ray are not enough tools to prevent central venous catheter displacement and maybe ultrasound of the puncture point in association with a cardiac ultrasound are necessary to ensure the placement of the catheter in the right atrium. Although, the sensitivity of this method in the extremely rare cases where the catheter is in small branches like internal mammary vein, is low, this method may be the gold standard procedure in order to eliminate the cases of central venous catheter misplacement.^{18,19}

Conclusion

Obese patients belong to a unique category that is characterized as high risk for postoperative complications. The altered anatomy because of excessive weight leads to high chance of central venous catheter displacement. Postoperative surgical care is essential for obese patients and every surgeon has to keep in mind that every kind of intervention in the human body as minor as it may be, it can cause, in some cases serious complications.

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Conflicts of interest

There were no conflicts of interest.

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