

Risk factors for developing cardiac arrhythmias during bariatric surgery. Case report and review of the literature

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Abstract

Morbid obesity is a risk factor for arrhythmias (mainly atrial fibrillation), long QT interval, hypertrophic cardiomyopathy due to increased systolic volume and cardiac output, and ischaemic heart disease. During laparoscopic surgery, cases of ventricular fibrillation and sudden cardiac arrest (SCA) during gastric surgery related to electric stimulation of structures located close to the heart have been reported. We describe the case of a 49-year-old male with a history of hypertension, obstructive sleep apnea-hypopnea syndrome and morbid obesity with a body mass index (BMI) of 52.8. During the performing of a gastric bypass, possibly in relation to the electric activity of the scalpel near the Hiss angle, a heart rhythm compatible with ventricular fibrillation (VF) was observed. Cardiopulmonary resuscitation was carried out and cardiac massage was started

until a 360 joules electric shock was administered, recovering hemodynamic stability after a 4-minute cardiac arrest. Life-threatening cardiac arrhythmias can occur during bariatric surgery. In OM, a rigorous cardiovascular evaluation is essential to minimize postoperative mortality. Authors suggest to remain cautious with the use of the electric scalpel or the use of the ultrasonic scalpel near the heart during laparoscopic procedures. Understanding the physical principles of electrosurgery is essential for ensuring patient security.

Keywords:

- Arrhythmia
- Cardiorespiratory arrest
- Atrial fibrillation
- Monopolar energy

Objectives

Morbid obesity is a risk factor for arrhythmias (mainly atrial fibrillation), long QT interval, hypertrophic cardiomyopathy due to increased systolic volume and cardiac output, and ischaemic heart disease (1 – 3). During laparoscopic surgery, cardiovascular complications are usually attributed to haemodynamic disturbances caused by insufflation to create pneumoperitoneum during the procedure with the consequent decrease in venous return and cardiac output as a consequence of increased intra-abdominal pressure. However, cases of ventricular fibrillation and sudden cardiac arrest (SCA) during gastric surgery related to electric stimulation of structures located close to the heart have been reported (4 – 6).

Material and methods

We present the case of a 49-year-old male with a history of hypertension, obstructive sleep apnea-hypopnea syndrome and morbid obesity with a body mass index (BMI) of 52.8 kg/m². He was admitted for gastric bypass surgery. During the operation, he had a tendency towards low blood pressure requiring occasional administration of ephedrine and phenylephrine, after which he maintained normal blood pressure. Possibly in relation to the electric activity of the scalpel near the Hiss angle, a heart rhythm compatible with ventricular fibrillation (VF) was observed.

Results

Cardiopulmonary resuscitation was carried out and cardiac massage was started until a 360 joules electric shock was administered, recovering sinus rhythm and heart rate after a 4-minute cardiac arrest. Subsequently, the patient remained haemodynamically stable and the planned intervention was completed. The postoperative period was uneventful.

In morbidly obese (MO) patients undergoing gastric bypass, cardiovascular complications and death have been reported in the absence of atherosclerosis (7). These patients often have preoperative electrocardiographic abnormalities or cardiomegaly. The electric scalpel is one of the most commonly used instruments in laparoscopic surgery, with monopolar scalpel being the most common mode of electrocautery owing to its effectiveness and safety. However, its use in the vicinity of the angle of His or the diaphragm could cause stimulation of the right ventricle causing ventricular arrhythmias and even CRA.

Pericardial fat could have a protective role being ventricular fibrillation, which is a rare complication during bariatric surgery (8). This is caused by a low-frequency current leakage due to an arcing between the electrode tip and the tissue during cutting in coagulation mode. In case of VF, the patient survival depends on the interruption of the circuit by electrical cardioversion (5, 6).

Another cause of arrhythmias is pharmacological (1), with the risk being determined by the baseline QT interval. Drugs such as ondansetron or succinylcholine, which are widely used, may trigger arrhythmias in obese patients receiving previous treatments with a risk of QT lengthening, such as tricyclic antidepressants.

Conclusions

Life-threatening cardiac arrhythmias can occur during bariatric surgery. In OM, a rigorous cardiovascular evaluation is essential to minimize postoperative mortality. Authors suggest to remain cautious with the use of the electric scalpel or the use of the ultrasonic scalpel in laparoscopic interventions near the heart. Understanding the physical principles of electrosurgery is essential for ensuring patient security.

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