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ORIGINAL CONTRIBUTIONS

Aspiration Pneumonia: a Shadow in Post-Bariatric Patient

Correlation between aspiration and minigrastric bypass

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Abstract

Background The number of post-bariatric surgical procedures is increasing in time.

Post-bariatric patients must be carefully evaluated preoperatively, and they must be considered a particular group of patients in plastic surgery. Aspiration is an occurrence in surgical patients that can cause transient pneumonitis but, in some cases, it can progress to severe clinical acute lung injury or in acute respiratory distress syndrome. The aim of this research is to underline a correlation between one anastomosis bypass-minigastric bypass (OAGB-MGB) and biliar or gastric aspiration.

Methods We performed an analysis of literature and a systematic review of our post-bariatric patients who underwent body contouring procedures which required general anaesthesia from 2013 to 2018 and divided them in two groups: OAGB-MGB group and other bariatric procedures in order to compare the rate of aspiration/pneumonia occurred in time.

Results We collected 423 patients for 536 procedures and 9 complications. In the OAGB-MGB group, there was the highest rate of reflux/aspiration during anaesthesia induction (3.5%, 8 patients) compared with the other group (0.51%).

Risk ratio of OAGB-MGB group vs other procedures is 7.054.

Literature confirmed high risk of biliar reflux after OAGB-MGB procedure.

Conclusions This study underlined a significant correlation between OAGB-MGB and reflux/starting general anaesthesia in post-bariatric patients. In our experience we believe that it can be useful enlarge the pre-operatory fasting period and positioning a nasogastric tube during anaesthesia induction that can be performed moreover, in anti-Trendelenburg position, in order to prevent pulmonary aspiration.

Keywords Mini-bypass · OAGB-MGB · Post-batiatric plastic surgery · Aspiration · Ab-injestis

Introduction

Surgery after a massive weight loss has become actually an argument of interest in Plastic Surgery.

The number of bariatric/metabolic surgical procedures performed in 2014 consisted of 579.517 in the IFSO countries, 191.920 in the USA and 149.279 in Europe [1, 2].

This led plastic surgeons to perform increasing number of body contouring surgery procedures in order to correct post-obesity-related problems, such as skin redundancy: 75% of women and 68% of men were interested in plastic surgery following weight loss [3].

Among body regions, body contouring at the waist/abdomen is the most commonly contouring site [4] and the most common procedures are abdominoplasties [5].

Post-bariatric patients must be carefully evaluated preoperatively, and they must be considered a particular group of patients in plastic, reconstructive and aesthetic surgery, due to their vascular peculiarities, higher risk of seromas, dehiscences, hematomas, infections and venous thromboembolic events and due their anatomical alterations to digestive system [6–8].

Aspiration is an occurrence in surgical patients that can cause transient pneumonitis but, in some cases, it can progress

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to severe clinical acute lung injury or in acute respiratory distress syndrome. [9]

The aim of this research is to underline a possible correlation between one anastomosis bypass-minigastric bypass (OAGB-MGB), bile reflux and aspiration pneumonia in some post-bariatric patients, discussing our experience and literature, in order to alert those Plastic Surgeon performing post-bariatric surgery.

To date, there are no strong evidences in literature suggesting a high risk of aspiration pneumonia during anaesthesia induction in patients who previously underwent OAGB-MGB procedures, but many authors are according on presence of biliar and gastro-oesophageal reflux after OAGB-MGB. We focused on this complication as a possible *alert* for plastic surgeons and anaesthesiologists who usually perform surgery for this kind of patients.

Materials and Methods

This research is in conformity with Helsinky Declaration. Every patient firmed an informed consent before every procedure.

This research started in November 2018, when an aspiration and consequent ARDS occurred in a 39-year-old female patient hospitalized in our Operative Unit for a body contouring procedure (tummy tuck) due to abdominal skin redundancy and dermolipodystrophy after a massive weight loss following OAGB-MGB procedure.

The patient had a history of biliar and gastric reflux started after OAGB-MGB procedure and treated with omeprazole 40 mg/die; she did an ab-ingestis during the induction of general anaesthesia in operative room after 12 h of fasting.

In January 2019, we performed the same procedure on her sister (who underwent OAGB-MGB procedure and had important biliar reflux as well, treated with omeprazole 60 mg/die) and we carefully evaluated and prevented this complication by alerting the fibroscopist in our operatory room, previously extending her pre-operatory fasting period and inducing anaesthesia in an oblique position. This patient had a reflux during general anaesthesia induction, too, but without aspiration.

We carefully studied their anamnestic histories as well, underling OAGB-MGB procedure and gastro-oesophageal reflux in both patients.

We performed a systematic review of our patients who underwent body contouring procedures which required general anaesthesia (abdominoplasty, brachioplasty, thigh lifts, mastopexy) from 2013 to 2018, after a massive weight loss due bariatric surgery, and divided them in two groups: OAGB-MGB group and sleeve gastrectomy group plus intragastric balloon group plus bilio-pancreatic diversion and evaluated the rate of aspiration pneumonia in each group, anamnesis for biliar or gastric reflux, some life-habits like smoke and alcohol.

The rate of aspiration pneumoniae or reflux occurred during anaesthesia was calculated.

The statistical significance was evaluated calculating relative risk and Chi-square tests, assuming OAGB-MGB as a risk factor for the recurrence of aspiration pneumonia, compared with other bariatric procedures. The respect of the pre-operatory fasting period was assured in each patient through our nursery informatic check-list.

Results

We collected 423 patients for 536 procedures and 9 complications. We collected 423 patients submitted for 536 body contouring procedure (abdominoplasy or brachioplasty or thigh lifts or mastopexy).

Among them, 228 underwent OAGB-MGB procedure, 125 sleeve gastrectomy, 64 gastric banding, 6 bilio-pancreatic diversion Table 1.

We focused on the rate of oesophageal reflux/aspiration in each group:

In the OAGB-MGB group, there was the highest rate of reflux/aspiration during induction: 8 patients on 228 (3.5%, 8 patients) compared with the other group: sleeve gastrectomy plus gastric banding plus diversion registered only 1 patients (0.51%).

Risk ratio of OAGB-MGB group vs other procedures is 7.054.

Of the 8 aspirations of the OAGB-MGB group, two went into a full ab-ingestis but only one degenerated into aspiration pneumonia. The aspiration in the group of other procedures is related to a patient who had bilio-pancreatic diversion and developed an ab-ingestis without pneumonia.

No significant differences were found in other related factors such as smoking, alcohol abuse, coffee abuse or diets that could have caused an increase in reflux.

The main limitation of these studies and these statistical tests is them not taking into account the specific clinical conditions of the patients. In this regard, one patient in the OAGB-MGB group had a history of psychiatric dyspepsia in treatment with antipsychotics.

A careful analysis of the literature, as will follow in the discussion in detail, has highlighted an interesting factor: the OAGB-MGB is correlated with a high risk of bile reflux, bile in the oesophagus and lung damage due to biliary microaspirations.

Table 1 Patients and procedures

PROCEDURES	MASTOPEXY	ABDOMINOPLASTY	BRACHIOPLASTY	THIGHT LIFT
563	188	202	102	71

PATIENTS	MINI GASTRIC BYPASS	SLEEVE GASTRECTOMY	GASTRIC BANDING	BILIO-PANCREATIC DIVERSION
423	228	125	64	6

MINI GASTRIC BYPASS	**228**
REFLUX/ASPIRATION	8

SLEEVE GASTRECTOMY	**125**
REFLUX/ASPIRATION	1

GASTRIC BANDING	**64**
REFLUX/ASPIRATION	0

BILIO-PANCREATIC DIVERSION	**6**
REFLUX/ASPIRATION	0

TOTAL OF PROCEDURES	TOTAL OF PATIENTS
563	423

Discussion

OAGB-MGB was introduced by Rutledge in 2001 [10, 11] that described a modification of Mason's loop gastric bypass with longer curvature-based pouch. The main advantages are simplicity in performing, the efficacy and the ease in revision with similar results in terms of weight loss and co-morbidity resolution. Despite this, many authors raised some controversy surrounding this technique biliary gastritis and or oesophagitis that require revision surgery in some cases.

Mahawar et al. examined the main controversies in a review including 128 articles in 2014. [12] First opposition to OAGB-MGB was proposed by Fisher et al. in 2001 that showed an increase in gastric and oesophageal bile reflux due to lesser curvature that increased exposure of gastric mucosa to bile. The second one opposition came from Johnson et al. in 2007 [12, 13] that analysed revisional surgery rate after OAGB-MGB of five centres showing that the most frequent complication reported in this study was bile reflux gastritis raised in 62.5% of evaluated patients.

Although a systematic review by McQuaid et al. of 2011 [14] showed an increase in DNA damage in Barret's syndrome by the bile in oesophagus, clinical studies have not shown an unequivocal correlation between bile reflux and Barret's oesophagus.

A review proposed by Parmar et al. in 2018 [10] showed an incidence of gastro-oesophagous reflux disease in 0.6 to 10% of patients, well treated with pump inhibitors.

The relationship between gastro-oesophageal reflux disease and aspiration/airways disorders has long been postulated by many authors [15], but the damage on airways depends on the amounts of aspiration and by its composition [16–18]: bile acids, if present, may play roles in aspiration injury; many authors discussed that association between bile acid reflux aspiration and infection with *Pseudomonas aeruginosa* [15, 19–22].

Plastic surgery after massive weight loss is a widespread surgical procedure in the world. In our operative unit, we usually perform body contouring procedures in post-bariatric patients with skin redundancy and dermolipodystrophy in thighs, abdominis, arms, and pseudogynecomastia obese as well.

After aspiration, as described in the previous paragraph, the patient's airways were immediately aspirated by the fibroscopist that was alerted. He confirmed the absence of solid material in airways. Approximately 200 cc of green/yellow liquid were aspirated. Then the patient was successfully intubated. Anaesthetist gave the consent to perform the intervention because good vital parameters were registered.

After surgery and de-intubation, desaturation was revealed and a chest x-ray was requested: aspiration pneumonia was confirmed. The inflammatory parameters and the pro-calcitonin were monitored. A 10–12-mmhg continuous positive airway pressure (CPAP) therapy was established for 7 days. Two days post-operative, we registered an increase in pro-calcitonin and inflammatory markers and x-ray revealed a worsening of lung imaging, then antibiotic therapy based on clindamycin 600 mg every 8 h and amoxicillin/clavulanic acid every 12 h was started.

After 10 days, the patient was discharged. An x-ray control at 10 days showed remission of the pulmonary disease.

We faced a life-threatening complication, aspiration pneumonia, which is more frequent in patients who previously underwent OAGB-MGB procedure.

Conclusions

This study showed a statistically significant correlation between OAGB-MGB and reflux during the induction of general anaesthesia in post-bariatric patients. We did not underline a strong correlation between OAGB-MGB and aspiration pneumonia, and further studies with a larger number of patients and parameters will be required, but many authors agree that OAGB-MGB is linked to bile reflux, presence of bile in oesophagus and gastritis, and many patients require inhibitor of protonic pump for long time.

Because this kind of surgery is increasingly performed, we believe that this research can be considered as an alert for plastic surgeons and anaesthesiologists who usually perform body contouring procedures with the use general anaesthesia in patients who underwent OAGB-MGB procedure.

In our experience, we believe that it can be useful enlarge the pre-operatory fasting period until 10–12 h and positioning a nasogastric tube during anaesthesia induction that can be performed moreover, in anti-Trendelenburg position, in order to prevent pulmonary aspiration.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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