Case Study

Laparoscopic Gastric Bypass Surgery & Obesity
Pathology Associated with Obesity

- Coronary Artery Disease
- Atherosclerosis
- Hypertension
- Diabetes mellitus
- Obstructive Sleep Apnea
- Systemic and pulmonary hypertension
- Gastroesophageal reflux disease
- Non alcoholic fatty liver disease
- Cholelithiasis
- DVT
- Degenerative disk disease
Preoperative Evaluation

- 56 year old woman
- Type 2 Diabetes
- Hypertension
- ↑ Chol
- OSA
- GERD
- 25 pack year smoker
- No PSH
- Uses a walker frequently
- 61” tall
- 151 kg/334 lbs. (BMI = 63.3)
- EKG: NSR with nonspecific ST segment abnormalities
- ECHO: EF 67% LVH
- CXR and Labs WNL
Absolute contraindications to bariatric surgery?

- A lack of understanding of the procedural risk
- Severe liver disease with accompanying portal hypertension.
- Uncontrolled severe OSA with pulmonary hypertension.
- Unstable or terminal illness
Airway Plan

• Patient was induced and intubated with the Glidescope after adequate pre-oxygenation and ramping of the patient

• Rapid-sequence induction

• Ramp

• Glidescope intubation.
• You notice that your pulse ox is slowly dropping and your peak airway pressures are rising.

• Maintaining adequate oxygenation for this morbidly obese patient is becoming a challenge.
Goals

Prevent Atelectasis
- Recruitment maneuver by using sustained (8-10 seconds) pressure \(\geq 40 \text{cm/H}_2\text{O}\).
- Restrict the use of FiO2 to less than 0.8 during maintenance of anesthesia.

Maintain Lung Recruitment
- Use PEEP (10-12 cmH\(_2\)O)
- Increase I:E ratio to 1:1
- Improves arterial oxygenation
Avoid lung overdistension

- Use tidal volume of 6-10 mL/kg of IDEAL body weight.
- Keep peak inspiratory pressure <30 cm/H₂O
- Change to pressure control.
- Consider mild hypercapnia if necessary.

Maintain postoperative lung expansion

- Use CPAP or BiPAP immediately after tracheal extubation.
- Keep upper body elevated.
- Maintain good pain control using multimodal approach.
- Use incentive spirometry.
- Encourage early ambulation.
Case continues...

- The operation takes longer than expected due to the patient’s body habitus.
- Total time on the table 6 hours
- Extubation successful and you take your patient to PACU, glad to be done!
POD 1 Visit

- C/O gluteal and lumbar myalgia
- Oliguria
- Overnight hospitalist had ordered CPK & Myoglobin levels
  - CPK >30,000 (Normal is <250)
  - Myoglobin: >400 (Normal 0-85)
What’s the Significance?

- Creatine Phosphokinase Enzyme (CPK) – found in skeletal muscle
- The patient’s level was over 5x’s the normal value, which is diagnostic for Rhabdomyolysis (RML)
- Pharmacologic causes of elevated CPK are: ETOH, Amphotericin B, cocaine, steroids such as dexamethasone, and statins
• This patient’s creatine phosphokinase level was **38,700 U/L**
Rhabdomyolysis (RML) is a rare complication of surgical procedures, and is caused by injury and destruction of skeletal muscles.

- It is accompanied by pain in the region of the referred muscle group, an increase in CPK (5x’s or more of the normal value), and myoglobinuria. This can lead to varying levels of renal dysfunction, and if not recognized and treated, multi-organ system failure and death.
Rhabdomyolysis

- Morbidly obese patients who undergo laparoscopic bariatric operations should be considered high-risk for RML
  - extended immobilization and pressure phenomena in the lumbar and gluteal regions.
• Significant correlation between postop CPK, Myoglobin, surgical duration, and patients’ BMI.

  • Retrospective study of 100 patients undergoing laparoscopic gastric bypass
  • 6 out of 100 found to have acute kidney dysfunction secondary to RML
RML ranges in severity from asymptomatic to life-threatening

- Electrolyte disturbances
- Kidney injury
- Cardiac arrest
- DIC
- Multi-organ failure
Increasing population of bariatric surgical patients

Awareness of identified risk factors for RML is key

- Surgical time > 4 hours
- BMI > 40
- HTN (presence of comorbidities)
- ASA status III-IV
- Lithotomy position
Precautions

- Awareness of comorbidities
- Positioning and padding
- Adequate intraoperative fluid administration
- Postoperative CPK monitoring in high-risk patients can hasten diagnosis and prevent further complications
  - If untreated, 33% of patients develop AKI secondary to RML (Forfori, et al 2013)
Treatment after Diagnosis

- Adequate fluid resuscitation to prevent further renal damage by flushing myoglobin
- Mannitol and Sodium Bicarbonate to maintain urine pH > 6.5
  - Postulated to minimize breakdown of myoglobin into its nephrotoxic metabolites
Summary

- RML in this patient population most likely caused by prolonged muscle pressure, resulting in a compartment-like syndrome
- Early detection can mitigate RML’s deleterious effects
- CPK is a sensitive marker for the diagnosis of RML
References

