Effect of muscle relaxants on the abdominal pressure-volume relation

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Goal of Study

The aim of the study was to evaluate the effect of muscle relaxants on the abdominal pressure-volume relation.
Methods and analysis

- 33 patients, ASA class I, II or III and scheduled for a bariatric laparoscopic intervention were included in this study with approval from the hospital ethical committee.
- Age, length, bmi, sex, and gravidity were recorded.
- Anaesthesia was induced with Propofol 200 mg, Sufentanil 20 ug, Succinylcholine 100 mg and Sevoflurane 1.5 Mac in a 50 % O2/N2O. Patients were asked to empty the bladder before surgery.
- The stomach was emptied by suction through a gastric tube. All the CO2 was allowed to escape after insertion of the trocar.
- The insufflator Olympus UHI-3 was initialised and during a stepwise insufflation at a flow of 1 l/min the abdominal pressure and volume were measured.
- 20 mg Cisatracurium was given and after confirming muscle relaxation with a post-tetanic count stimulation, the second insufflation and measurement was done.
- Pressure-volume data were fit by a linear least-squares regression and used to calculate the abdominal volume at 15 cmH2O pressure.
- A logistic regression analysis was done to find the variables determining the abdominal volume before relaxation.
- The abdominal volume increase by muscle relaxants was analyzed by a paired t test and by a logistic regression analysis for its variables.
Results

**Abdominal Volume before Relaxation**

- **Without muscle relaxants**
  - Starting volume: 1.59 l
  - Ending volume: 2.25 l

- **With muscle relaxants**
  - Starting volume: 1.59 l
  - Ending volume: 2.25 l

**Volume increase by muscle relaxation**

- **Without muscle relaxants**
  - Volume increase: 0.00 l

- **With muscle relaxants**
  - Volume increase: 18.00 l

**Statistical Significance**

- *p < 0.000

**Graphical Representation**

- **Without muscle relaxants**
  - Fit curve

- **With muscle relaxants**
  - Fit curve

**Comparison**

- Significance level denoted by stars: *p < 0.000
Discussion

- Multiparae ($p=0.027$) have significantly larger abdomens.
- Abdominal volume increased significantly ($p=0.000$) $0.95$ l with a large stdv of $1.22$ l.
- The increase was significantly more in tall patients ($p=0.047$) and in patients with a small abdominal volume before insufflation ($p=0.003$).

Conclusion

- Muscle relaxation during laparoscopy for bariatric surgery helps to increase the abdominal volume in many patients and therefore the surgical workspace and visibility.
- Multipara have the largest abdomen.
- Abdominal volume increased most in patients with a small abdomen.
- Some patients have already a large abdomen and don’t need muscle relaxation.
- Muscle relaxation is not effective in every patient.