Comparison of Deep vs. Moderate neuromuscular blockade on Low-Pressure pneumoperitoneum for laparoscopic cholecystectomy

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WHY LOW-PRESSURE PNEUMOPERITONEUM (IAP<9 mmHG)?

- Clinical Outcome Advantages: Impact on postoperative pain and quality of recovery. Fewer adverse effects (pulmonary/hemodynamics)
- Experimental assays: Impact on the recovery of injured tissues, peritoneal cancer spread and postoperative complications like adhesion syndromes or fibrosis (Matsuzaki et al.)

LIMITATIONS OF LOW-PRESSURE PNEUMOPERITONEUM: SURGICAL CONDITIONS. Working with low-pressure pneumoperitoneum can limit working space during laparoscopy and it can affect surgical conditions or the surgeon's satisfaction.

NEUROMUSCULAR BLOCKADE (NMB) AND SURGICAL CONDITIONS: Deep NMB (TOF 0, PTC 1-5) vs no NMB has shown a beneficial effect on the abdominal space during pneumoperitoneum establishment, however there is no evidence yet to suggest that using deep NMB, as opposed to moderate NMB (TOF 1-3), will improve surgical operating conditions in laparoscopic surgery.

GOAL OF THE STUDY: To assess the influence of NMB depth on performing low-pressure pneumoperitoneum laparoscopic cholecystectomy (LC), comparing Deep-NMB and Moderate-NMB. Surgical conditions, operation time and complications were investigated.

MATERIAL AND METHODS: RANDOMIZED-SINGLE BLINDED CLINICAL TRIAL (Rocuronium/Sugammadex/TOF WATCH-S)

- 90 patients (60f/30m, ASA 1-2, 49,8±11,7 y, normal-range BMI) scheduled for elective LC were randomly allocated into three groups (N=30):
 - **Group 1: Low-Pressure LC** (IAP 8mmHg) with **Deep NMB** (TOF 0, PTC < 5).
 - **Group 2: Low-Pressure LC** (IAP 8mmHg) with **Moderate NMB** (TOF 1-3).
 - **Group 3: Standard-Pressure LC** (IAP 12 mmHg) with no intervention on NMB depth (**CONTROL GROUP**: reflect of clinical practice).
- Three experienced surgeons (Blinded to IAP setting) performed all the surgeries and judged surgical conditions according to a 4-step scale at 3 Points of evaluation (Exposure, Dissection of gallbladder and Extraction-closure):
 - GOOD CONDITIONS:** 1- **OPTIMAL** surgical conditions to perform LC.
2- **Not optimal, but ACCEPTABLE** surgical conditions to perform LC.
 - BAD CONDITIONS:** 3- **LC can be performed with DIFFICULTY** in these conditions (no intervention).
4- **BAD** surgical conditions. An **INTERVENTION** is necessary to perform LC.

RESULTS: No differences in demographic data were observed within the groups.

- **ACCOMPLISHMENT of Low-Pressure LC:** Average 91,6% (No differences between Deep vs Moderate NMB, p=0,353, Fisher).
- **SURGICAL CONDITIONS:**
 - **Low-Pressure LC:** No statistically significant differences between Deep vs Moderate NMB neither in the distribution of Good/Bad Conditions nor in Step distribution at any Point of evaluation, (Fisher).
 - **Standard-Pressure LC:** Statistically better Surgical Conditions than Low-Pressure LC at the Dissection Point (*p=0,021, Fisher). No Bad Conditions at any Point for Standard Pressure LC, while 15% at Dissection Point for Low-Pressure LC.
 - **Standard Pressure LC:** Statistically significant higher proportion of Surgical Conditions Step 1 (Optimal Conditions) for Standard-Pressure LC at any Point (**p<0,003, Fisher). No Step 4 (Intervention) for Standard-Pressure LC while 8,3% for Low-Pressure LC.
- **COMPLICATIONS:** No major complications (Bleeding or Bile duct injury) in any group.
 - Minor complications (Gallbladder Perforation) were higher for Low-Pressure LC (28,3%) than for Standard-Pressure LC (6,7%), p=0,026.
 - No differences in minor complications during Low-Pressure LC were observed between Deep (23,3%) vs Moderate NMB (33,3%),p=0,567.
- **OPERATING TIME:** No differences in operating time were observed within the groups. Average: 43,6±13 min (p= 0,903, Anova)

CONCLUSIONS:

- We did not observe better surgical conditions when performing Low-Pressure LC with Deep NMB compared with Moderate NMB. Bad surgical-conditions, complications and operating time were not different at both NMB levels.
- Depth of NMB did not affect the rate of accomplishment of Low-Pressure LC.
- Surgical conditions were judged better and the incidence of minor complications was lower when performing LC with Standard-Pressure pneumoperitoneum than with Low-Pressure Pneumoperitoneum, unrelated to NMB level.