Effect of pneumoperitoneum on hemodynamics and inspiratory pressures during natural orifice transluminal endoscopic surgery (NOTES): an experimental, controlled study in an acute porcine model.

BACKGROUND AND STUDY AIM: Physiologic reactions during natural orifice transluminal endoscopic surgery (NOTES) may differ from those at laparoscopy. This experimental study assessed the effect of pneumoperitoneum induced by endoscope air pump on hemodynamics and inspiratory pressures during transgastric peritoneoscopy. METHODS: Transgastric peritoneoscopy was performed in 11 female pigs (35 - 50 kg) under general anesthesia. Five pigs with controlled insufflation and no endoscopic intervention served as controls. Cardiac index and global end-diastolic volume index (GEDVI; reflecting preload) were measured every 3 minutes by transpulmonary thermodilution. We also recorded: intra-abdominal pressure (IAP), heart rate, mean arterial pressure (MAP), systemic vascular resistance index (SVRI; reflecting afterload), peak inspiratory pressure (PIP), and oxygenation. RESULTS: One study group pig was excluded from analysis because of a major complication related to the gastric incision. In the remaining 15 animals we performed 264 paired measurements. On-demand insufflation in the study group produced wide variation in intra-abdominal pressures; the control group demonstrated minimal
fluctuation around a predetermined value. In the study group, IAP and PIP correlated well (R = 0.667, 
P = 0.000), with maximum PIP values of 40 mbar contrasting with the control group maximum of 26.5 
mbar. Hemodynamically, there was a minor decrease of cardiac index in the study group (in contrast 
to the control group). Relative changes in cardiac index and IAP during transgastric peritoneoscopy 
correlated highly significantly (R = -0.416, P = 0.000). Neither group showed hemodynamic instability 
or decline in oxygen saturation. CONCLUSIONS: On-demand insufflation with a standard endoscopic 
light source/insufflator resulted in a marked median increase and wide variation in IAP throughout 
transgastric peritoneoscopy. Hemodynamic changes were moderate. However, major increases in 
PIP suggest a need for stricter control of intra-abdominal hypertension during NOTES.