369. Pre-operative evaluation in thoracic surgery

3300 Study of compensatory lung growth after right bilobectomy in a COPD experimental model
Francine Almeida1, Beatriz Saraiva-Romanholo1, Rodolfo Vieira2, Henrique Moriya3, Fernanda Lopes1, Thais Mauad 4, Milton Martins1, Rogerio Pazetti5.
1Laboratory of Experimental Thepeutics, São Paulo University Medical School, São Paulo, SP, Brazil; 2Post Graduate Program in Biophotonics Applied to Health Sciences, Nove de Julho University, São Paulo, SP, Brazil; 3Telecommunications and Control (LEB), São Paulo University Polytechnic Institute, São Paulo, SP, Brazil; 4Pathology, São Paulo University Medical School, São Paulo, SP, Brazil; 5Laboratory of Thoracic Surgery Research-LIM61, Heart Institute (InCor), Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo, SP, Brazil

Lung volume reduction surgery (LVRS) is one of the surgical approaches performed in COPD patients waiting for lung transplant. We hypothesized that compensatory lung growth (CLG) after LVRS is important to explain the improvement of life quality in these patients after LVRS. We investigated the CLG physiological effects after right bilobectomy (LBX) in a COPD rodent model. Sixty-four rats were assigned in 4 groups: saline+sham LBX (SS), saline+LBX (SO); elastase+sham LBX (ES); and elastase+LBX (EO). Forty days after instillation with elastase (5UI/100g) or saline, animals were underwent to sham surgery or right LBX (middle and cardiac lobes). Eight animals from each group were killed after 2 (T1) or 4 (T2) weeks and ventilatory parameters, lung tissue remodeling, gas exchange area and inflammatory cells were measured. All elastase-treated animals showed a typical destruction of lung parenchyma architecture with a decrease in elastic fibers amount (11.1±4.1 and 9.4±2.7%, saline and elastase, respectively, p<0.05) and an increase in average alveolar diameter (Lm) (66.5±6.1 and 94.3±18.6 μm, saline and elastase, respectively, p<0.05) and collagen fibers proportion (8.6±1.6 and 11.7±1.4%, saline and elastase, respectively, p<0.05). The CLG observed in elastase-treated animals after LBX was followed by a decrease in Lm (94.1±13.9 and 76.8±10.9 μm, ES and EO, respectively, p<0.05), and an increase in lung elastance (1.2±0.1 and 1.6±0.3cmH2O/mL/s, ES and EO, respectively, p<0.05) and elastic fibers (8.5±1.1 and 13.1±1.1%, ES and EO, respectively, p<0.05). We conclude that the compensatory lung growth after LBX plays an important role in the improvement of lung elasticity and function in COPD animals.

3301 The use of respiratory functional imaging to get better understanding of lung resection surgery
Wim Vos1, Cedric Van Holsbeke1, Annelies Janssens2, Samir Vinchurkar3, Tan De Baccker4, Wim D’hondt1, Wilfried De Backer1,1 Respiratory, FluidDA nv, Kontich, Belgium; 2Respiratory Medicine, University Hospital Antwerp, Edegem, Belgium

Aim: The aim of the present study was to get a better understanding of the impact of lung resection surgery (LRS) on the respiratory function using respiratory functional imaging (RFI).

Method: 7 patients underwent either a single (5/7) or double lobectomy (1/7), or a full pneumectomy (1/7). All patients underwent lung function tests and CT based RFI providing imaged Raw (iRaw), airway volume (iVaw) and internal flow distribution before and after surgery.

Result: LRS causes deformation of the airways (see figure), a significant drop in FEV1 (p=0.02), TCO (p=0.02) and VA (p=0.02) and an increase in Raw (p=0.03). RFI shows decreased airway volume (iVaw,p=0.02) and increased resistance (iRaw,p=0.02). Changes in both iVaw and iRaw did correlate with changes in FEV1 (p=0.007 and p=0.02). If iVaw, iRaw and lobar flow were recalculated...
Conclusion: Patients with mechanical and/or decreased gas exchange (<80%) present a lower (VO2 max). The use of the algorithm that includes as initial step exercise testing predicts a good postoperative surgery.

3305
Six minute walk test (6MWT) in patients with diagnosis of lung cancer – Clinical value in physiological evaluation candidates for surgical treatment
Monika Franzek, Piotr Rudzinski, Jerzy Ustrueklewicz, Marek Kampa, Renata Langfort, Stefan Wesolowski, Tadeusz Orłowksi. Lung Function Dept, Thoracic Surgery Dept, Rehabilitation Dept., Dep. of Pathology, National Research TB and Lung Diseases Institute, Warsaw, Poland.

The lung function testing (LFT) and assessment of exercise capacity in patients with lung cancer are important tools for qualification for the surgery and estimation the risk. However the commonly used 6MWT is not recommended by the current guideline as a reliable method of evaluation (Brunelli 2009).

The aim of the study was to analyze the differences in LFT and 6MWT between patients with and without complications after lung resection. The analysis included 127 operated pts (mean age 63,1±9,3 yrs, 80 M, 47 F), with histopathologically confirmed NSCLC. Patients with a history of previous lung resection, chemotherapy or radiotherapy were not included into the study.

The comparison of LFT and 6MWT was performed and the differences between pts without (86 pts) and with (41 pts) postoperative complications (e.g. arrhythmias, PAL, hemorrhage) were noted.

- FEV1 2,4 ± 2,1 L, p<0,01 (91,3 ± 75,5%, p<0,001), FEV1/FVC 69,2 ± 60,3% (p<0,001), ppoFEV1 1,9 ± 1,6 L, p<0,01 (71,9 ± 51,3%, p<0,001).
- 6MWT distance 430 ± 415 m, SaO2 start 96,9 ± 95,5% (p<0,001), SaO2 min 95,5vs. 92,2% (p<0,001). In univariate analysis ppoFEV1/pred., 6MWT distance and minimal value of SaO2 during the test were significant prognostic variables.

Conclusions: Patients with postoperative complications had lower lung function indices (FEV1, ppoFEV1) and lower minimal saturation during 6MWT than those with uneventful postoperative course. Those findings suggest that 6MWT, highly reliable in estimating exercise tolerance in COPD patients, ILD and IPAH, can be valuable also in assessment of lung cancer patients, candidates for surgical treatment.

3306
Effect of pre-operative short-term rehabilitation on peak VO2 in patients with NSCLC
Pier-Olivier Bridevaux1, Jean-Marie Tschoff2, Chetna Bhatia3, Isabelle Friesland, Frederic Triponez4, Jean-Marie Schwyzer5, John Roberts6, Thierry Rochat1, Marc Licker7. 1Pulmonary Care Division, University Hospitals, Geneva, Switzerland; 2Pulmonary Care Division, Reseau Santa Valais, MolareMontana, Switzerland; 3Pulmonary Care Division, University Hospitals, Geneva, Switzerland; 4Thoracic Surgery Division, University Hospitals, Geneva, Switzerland; 5Physiotherapy Division, University Hospitals, Geneva, Switzerland.

Pulmonary fitness is best assessed with cardio-pulmonary exercise testing (CPET) in patients with non-small cell lung cancer (NSCLC). Peak Oxygen consumption (VO2 peak) is predictive of short-term complications after thoracic surgery. Feasibility and effect of short-term (2 to 3 weeks) rehabilitation on fitness and short-term outcomes are unknown. We planned a pragmatic, randomized controlled trial (RCT) comparing short-term rehabilitation (R) with usual care (UC) in patients with operable NSCLC.

Method: This ongoing study enrolls patients after baseline CPET from 2 centres in

3519
Switzerland. Intervention: preoperative three-times a week, intensive, respiratory physiotherapist supervised interval training. Controls: usual care

**Outcomes:** Post-operative complication rate, short-term change in VO2 (baseline and immediately before surgery), long-term fitness and quality of life.

**Results:** Up to December 2011, 65 patients were randomized, R n=31, UC n=34 (mean age 63.4 [10.5], FEV1 86.7% [23.5], DLCO 70.5% [19.0], VO2 peak 19.5 ml/min/kg [5.7], watt peak 86 W[38], 6MWT 370 m [101]). As reassessed immediately before surgery VO2 peak (+2.3 [0.7] ml/min/kg, p=0.04), watt (+15.5 [4.6] W, p=0.04), 6MWT (+87 [15.5] m, p <0.01) improved in R but not in UC patients.

**Conclusion:** This interim analysis shows that short-term intensive rehabilitation is feasible and improves fitness before surgery in patients with resectable NSCLC.

### 3307

**Structured light plethysmography for the non-contact estimation of chest and abdominal motion changes after thoracic surgery: pilot experience**

Irisz Levai1, Simon Baker2, Willem de Boer2, Richard Iles1, Aman Coonar3.

1Department of Respiratory Paediatrics, Addenbrookes Hospital, Cambridge University Hospitals, Cambridge, Cambridgeshire, United Kingdom; 2PneumaCare Ltd, St. John’s Innovation Centre, Cambridge, Cambridgeshire, United Kingdom; 3Department of Thoracic Surgery, Papworth Hospital, Papworth Everard, Cambridgeshire, United Kingdom

**Introduction:** Structured Light Plethysmography (SLP) is a non-contact method of studying chest and abdominal motion. SLP allows a representation of chest and abdominal wall movement which can relate to tidal and spirometric volumes. This can also be studied with a 3D-viewer.

**Methods:** We obtained serial data from 10 patients who underwent thoracic surgery. They were scanned pre and postoperatively with a PneumaScan-P2™ device (PneumaCare, Cambridge, UK). A checkerboard grid of light was projected onto the patients’ chest area. Two digital cameras, recorded the grid movement during breathing. Data was presented as a respiratory volume trace over time and as Konno-Mead plots for left v right hemithorax and chest v abdomen movement. A post operative patient is shown in figure 1.

**Results:** In some patients following thoracic surgery we demonstrate reduced chest wall motion on the operated side. We find improvements in chest wall movement over the recovery period. In one patient no significant difference in pre and post op scans can be found. This patient had virtually no pain post-op and returned to work 5 days after his limited thoracotomy and lung resection.

**Conclusions:** SLP can objectively measure chest wall movement in thoracic surgery patients. There may be a role for it in monitoring post-operative recovery and we are exploring this further.