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317. Mediastinum and tracheobronchial tree

P2930

Evaluating outcomes after therapeutic rigid bronchoscopy using impulse oscillometry in patients with tracheal stenosis

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Background: Previously impulse oscillometry (IOS) provided useful data for monitoring respiratory mechanics through the endotracheal tube.

Objective: To confirm that IOS monitoring can assess the efficacy of interventional procedures in patients with tracheal stenosis.

Methods: IOS was performed on 14 patients with tracheal stenosis in the endoscopic suite between April 2009 and December 2011. After patients were intubated with a rigid bronchoscope (EFER, La Ciotat, France), IOS (CareFusion, Hochberg, Germany) was attached to the tube of the rigid bronchoscope. IOS was performed in real time during interventional procedures under spontaneous breathing. Resistance at 5Hz (R5) and 20Hz (R20) measurements were recorded during inspiration and expiration. The cross-sectional area (CSA) at the narrowest segment was recorded using zioflation (Ziosoft, Tokyo, Japan) before bronchoscopic intervention.

Results: Prior to stenting, IOS measurements using rigid bronchoscopy revealed R5 was 1.24 ± 0.92 kPa/l/s and R20 was 1.31 ± 0.79 kPa/l/s. After stenting, R5 and R20 showed significant improvements (R5 was 0.60 ± 0.33 kPa/l/s, R20 was 0.64 ± 0.28 kPa/l/s $p < 0.05$). There was little difference between R5 and R20 during inspiration and expiration.

R5 on inspiration revealed the strongest correlation with the narrowest segment of the cross-sectional area ($r = -0.61$, $p < 0.05$).

Conclusion: IOS could evaluate airway narrowing in real time during interventional bronchoscopy.

P2931

Surgical treatment of descending necrotizing mediastinitis

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Surgical treatment of descending necrotizing mediastinitis remains one of the most complex and unresolved problems in thoracic surgery. High level of mortality (up to 70%) is indicative for it's actuality.

Material and methods: The study based on an analysis of treatment 158 patients with descending necrotizing mediastinitis of following localization: upper anterior – 45, upper posterior – 28, upper total – 20, total anterior – 20, total posterior – 15, total – 30.

Results: Surgical treatment undergone 152 patients (six was not operated and died within two hours after admission). Overall mortality was – 37.7%, postoperative – 35.5%. The results of clinical application of new methods of draining of anterior and posterior mediastinum are presented.

Conclusions: Surgery method remains the main in the treatment of descending mediastinitis. The results of treatment can be improved by timely diagnostics, adequate mediastinal draining, adequate homeostasis correction, “open” cervical wound treatment, tracheostomy only in cases of impossibility of intubation.

P2932

A rare case of mediastinal inflammatory myofibroblastic tumor

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The inflammatory myofibroblastic tumor (IMT) or the inflammatory pseudotumor

is a rare benign tumor composed of spindle cells that is known to develop in various locations such as lung, skin, breast, gastrointestinal tract, pancreas, bone, epididymis, peritoneum. Mediastinal localisation of the tumor is very rare. We present the case of a 16 years old female with such pathology.

Methods: The patient was admitted into our clinic with a history of pain in the right hemithorax, mild dyspnea and irritative cough. The chest x-ray showed a great ascension of the right hemidiaphragm. Abdominal ultrasound revealed the presence of heterogeneous formations, bulky with liver parenchyma dislocation and fluid collection. The Chest CT examination showed a giant formation in the right hemithorax having right upperdiaphragmatic mass effect on the liver, lower mediastinum and lung parenchyma. A right posterolateral approach was used revealing a giant tumoral formation (14/13/12 cm) originating from the mediastinum. Total surgical ablation was performed.

Results: The postoperative outcome of the patient was good, with no complications and lung reexpansion. The hospital stay was 7 days. Immunohistochemistry was positive for desmin, VIM, CD 34, CD 68, Ki67, and was diagnosed with inflammatory myofibroblastic tumor. No tumoral recurrence was noticed at the one year and two year follow-up.

Conclusions: The mediastinal inflammatory myofibroblastic tumor is a very rare pathology. It can raise a series of problems such as the preoperative diagnosis, technical problems related to its location. If total surgical ablation is possible the patients have a favorable outcome.

P2933

Mediastinal metastases from non-lymphomatous extra-thoracic tumours. A multicenter series of a rare condition

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Introduction: Most mediastinal metastases are from lung, esophagus or mediastinum itself. Non-lymphomatous extra-thoracic tumours rarely give place to mediastinal metastases. The purpose of this study was to investigate the way this rare condition is managed and its prognosis.

Material and methods: Thoracic surgeons from 7 different centers in Spain and France put together their series to perform a retrospective study of this kind of mediastinal metastases.

Results: A total of 16 cases was recorded (11 women and 5 men). Age ranged between 32 and 72 years in women (M=49) and between 31 and 76 in men (M=49). Among women, the primaries were: 4 sarcomas, 3 breast, 2 kidney and 2 ovary. Among men, the primaries were 2 testicular and 1 melanoma, 1 digestive and 1 feochromocytoma. The time between treatment of the primary tumor and the diagnosis of mediastinal metastasis was 16 months in breast origin (0-24), 84 months in sarcomas (12-132) and 19 months in kidney cases (14-92). Other metastases were rare, only pulmonary in 3 cases of sarcoma and one case of retroperitoneal metastasis in a testicular case. The mediastinal metastases were treated through thoracotomy in 11 patients (9 right, 2 left), 2 right videothoracoscopies and 3 sternotomies. Survival was of 67 months for the already dead patients and 58 months for the still alive patients.

Conclusions: Mediastinal metastases of nonlymphomatous extrathoracic tumors are more frequent among women, normally the mediastinal metastasis is solitaire except in sarcomas, and their prognosis is not as bad as expected.

P2934

Thymic tumours: Diagnostic and therapeutic approach

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Introduction: Thymic tumours represent 0.2–1.5% of all malignancies, with an incidence of 0.15 cases per 100,000 populations. We present our experience in the management of patients (pts) with thymic tumours.

Materials and methods: We evaluated retrospectively the records of 16 consecutive pts who underwent thymectomy in our department. All but one pts underwent radical thymectomy, through a median sternotomy. The upper and lower thymic poles were traced and all fatty tissue between the phrenic nerves was resected. Diagnostic procedures included contrast enhanced CT of thorax and/or MRI and in the case of 2 pts, F-18 FDG PET-CT was performed. Myasthenia gravis was present in 2 pts (12.5%).

Results: There were 8 male and 8 female pts (mean age: 42.8 years). The histopathology revealed 11 thymomas, 1 endocrine carcinoma and 4 hyperplasias. Type A thymomas were found in 2 pts (12.5%), AB in 3 pts (18.75%), B1 in 1 pt (6.25%) and B3 in 1 pt (6.25%), while 4 thymomas (25%) were unclassified. The mean diameter of the resected masses was 8.31 cm. Two pts were classified as Masaoka IIA stage (12.5%) and one as Masaoka IIB (6.25%), who received adjuvant radiotherapy. All the others were classified as Masaoka I. All tumours

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were totally resected. The 5 year survival was 100%. There was recurrence of the endocrine carcinoma within 5 years.

Conclusions: Tumours of the thymus are a heterogeneous group of tumours, ranging from relatively benign thymomas to highly aggressive carcinomas. Surgery continues to be the mainstay of treatment and complete resection of the tumour remains the most important prognostic factor. A recurrence should be completely resected whenever possible, because this approach is associated with good long-term survival.

P2935

Surgical treatment of superior vena cava syndrome caused by thymic carcinoma

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Introduction: Thymoma and thymic carcinoma are a rare disease, but they are the most common tumor of the anterior mediastinum in adults. They are asymptomatic until late. There are some potentially life-threatening manifestations of thymic neoplasms like myasthenia gravis and superior vena cava syndrome. The palliative treatment of the mediastinal malignancies have poor prognosis and radical surgical therapy is the only option. Resection and reconstruction of the great mediastinal vessels in case of involved are technically challenging.

Materials and methods: We report the case of a 63 year-old Caucasian female patient who presented superior vena cava syndrome derived from a mediastinal neoplasm compromising intrinsically and extrinsically the superior vena cava, right and left brachiocephalic vein. After evaluation the patient underwent radical resection of the tumor en bloc with the involved vessels and reconstruction with Y-shaped gore-tex graft. Cardiopulmonary bypass wasn't used. The histological analysis of the surgical specimen was diagnosed as thymic carcinoma, stage III (Yamakawa-Masaoka staging). The patient was discharged after 25 days of hospitalization without chemotherapy and radiotherapy after the operation.

Results: The postoperative observation was conducted for a period of 2 and 6 months. There were no signs of recurrent disease or thrombosis of the prosthetic graft. The patient performed his daily chores without difficulty.

Conclusion: Extensive resections of the tumor tissue with involved adjacent organs and vessels are feasible, safe, and improve satisfactory survival in invasive thymomas. Radiation therapy and chemotherapy in case of radical resection are not necessary.

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Cryotherapy plus chemotherapy or radiation offers increased survival and quality of life in advanced stage lung cancer patients with endobronchial obstruction: Analysis of 160 patients treated with the rigid bronchoscope

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Objective: The objective of this clinical study is to evaluate the efficacy of Bronchoscopic Cryotherapy plus Chemotherapy or Radiation in quality of life and survival of non operable lung cancer patients with endobronchial obstruction.

Methods: 160 lung cancer patients with stage IIIa, IIIb, IV and endobronchial tumor, were included in a protocol of three sessions of rigid bronchoscopic cryotherapy. From 2001-2011 142 men (44-82 yrs old) and 18 women (45-66 yrs old) were treated in our Department. After each cryotherapy one cycle of chemotherapy or radiation therapy followed. Patients age, sex, type of tumor, stage, symptoms of dyspnea, cough, hemoptysis, pain plus lung functional studies, performance status and survival time, were recorded. Follow up was at least two years.

Results: Symptoms of dyspnea, cough, hemoptysis and pain improved significantly in 73%, 68%, 69% and 42% of patients respectively ($p < 0.001$). Lung function improved 15-20%, Fvc 1 from 1.41 ± 0.5 to 1.9 ± 0.57 lt, Fvc from 1.5 ± 0.6 to 2.24 ± 0.75 lt after treatment ($p < 0.05$). Performance status increased from 62 ± 5 to 75 ± 7 (Karnofsky scale, $p < 0.05$) and from 3.15 ± 0.9 to 2.3 ± 0.5 (WHO scale, $p < 0.05$).

Survival increased considerably to 6-42 months (mean 16+) for stages IIIa, IIIb (Kaplan-Meier, 95% interval). We had 2(1.25%) in hospital deaths.

Conclusions: Endobronchial Cryotherapy is a safe palliative method for inoperable lung cancer with endobronchial obstruction and combined with chemotherapy or radiation offers better survival and increased quality of life.

P2937

The effect of locally applied TGF-BETA3 on wound healing and stenosis development in tracheal surgery

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Introduction: Tracheal stenosis constitutes one of the most frequently seen problems in thoracic surgery. Although many treatment modalities to prevent tracheal stenosis have been attempted, an effective method has not been found yet. In this study, TGF-beta3/chitosan combination was used for that purpose.

Material and method: A film shaped slow releasing preparation, which contains TGF-beta3 with basal substance of chitosan was created. Thirty "Wistar Albino" rats were divided into 3 groups. Full layer vertical incision was made in the anterior side of trachea between 2. and 5. tracheal rings. Membranous trachea was preserved. Tracheal incision was sutured. Group A was evaluated as control group. In group B, a chitosan based film substance was placed on the incision line. In group C, a chitosan- TGF- $\beta 3$ combination slow-release film coated substance was placed on the incision line. The rats were sacrificed on 30th day, the tracheas of the rats were excised by cutting between the lower edge of the thyroid cartilage and the upper edge of the 6th tracheal ring together with oesophagus. Epithelialization, fibroblast proliferation, angiogenesis, inflammation and collagen levels were evaluated histopathologically by the same histopathologist (Figure).

Results: It was not found statistically significant difference between three groups. Cold abscesses were observed at the incision area in both TGFB3/chitosan combination and chitosan groups and they were thought to form because of chitosan.

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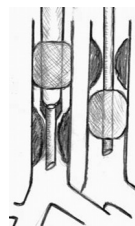
Use of heliox and small size endotracheal tubes for surgery of severe tracheal stenoses (STS)

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Heliox improves ventilation by reducing density dependent resistance due to high kinematic viscosity and high diffusivity.

Objective: To present our experience and evaluate feasibility to maintain adequate ventilation using Heliox through small size endotracheal tubes during the initial period of operations for STS until the trachea is divided below the stenosis.

Methods: 4 patients with postintubational STS were intubated spontaneously breathing He-O₂ (70/30) after topicalization and light sedation. In 3 of them (high stenoses) we used microlaryngeal tubes; for one (low stenosis) we designed double-size tubes.



Anesthesia was deepened with propofol, relaxants and opioids. He and O₂ were mixed via recalibrated rotameters at 75/25 ratio, controlled paramagnetically and delivered with a bellow ventilator. Monitoring: side stream spirometry, recalibrated mechanical volumeters, pulse oxymetry, invasive pressure, ABGs.

Results: Results for the period of Heliox ventilation.

Pt #, sex, kg	Heliox tidal vol. (ml)	Time (min)	Int. diameter of STS (mm)	PetCO ₂ , PaCO ₂ (mmHg)	Ppeak, Pplat, PEEPi (cmH ₂ O)	SatO ₂ %
1, F, 57	450	55	3	40, 43	42, 32, <5	>95
2, M, 61	550	75	4	34, 36	25, 18, 0	>96
3, M, 75	500	45	3.5	41, 45	38, 32, <4	>96
4, M, 67	500	65	3	38, 42	40, 33, <3	>95

Conclusions: Heliox through small size tubes may be an alternative ventilation for securing free airways during the initial period of operations for STS.

P2939

Technical aspects of mini-invasive transcervically right main bronchus approach

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We present the mini-invasive transcervical approach of the right main bronchus as operative technique.

We have used this method at a MDR patient for whom we first stapled and cuted the right main bronchus in order to allow the proper treatment to be administered without the risk of TB spilling. Using a Cooper suprasternal retractor we have open an access to the mediastinum as described by Zielinski for Temla and encircled the right main bronchus and after stapled and cuted it.

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Careful hemostasis and aerostasis were checked. Operative time was 70 min and postop complications were absent. 2 months later we performed the simplified right pneumonectomy. Technical aspects of this approach are described in order to spread this simple technical variant of bronchial approach.

P2940**Tracheal resection for post-intubation tracheal stenosis**

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Tracheal resection and reconstruction is required in some conditions, such as tumors, post-traumatic lesions. Post-intubation tracheal stenosis (PS) remain the most common indications for tracheal resection. The best treatment of PS is surgical resection. We aim to evaluate our experience on patients with PS. Between 2008-2011 seven patients underwent primary tracheal resection and reconstruction for PS. Six of the patient were male and one of the patient was female, with main age of twenty eight (range 21-75 years). Before the surgery, dilatation with rigid bronchoscopy was performed for two patients and a stent was inserted in one patient. A 1.5-4 cm tracheal segment resection and end-to-end anastomosis was applied. Tracheal resection and end-to-end anastomosis caused good tracheal healing post-operatively. We had one tracheal air leak, one tracheal stenosis and one wound infection. Postoperative mortality was not observed. Patients who underwent tracheal resection and end-to-end anastomosis had a better airway on examination and were symptomatically improved in all cases (7/7). The treatment of PS is well established and leads to high level of success with minimally complication. Good results are obtained both with tracheal resection and end-to-end anastomosis, but restenosis remains a problem. Detailed preoperative assessment and preparation associated with good surgical results. Good outcomes are achieved with both LTR and CTR. An individual approach is required for treatment of paediatric airway stenosis to achieve good final outcomes. The overall success rate has increased only marginally in our institution over the last 20 years.

P2941**Intrathoracic foreign bodies – A 11 year statistics**

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Introduction: Although is very rare, the pathology of foreign intrathoracic bodies, either into the bronchial tree, chest wall or the pleural space is very challenging and can raise a series of problems, especially if we are dealing with debilitated patients.

Method: In an 11 year period we had 20 admissions with different types of foreign intrathoracic bodies, with ages ranging from 16 to 75 years, with an m/f sex ratio of 17:3. The pathology was represented by 13 thoracic wounds with retention (glass, knife blades, needles, bullets), 3 foreign intra-bronchial bodies (1 syringe needle, 2 rocks), 4 intraoesophageal bodies (1 dental prosthesis, 2 copper wires, 1 bone). We performed thoracotomy in 9 cases, pleural drainage in 1 case, 1 bronchoscopy, wound explorations, one conservative treatment. The mean hospital stay was 11 days.

Results: In all the cases the long term prognosis was excellent. We had 3 complications: pleural effusion managed by drainage in a case with esophageal perforation, aspiration pneumonia and prolonged fever.

Conclusions: The foreign bodies are sometimes a challenge and the management requires a thoracic and abdominal surgeon, bronchologist, gastro-enterologist. Thoracotomy is the final solution of approach, minimally invasive surgery is required in most of the cases.

P2942**Does bacterial colonisation potentiate granulation tissue formation post endobronchial stenting?**

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Background: Following endobronchial stent insertion granulation tissue formation may occur, which can occlude the airway. It has been postulated that bacterial colonisation causes granulation tissue formation and its subsequent proliferation. **Aim:** To study whether specific microorganisms are associated with granulation tissue formation in patients post endobronchial stent deployment.

Methods: We conducted a retrospective review of all endobronchial stent insertions performed for benign conditions between January 2005- November 2011. Stents used in the procedure were covered and uncovered Ultraflex expandable metallic stents (Micro-invasive, Boston Scientific, Watertown, MA). Follow up bronchoscopies determined which patients had developed granulation tissue formation. Biopsies, sputum and lavage were then taken for microbiological analysis. Microsoft excel was used to collect and analyse data.

Results: Thirty patients had endobronchial stents deployed. Ten patients developed granulation tissue proliferation and all of these had bacterial colonisation

of the stent with at least one pathogen. A total of 11 different pathogens were found; *Staphylococcus aureus* (6), *Alpha haemolytic streptococci* (5), *Pseudomonas aeruginosa* (3), *Haemophilus influenza* (2), *Coagulase negative staphylococcus* (2), *Moraxella catarrhalis* (1), *Non haemolytic streptococcus* (2), *MRSA* (1), *Neisseria* (1), *Coliform* (1), *Corynebacterium striatum* (1).

Conclusion: Prophylactic control in the form of antibiotic-impregnated stents and nebulised antibiotics post stent deployment targeting specific microorganisms may be beneficial in reducing granulation tissue formation.

P2943**Comparative assessment of endobronchial valve lung volume reduction in patients with COPD**

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Objective: To compare the results of surgical lung volume reduction in patients with COPD with the results of endobronchial lung volume reduction valve.

Materials and methods: Endobronchial valve lung volume reduction (ELVR) was performed in 12 patients with diffuse homogeneous form of emphysema. For ELVR valve used endobronchial valves MedLang. Patients who underwent ELVR included in the "core" group (n=12). To compare the results has been allocated comparison group (n=12), which included patients with diffuse homogeneous form of emphysema. Both groups were comparable for comparison.

Results: Dynamics of spirometric indices in the comparison group: FEV1 before surgical lung volume reduction 20,95±3,1 (%), after 31,08±2,7 (%); FVC before 27,32±10,12 (%), after 37,09±12,6 (%);

Spirometric indices in the comparison group: FEV1 before ELVR 15,94±5,38 (%), after 22,9±12,63 (%) (p=0,011);

FVC before - 30,5±5,95 (%), after 30,23±11,07 (%) (p=0,858); FEV1/FVC to surgical lung volume reduction - 47,19±20,02, after - 72,0±17,54 (p=0,398).

In the comparison group: pO2 before surgical lung volume reduction - 58,08±12,32, after 61,02±12,05; pCO2 before endobronchial valve - 40,72±6,73, after - 41,09±5,48. Dynamics of parameters of blood gases in the study group. In the comparison group: pO2 before endobronchial valve lung volume reduction - 45,56±10,28 after - 52,7±9,99 (p=0,013); pCO2 before endobronchial valve - 49,84±7,79, after - 44,0±5,42 (p=0,01).

Conclusion: Thus, in terms of up to 12 months of ELVR of lung volume reduction surgery and lung volume are comparable to the dynamics of indices of cardiorespiratory system, which may have important implications for the provision of surgical care "core" patients with COPD.

P2944**Endobronchial interventions used in the management of large airway malignancies and their associated complications: An audit**

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Introduction: Endobronchial intervention is an expanding specialty involving a Multi-Disciplinary Team, which diagnoses and treats a diverse group of patients with large airway pathology. It is usually well tolerated and rarely contraindicated even for patients with advanced malignant disease.

Aims: To identify the different endobronchial interventions used in the treatment of airway malignancies at St. George's Hospital, and document associated complications.

Methods: Data relating to endobronchial stenting, laser ablation and forceps debulking, and any short-term complications, were collected from the St. George's Hospital patient database for 49 consecutive patients with airway malignancy.

Results: 36 (73%) patients had stent deployment, 7 (14%) had laser ablation and 3 (6%) had tumours debulked using forceps. Complications occurred in 9 (18.4%) patients and were granulation tissue formation (3), mucus retention (3), stent migration (2) and bleeding (1). All complications were effectively treated.

Conclusions: Stenting is the endobronchial intervention of choice for the treatment of large airway malignancies at St. George's Hospital. Although it has the greatest associated complications, they are usually effectively treated. Furthermore, it is safe, well tolerated and achieves good symptomatic relief.

P2945**Lung volume reduction surgery (LVRS) after endoscopic lung volume reduction (ELVR) in severe emphysema – A case series**

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Background: LVRS as well as ELVR can improve patients symptoms, wellbeing and pulmonary function testing. ELVR can be performed in upper and lower lobe emphysema. LVRS is currently not recommended for patients with very low FEV1 or lower lobe emphysema.

Objectives: Case series to establish if surgical lobectomy after initially successful ELVR is effective and safe.

Methods: 6 patients (4 female, mean age 60.3 y, mean FEV1 640m214 ml)

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with severe lower lobe emphysema received ELVR and showed an initial but not persistent improvement. Hence a lobectomy was performed for surgical lung volume reduction. Pulmonary function tests (PFT), 6-minute-walk-test (6MWT) and dyspnea score (mMRC) were performed 90 days after surgery and safety issues were assessed.

Results: In all cases lobectomy of one lower lobe (5 left, 1 right side) was performed without any problems. No prolonged air leak and no 30-days mortality were observed. 1 patient was lost for follow up. He died 86 days after the procedure due to an acute tension pneumothorax, but showed a primary clinical benefit. In the remaining 5 cases an improvement of $+42.4 \pm 16.3\%$ in FEV1 and reduction of $-35.1 \pm 17.4\%$ in residual volume (RV) was seen. Both 6MWT ($+72 \pm 43$ m) and mMRC ($+2.6 \pm 1.1$ points) were also improved.

Conclusion: A lobectomy in patients with severe lower lobe emphysema for definitive LVRS seems to be effective and safe in selected cases. A previous successful ELVR can be used as a pretest for adequate patient selection.