83. To stent or not to stent: interventional bronchoscopy

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Interventional management versus standard treatment for inoperable malignant tracheal obstruction

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Although endoscopic management of malignant central airway obstruction (mCAO) is well established, not enough survival and quality of life (QoL) data exist comparing it with sole chemo-radiotherapy.

We prospectively studied patients referred to our unit for mCAO using the EORTC QoL questionnaire, at one day before, 1 week after and every following month.

40 patients (31 males) aged 66.2±12.3 (mean ± st.dev) with either non-small cell lung cancer (n:35) or metastatic malignancies, were included.

31 patients (intervention group) underwent extensive interventional bronchoscopic management as indicated, whereas 9 declined endoscopic treatment (control group).

Patients of the two groups did not statistically differ in age, comorbidities, type of malignancy and tumor obstruction. Overall follow up time was 6.6±6.2 (range 1-26) months. 13 patients are still alive followed for 6.6±7.6 months (range 1-26). QoL and dyspnea significantly improved in all patients of the intervention group up to 1 month after the procedure (p<0.05). Improvement was greater in those initially presenting with atelectasis and tracheal obstruction. Dyspnea remained significantly improved in treated patients up to the 6th month. For those surviving over the 9th month (n:11) and those surviving over the 12th month (n:6), QoL and dyspnea, did not significantly deteriorate. In time points, control patients had worse QoL and dyspnea (p<0.05). Mean survival time for intervention and control group were 20.7±23.57 and 6.3±3.70 months respectively.

Interventional bronchoscopy may achieve prolonged survival, significant and sustained QoL and dyspnea improvement, in patients with airway obstructing malignancies.

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Bronchoscopic assessment of airway invasion by esophageal cancer: A retrospective study

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Background: Fiberoptic bronchoscopy (FOB) is frequently used to evaluate postintubation injury, with or without tracheostomy, which is the most common cause of benign tracheal stenosis (TS).

Airway stenting was performed on 31 patients, 25 malignant and 6 benign. EBUS and MDCT images were compared in patients with tracheal stenosis.

Methods: Airway stenting was performed on 31 patients, 25 malignant and 6 benign. EBUS and MDCT images were compared before intervention to assess the narrowing airway at 212 sites. Of these, 130 sites were considered normal and 82 abnormal. For malignant stenosis, airway measurements were taken at 160 sites including 112 normal and 48 abnormal. For benign stenosis, airway measurements were taken at 52 sites including 18 normal and 34 abnormal. This technique enables the EBUS probe to measure the distal end to proximal end of the stenosis whereby the inflated balloon size changes according to the degree of stenosis.

Results: The diameter and length of stenotic sites measured by EBUS and MDCT were near equal in all patients. Significant correlation was seen at all 212 sites.

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Postintubation tracheal stenosis – A 15 year experience

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Background: Postintubation injury, with or without tracheostomy, is the most common cause of benign tracheal stenosis (TS).

Method: Retrospective analysis of patients with postintubation TS evaluated at department of Bronchology in Hospital de São João between 1st January 1996 and 31st December 2010.

Results: 84 patients were analyzed, with a mean age of 43.5 years. Median duration of intubation was 23 days and 38% of patients had a tracheostomy. Among tracheostomized patients, median time of otracheal intubation before tracheostomy was 29 days. Symptoms occurred in a median of 30 days after extubation. Occurrence of stridor was associated to an earlier diagnosis. TS occurred at a high location (subglottic or larger tracheal third) in 37% of patients and was mostly complex (55.1%), followed by exophitic and web-like (14.5%). In children, web-like stenosis was predominant. Occurrence of ventilator-associated pneumonia was associated to complex TS and higher levels of severity. Endoscopic treatment was the first therapeutic measure in most patients (84.8%). Dilatation was the main therapeutic option, either isolated (39%), either as a bridge to more definitive therapies (54.2%), and even after failure of other therapies (16.9%). Patients treated only with dilatation performed a mean of 2 dilatations/patient and median free time between dilatations was 47 days. Surgical treatment was performed in 42.1%, with 38.7% of relapse. 13.2% of patients had stent placement and 11.8% had laser therapy. Most patients are now asymptomatic and mean residual stenosis is 28%.

Conclusion: TS is a challenging condition and several therapeutic modalities are usually needed.
P611 Bronchoscopic application of mitomycin-C as adjunctive treatment of postintubation tracheal stenosis
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Introduction: Postintubation tracheal stenosis (PITS) continues to be a challenge in the diagnosis, management, and prevention. Mitomycin-C (MMC) is an antineoplastic antibiotic that inhibits fibroblast proliferation, modulating wound healing and scarring. Its topical application, as an adjunctive treatment in endoscopic management of stenosis, has shown good results.

Aim: Evaluate the results of MMC application by Rigid Bronchoscopy (RB) in PITS.

Methods: Selected patients with PITS, in whom MMC was applied. It was used in a concentration of 0.4 mg/ml, applied with a cotton swab onto the granulation tissue, for 2-3 minutes, after RB dilatation or laser. Re-evaluation and MMC application was done according to evolution. Patients were evaluated for kind, location and stenosis size (%), treatment procedures and results with adjunctive MMC application.

Results: 7 patients, 71.4% women, mean age 55.4y. Mean initial stenosis diameter 50% of airway lumen, mostly located 1-3cm below vocal cords, with 1-2 tracheal rings involved. Stenosis RB dilatation, laser and MMC were made in all patients. Mean MMC sessions 2.7, with good and lasting decrease in granulation tissue in 43%, moderate in 29% and relapsing in 29%. At this moment, after MMC patients. Mean MMC sessions 2.7, with good and lasting decrease in granulation tissue in 43%, moderate in 29% and relapsing in 29%. At this moment, after MMC treatment, 20% of patients (n=11), C: Post-surgery relapse (n=6), D: Complications/Relapse after stent placement (n=2) and E: External compression (n=2).

Conclusions: Our experience revealed that topical application of MMC can be beneficial in the modulation of wound healing and in the decreasing scar formation in the treatment of airway stenosis. Further research and randomized prospective clinical trials are needed to determine the most effective concentration, time and frequency of exposure to MMC.

P612 The management of post-intubation/tracheostomy stenosis with silicone stent
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Benign tracheal stenosis in adult patients may occur as a complication of intubation, tracheostomy or surgical procedure. Silicone airway stenting has opened up a new way to treat patients with post-intubation stenosis. We investigated the clinical efficacy through a review of patients with post-intubation stenosis who underwent consecutive Natural silicone stent. Between January 2005 and December 2009, 19 patients underwent balloononing, ablation using electro-surgical unit, or bougienage by rigid bronchoscopy, followed by placement of the Natural stent. All patients reported subjective symptomatic relief immediately after stent placement. Spirometry data was collected at baseline, 3 month, and 24 month. The baseline and follow-up spirometry data was available in 11 patient. The baseline median FEV1% predicted was 40% (range, 22% to 62%). Follow-up-spirometry data showed 37% improvement (range, 19% to 74%) at 3 month later, and 41% improvement (range, 21% to 77%) at 24 month later.

The Natural stent were removed successfully in 10 patients (52.6%) after median of 16months. Other 5 patients (26.3%) were required re-stenting, and 4 patients died due to acute pulmonary edema with ESRD, myocardial infarction, intracranial hemorrhage. The Natural silicone stent proved to be effective and feasible therapeutic modality in improving quality of life with relief of dyspnea.

P613 Long term outcomes of patients with benign tracheal stenosis after multidisciplinary management
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Post-intubation tracheal stenosis represents a severe complication in patients with hypercapnic respiratory failure due to COPD. We present a series of iatrogenic tracheal stenoses in COPD patients addressed to the Bronchology Department during 5 years. There were 13 patients (10 males, 46% over 60 years-old), COPD stage III-IV GOLD, who suffered a severe exacerbation that required oro-tracheal intubation; 8 needed tracheotomy. Tracheal stenoses developed after a mean period of 24 days (7-42) and were clinically significant. Bronchoscopy revealed tracheal stenosis with diameter less than 5 mm. 8 were located in proximal trachea and 5 in medial trachea, with length more than 2 cm in 7 cases and less than 2 cm in other 6. Initially, all were treated with interventional bronchoscopy (dilatation, granuloma resection) but the results were unstable in time, requiring other methods: prosthetics (8 cases) or surgery (5 cases). In the patients treated by prosthesis, the stent was removed in 3 cases after 1.5-2 years, the rest remained chronic carriers of prostheses. The patients treated by surgery had significant complications: 1 death by mediastinis, 3 stenosis relapse on the anastomosis line (finally resolved with interventional bronchoscopy). Only one case was successfully solved after surgery. In conclusion, interventional bronchoscopy had a higher success rate (37%) than surgical therapy (20%), also solving the cases complicated post-surgery with reoccurrence of stenosis. While for different etiologies of tracheal stenosis, surgical resection is the first choice of treatment, in patients suffering from COPD, interventional bronchoscopy remains the only way to solve it.

P615 Respistem – A new concept for a viable stent for the treatment of endobronchial stenosis
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Endobronchial stent therapy is an accepted method for the treatment of endobronchial stenosis. It is limited by a loss of physiologic surface and, thus, mucus retention. We developed a novel concept for a viable endobronchial stent (fig. 1 A). The concept is based on the combination of stent technologies with the principles of tissue engineering. The Respistem presents local (1) a functional respiratory epithelium on the luminal side, which allows the maintenance of the mucociliary function in the stented area and hereby will help to reduce complications of mucus retention, (2) embedded micro- or nanoformulations, enabling the sus-
In addition (4) an adequate anchorage resulting from the specific stent design and the biological coating of the stent struts guarantees an adequate fixation and embedding of the construct into the surrounding tissue, thereby avoiding stent displacement during breathing and coughing. As seen in fig. 1B and C, the stent structure embeds readily in a fibrin-gel based tissue-engineered construct. The novel RespiStent with active mucociliary clearance will improve quality of life and increase the life expectancy of patients undergoing endobronchial stent therapy.

Methods: We collected bronchial washings from patients treated endoscopically for neoplastic or benign tracheobronchial stenosis

Results: We retrospectively studied 39 patients during a median of 128 days (12-448), 12 (31%) COPD with FEV1% of 58%, benign disease 5 (13%) and malignant 17 pts with esophageal carcinoma, 8 pts with bronchial/tracheal cancer, 8 pts with other tumours, 9 cases with tracheostomy or tracheal intubation, 8 traumatic cases and 7pts with PPM colonization (25.6% vs 71.8%, p < 0.05) in the quarter 4.

Prevalence of PPM colonization/Type of germ

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<tr>
<td>BAS + for PPM</td>
<td>39</td>
<td>39</td>
<td>25</td>
<td>11</td>
<td>7</td>
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<tr>
<td>PA</td>
<td>10 (25.6)</td>
<td>28 (71.8)</td>
<td>20 (80)</td>
<td>9 (81.8)</td>
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<td>8 (33.3)</td>
<td>5 (23.7)</td>
<td>1 (14.3)</td>
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<td>9 (23.1)</td>
<td>6 (25)</td>
<td>2 (18.2)</td>
<td>2 (28.6)</td>
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<tr>
<td>HI</td>
<td>2 (5.1)</td>
<td>3 (7.7)</td>
<td>7 (28.6)</td>
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<tr>
<td>SP</td>
<td>2 (5.1)</td>
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<td>7 (28.6)</td>
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<tr>
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<td>6 (15.4)</td>
<td>12 (53)</td>
<td>4 (36.4)</td>
<td>2 (28.6)</td>
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PA, P. aeruginosa; SA, S. aureus; HI, H. influenzae; SP, S. pneumoniae; PPM, potentially pathogenic microorganisms.

Conclusions: Tracheobronchial stents are associated with a high, increasing and irreversible colonization of PPM, with a prevalence of 87.5% after 12 months. Infection density is high. The main colonizing PPM are P. aeruginosa and S. aureus.

Double esophagus and airways stents: Retrospective analysis in 33 patients

Maxime Patout, Samy Lachkar, Mathieu Salama, Stephane Leclerc.

Introduction: Double stenting of esophagus and airways can be used for the palliative treatment of advanced tracheo-esophageal tumors.
Bronchial artery embolisation in the management of haemoptysis in pulmonary tuberculosis

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Introduction: Bronchial artery embolisation (BAE) is the procedure of selective bronchial angiography with embolisation of abnormal vessels.

Aims and objectives: To assess the efficacy and safety of BAE in patients with haemoptysis in pulmonary tuberculosis (PTB).

Methods: This is a retrospective study of all patients of haemoptysis in PTB who underwent BAE between January 2004 and December 2010 in a tertiary care hospital in India. Bronchial arteriography and embolisation was performed using 5 French pigtail catheter and polyvinyl alcohol (PVA) particles ranging from 150 to 1000 micrometers.

Results: 34 patients (21 males and 13 females) of haemoptysis in PTB, underwent 37 BAE procedures during the period of study. 11 (32.3%) of these patients had multidrug resistant tuberculosis. Mean age of patients was 29.4 years (range: 13-69 years). Indication of BAE was: acute major haemoptysis in 11 (32.3%) and chronic recurrent bleeding in 23 (67.7%) patients. Haemoptysis was successfully controlled after the embolisation procedure in 32 (84.1%) patients. Procedure was repeated in three (8.8%) patients within a period of six months because of recurrent haemoptysis. Following arteries were embolised: right bronchial artery (11), left bronchial artery (7), common bronchial trunk (7), intercostal artery (14), right internal mammary artery (1), thryocervical trunk (1), right intercostobronchial (2), and left intercostobronchial (1). No abnormal vessel was detected in one patient. The only complication encountered was local haematoma in one (2.94%) patient.

Conclusions: Bronchial artery embolisation is an effective and safe procedure for haemoptysis in pulmonary tuberculosis.
Methods and materials: All patients undergoing LT performed between August 2005 and May 2010 by a single surgeon at our institution were reviewed retrospectively. All airway complications were managed by the Interventional Pulmonary team. Airway stenoses were managed with rigid bronchoscopy, balloon dilation, observation and or stent placement.

Results: A total of 98 patients underwent LT (86 bilateral, 7 left, 5 right). 46 female and 53 male, with a mean age 49.7. 28 patients (28.6%) developed pneumonia within three months of transplantation, 8 of which were identified as a result of pseudomonas (28.6%). 28 (28.6%) patients also reported having evidence of acute cellular rejection within three months after transplantation. The median length of mechanical ventilation after transplant was 3 days (range 1 to 183). Of the 98 patients, 35 (35.7%) developed airway stenosis at a median of 16 weeks (range 1 to 164 weeks following surgery). Of these patients, 23 (65.7%) patients received at least one airway intervention.

Conclusions: Airway stenosis after LT can be successfully managed with a variety of airway interventions. Further studies are needed to determine the best modalities.

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SHFJV (super imposed high frequency jet ventilation), ETCO2 correlation to PaCO2 in diagnostic and therapeutic rigid bronchoscopy
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We report the findings on 42 patients who underwent diagnostic and therapeutic interventional rigid bronchoscopy under SHFJV.

Monitoring of the patients included ECG, blood pressure, SaO2, ETCO2, arterial blood gas analysis, FIO2 jet, FIO2 aw.

SHFJV is defined as weight-based innovative mechanical ventilation combined with superposition of two jet-streams in an open system.

The high-frequency jet-stream is responsible for the oxygenation; the normo-frequency jet-stream regulates the CO2.

Basic patient characteristics (mean±SD):
– Age 59.7±13.8
– FEV1 (liter) 2.79±0.58
– PaCO2 (mmHg) 35.52±6

Findings after 10 minutes SHFJV:
– PaCO2 (mmHg) 35.13±11.78*
– ETCO2 (mmHg) 27.48±4.81
– FIO2 (%) 64.76±12.95

*p=0.001

General characteristics of SHFJV:
– No CO2 increase
– No risk of barotrauma (open system conditions)
– No air trapping (open system conditions)
– Best ventilation in open system
– Integrated gas analysis
– Electronically controlled
– Laser application without fire risk (laser safe mode)

Summary: SHFJV in diagnostic and therapeutic rigid bronchoscopy is a safe and effective method of ventilation to achieve sufficient oxygenation without any increase of PaCO2.