WABIP Newsletter

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WABIP Newsletter

VOLUME 2, ISSUE 2 MAY 2014

Opinion/Editorial

CT Screening for Lung Cancer

-What are the recommendations?

Despite advances in technology, lung cancer is still the leading cause of cancer death in the Western world. Chest x-ray (CXR) and sputum cytology have been utilized to screen for lung cancer, unfortunately with no reduction in mortality. The National Lung Screening Trial (NLST) compared CXR with low-dose computed tomography (LDCT) in high-risk population for lung cancer and for the first time found a 20% mortality reduction in the LDCT arm 1. This is the first large (>50,000 participants) randomized controlled trial that showed a mortality benefit for a lung cancer screening study.

Currently, in most cases, screening for lung cancer is not covered by Medicare or most insurance companies in the US. However, based on the results of NLST, the National Comprehensive Cancer Network (NCCN), the American College of Chest Physicians, the American Society of Clinical Oncology and the American Cancer Society have recommended screening for high-risk individuals ages 55 to 74 with a minimum smoking history of >30 pack-years who currently smoke or have quit within the past 15 years 2. The NCCN also recommends screening for those 50 and older with a minimum smoking history of >20 pack-years and have one additional risk factor for lung cancer. This could include a history of exposure to radon or occupational exposure to certain chemicals.

Patients and physicians have become aware of the NLST results and lung cancer screening using LDCT has begun to be used without proper guidelines. There is a worry that hospitals pushing the LDCT scans may focus on promoting the benefits of the lung cancer study to patients rather than warn about its costs and complications. LDCT can potentially cause unnecessary exposure to ionizing radiation and subsequent invasive procedures for a false positive result. There needs to be a clear understanding of the balance of benefit and harm to the patient. In addition, the frequency and duration of screening as well as cost-effectiveness still needs to be addressed.

Recently, an evidence-based recommendation for screening high-risk populations for lung cancer has been developed by clinical experts 3. The practice guideline recommendations generally align with the parameters of the NLST, but with specific advice for determining positive results, appropriate follow-up and optimal screening interval. In terms of definition of positive result, a nodule size of >5 mm found on LDCT indicates a positive result and warrants a 3-month follow-up CT. Nodules >15 mm should undergo immediate further diagnostic procedures to rule out definitive malignancy. For optimal interval, screening should be performed with an initial LDCT scan followed by annual screens for 2 consecutive years, and then once every 2 years after each negative scan. Based on the evidence, the benefits of screening high-risk populations for lung cancer with LDCT outweigh the harms if screening is implemented in a strictly controlled manner.

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Editor in Chief

Kazuhiro Yasufuku

News of Humanitarian Activities

As a result of preliminary work in October-December, 2013, the World Bronchology Foundation (philanthropic arm of the WABIP) is pleased to announce that Chinese members of the WABIP are interested in helping the WBF pursue humanitarian aid activities including equipment donations and regional educational programs in mainland China including the Tibetan Autonomous Region. New projects, funding raising activities, budgets and strategic planning will be discussed at the next WBF Board meeting in Kyoto, April 2014. Ideas and suggestions from all WABIP members are welcome!

The World Bronchology Foundation will hold its next board meeting during the Kyoto WCBIP/WCBE, at which time it will acknowledge the help of outgoing board members Doctors Pablo Diaz Jimenez, Ramon Rami Porta, Patrick Barron, and Maria Teresa Argemi who have reached the end of their terms. Joining Henri Colt (Director of Operations, USA), and Silvia Quadrelli (Vice-president, head of logistics and planning), several newly selected board members of the WBF are Enrique Casas (President, Spain), Carlos Disdier (Secretary Treasurer, Spain), and Domingo Perez (Vice-president, Paraguay). The profiles of new board members will be detailed in the next edition of the Newsletter and on the WABIP website.

Figure 1: Tibet Autonomous Region Shegar District Hospital (4300 meters above sea level).

Figure 2: Medical tent en route to Everest base camp, Tibet.

Technology Corner

Technology corner: Biomechanical Properties of the Airway Stents: implications for practice

Introduction: Airway stents have been shown to improve the quality of life of patients suffering from malignant and benign central airway obstruction (CAO) and esophagorespiratory fistulas (ERF). These devices, however, are airway foreign objects and adverse events are expected. The incidence rate and severity of adverse events varies depending on patient-and operator-related factors (inability to clear secretions, lower respiratory tract infections, stent under- or oversizing, malposition) but also on specific stent-tissue interactions determined by the biomechanical properties of the stent.

Background: Stents are currently made of polymers, alloy metallic mesh or a combination of the two. As the understanding of stent-tissue interactions has evolved, manufacturers now take into consideration stents' biomechanical characteristics, but this information remains proprietary. The future may also see the incorporation of treatment agents such as chemotherapeutic or radioactive agents, bioabsorbable stents, stem cells-bioengineered airways or additive manufacturing[1]. Stent-related adverse events are not uncommon and include migration, obstruction from secretions, infection, granulation tissue formation and mechanical failure (fatigue or fracture).

Clinical applications: Airway stents are generally used for symptomatic extrinsic airway compression or when there is still more than 50% narrowing after the endoluminal component of a purely exophytic endoluminal or mixed type of obstruction has been bronchoscopically treated. Stents have also been used for sealing ERF and bronchial stump fistulas and are occasionally used to improve symptoms of severe tracheobronchomalacia (TBM) or excessive dynamic airway collapse, in patients who are refractory to more conservative measures (i.e. continuous positive airway pressure) and are not candidates for a permanent stabilizing airway open surgical procedure. Based on specific stent biomechanical properties and considering the clinical indications and specific airway morphology at the site of airway narrowing, the following stent selection criteria warrant consideration in clinical practice.

1) *Retrievability:* stent placement may be only transiently necessary or its removal may be required due to adverse events. In patients with malignant CAO who will undergo further chemotherapy and /or radiation therapy, and respond to treatment, the stent may become loose, migrate and require removal (1). For benign CAO, such as post intubation tracheal stenosis, sometimes, stents may be successfully removed without stricture recurrence. Excessive stent-induced granulation tissue, stent fracture or imbedding in the airway wall, as it can occur with uncovered or partially covered metallic stents, interfere with a safe stent removal (Figure A).

2) *Expansive radial force:* varies among different types of stents. In one study, the studded-silicone type stent and Polyflex stents had a higher expansive force than the self-expandable metallic stents (2) and thus may be preferred in CAO due to severe airway compression (Figure B). It would be beneficial for the operators to have this information available for each stent type prior to the procedure since the pressure required to dilate the stenosis can be measured by intraluminal application of balloons with pressure transducers. This would offer bronchoscopists an individualized, physiology-based approach to airway stent insertion.

3) *Resistance to buckling:* Stents also differ greatly in their elasticity and resistance to angulation (buckling) (2, 3). Angulation properties become relevant when dealing with distorted or curved airway, as they determine whether the stent can conform to the airway morphology and still remain patent. This is often the case in patients with left mainstem bronchial (LMB) obstruction due to extrinsic compression usually from large subcarinal tumors (Figure C). In these cases, SEMS (i.e. Ultraflex, Aero) stents may be a better choice than a straight silicone stent because of the SEMS' known resistance to angulation. Results from one study suggest that for malignant CAO, the most common stent used in the trachea and right mainstem bronchi (RMB) was the Dumon straight studded stent, while the most common one for the LMB was the Ultraflex stent, which has a better ability to withhold angulation. This is likely explained by the relatively straight tracheal and RMB's course as opposed to the LMB, which is a curved, tapered airway and often distorted in the setting of CAO (4).

4) *Hydrophilic properties*: Stent' inner lumen hydrophilic coating is specially designed to help prevent mucus buildup. This property varies among different brands. Direct comparison studies of hydrophilic properties of specific stents prior to deployment are not available. However, clinical outcome studies in patients with malignant CAO suggests that the SEMS stent (Aero type) was associated with an increased risk of infection (HR.98 p=0.041), the silicone stent (Dumon type) had an increased risk of migration (HR 5.69 p<0.001) and the lower respiratory tract infection were associated with a decreased survival (HR 1.57 p=0.001) (5)

5) *Morphology*: depends on location of the airway narrowing. For instance, T-tubes require a tracheostomy, straight stents splint open the trachea and the mainstem bronchi, while bifurcated stents are placed at the main carina and sometimes at secondary carinas. Customized stents are occasionally needed and can be created on site or ordered from the manufacturer.

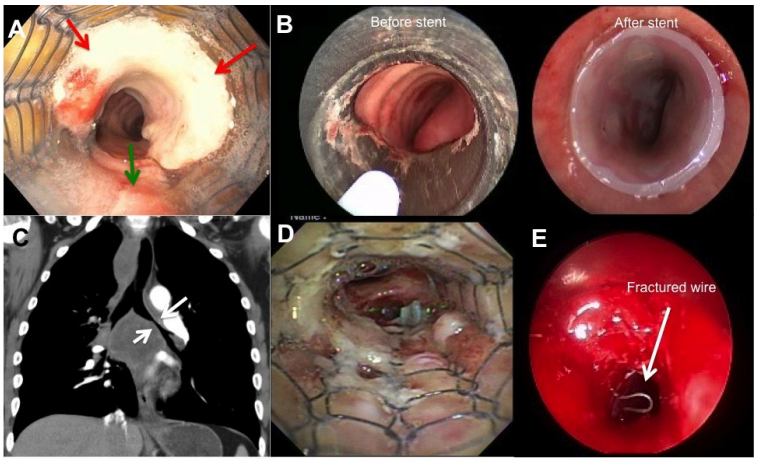
[1]*Popularly known as 3D printing, this process creates products through the accumulation of many thin layers of material. These printers are amenable to medical applications because they can efficiently custom tailor devices for specific patients from MRI or CT images.*

6) *Size*: from flow dynamics standpoint, because the effect of the normal glottis aperture has been noted to be of the same order as that of the 50% tracheal stenosis, it results that a 50% or less narrowing may not even be clinically detected or require treatment. A significant pressure drop is seen at 75%, 85% and 90% stenosis, which correlates with significant work of breathing (6). In view of this, the stent should be large enough to restore airway patency to less than 50% narrowing. An oversized stent, however, may not unfold after deployment, or may exert high pressures on the airway mucosa, impeding the blood supply and thus promoting granulation tissue formation. For the Dumon stent for example, it appears that the stent-to-airway diameter ratio of 90% is a critical cut-off point for predicting granulation tissue formation (7). In addition, if the expansion force of a stent is equally distributed over its complete circumference, this would result in a relatively small contact pressure on the airway wall. However, if the stent is in contact with only a small portion of the inner airway wall, as is it may occur with cylinder-shaped stents for triangular post tracheostomy stenosis, then the local pressure at that contact zone would be much higher and would result in considerable impairment of mucosal blood flow promoting tissue ischemia, damage and granulation tissue formation. This process can occur with metallic, hybrid and silicone stents. The wires of a SEMS can further shut down the mucosal blood flow at spots where they come in contact with the tissue (Figure D). Following dilation, in general, the selected stent size is only slightly larger (1-2 mm) than the size of the dilating bronchoscope/balloon. Some clinicians use CT scanning, measuring devices or the balloon-based radial probe EBUS. Ideally, in the future, bronchoscopists could routinely measure the pressures that lead to capillary shut off and compromise between the risk of migration (undersizing) and the risk of mucosal ischemia and granulation tissue (oversizing).

7) *Length*: long stenoses show a small difference in pressure profile with a slightly bigger magnitude of total pressure drop than the web-like, simple stenosis of comparable airway narrowing (6). Thus, from flow dynamic standpoint, the length of the stenosis or the stent for that matter is not that relevant. The length of the stent, however, should be longer than the stenosis, to avoid migration and to properly palliate the airway narrowing. It should exceed the stenosis by 0.5- 1cm proximally and distally. This principle may be difficult to apply in short airways (eg. RMB).

8) *Fatigability*: fatigue life, defined as time to weakness and potentially fracture results from chronic compression of the stent both during tidal and especially during forced exhalation and coughing. This property is particularly important in patients with benign CAO, especially TBM, in which cycled compression of the stent with each exhalation may lead to stent fracture and its associated complications (Figure E). Fracture is a rare complication, mainly seen with metal stent insertion, and it may result in airway wall perforation, hemoptysis and potentially fatal events. United States Food and Drug Administration warned that metallic tracheal stents in patients with benign airway disorders should be used only after thoroughly exploring all other treatment options, such as surgical procedures or placement of silicone stents (8).

Conclusions: Available airway stents are not equal in terms of biomechanics and tissue interactions. Complications are not uncommon and may be predictable and preventable if the biomechanical properties are available to the operators and if a personalized, physiology-based approach is used for stent insertion. Currently, these characteristics are considered proprietary by industry. Regulatory bodies do not mandate their reporting. Manufacturers should probably describe relevant biomechanical properties, including the resistance to angulation, expansive force, hydrophilic qualities and fatigability to help clinicians predict successful airway patency restoration and potential stent-related complications. The perceived concern of reverse engineering resulting from sharing this information to the public should not take precedence over patient safety.



A. Stent-related granulation tissue (red arrows), fracture (green arrow) and infection noted as the brownish membrane discoloration. **B.** Severe pure extrinsic compression in the upper –mid trachea palliated by a straight studded silicone stent with a high expansive radial force. **C.** Distorted LMB from large subcarinal tumor. The resulting "S-shaped" LMB may require a SEMS due to its resistance to buckling. **D.** Ischemic mucosa observed several weeks after stent deployment. Blanching is noted at the points of contact between the wire and the airway wall. **E.** Airway bleeding in a patient with a fractured uncovered metallic stent.

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Flex-Rigid Pleuroscopy

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Introduction

Flex-rigid pleuroscopy is a promising diagnostic and therapeutic technique for physicians managing patients with exudative pleural effusions of unclear etiology and recurrent malignant effusions requiring pleurodesis. The pleuroscope (model LTF-160, Olympus, Japan) has a 7 mm outer diameter, 22-cm rigid shaft, and 5-cm flexible distal tip (Fig 1). Procedures performed include parietal pleural biopsy, evacuation of free flowing and loculated pleural effusions, removal of thin fibrinous adhesions, evaluation of lung expandability, examination of diaphragm and parietal pleural surfaces, and pleurodesis with talc or other agents.

Indications

Indications and preferred techniques and instrumentations in various clinical scenarios are summarized in Table 1.

Planning

Routine laboratory markers are checked preoperatively to rule out any coagulopathy or neutropenia that may pose a higher risk for bleeding and infection, respectively. Patient's performance status (PS) is objectively evaluated using a validated tool such as ECOG or Karnofsky score (KPS) as patients with low PS (ECOG 4, KPS <30) may not be good candidates for this intervention. In patients with ipsilateral shift of the mediastinum on chest radiograph suggestive of mainstem bronchial obstruction, I perform a flexible bronchoscopy prior to scheduling the pleuroscopy, to evaluate for possible endobronchial tumor and debulking that will allow lung re-expnasion. A chest CT or ultrasound (US) evaluation of the pleural space increases the safety of the procedure by identifying localized pleural adhesions, assuring sufficient fluid exists at the desired entry site and thus avoiding lung laceration and subsequent prolonged air leak. Flex-rigid pleuroscopy can be performed on spontaneously breathing patients in the bronchoscopy suite or operating room using moderate sedation. Patient selection is key to avoid complications. For instance, patients with severe COPD and chronic CO_2 retention or patients with severe hypoxemia (PaO_2< 50 mmHg) may be unable to tolerate pneumothorax induction. Patients with contralateral parenchymal lung involvement may also decompensate during pneumothorax induction and are not good candidates for pleuroscopy done with moderate sedation and local analgesia without having a secure airway. Patients with severe, refractory cough are also poor candidates for pleuroscopy under moderate sedation as they may develop significant subcutaneous emphysema. Monitoring of patient's ECG, heart rate, respiratory rate, pulse oximetry and blood pressure is mandatory. Sedation and analgesia protocols vary among pleuroscopists. I routinely administer Demerol 50mg intramuscularly before the procedure and titrate midazolam IV according to patient comfort. A resuscitation cart with reversal agents (flumazenil and naloxone) should be readily available.

Technique: trocar insertion, pleuroscopic exploration and sampling

I prefer to prepare the chest tube and the water seal system prior to starting the procedure, so I can act quickly should a complication (i.e. severe hypoxemia, bleeding) occur and immediate re-expansion of the lung is needed. With the patient in the lateral decubitus (the healthy lung dependent side), the ipsilateral arm is kept above the head to open up the intercostal (IC) space. The hemithorax is prepared and draped in a sterile fashion. The point of entry is usually on the mid-axillary line in the 5^{th} or 6^{th} IC space but this may very depending on the preoperative US findings. In addition, when performed for pneumothorax, a higher insertion site is selected to better visualize the apex of the lung. If two ports of entry are needed (rarely for this procedure), the second one should be one IC space superior or inferior to the main entry in order to manipulate the instruments easily under direct visualization. I use generous amount of local anesthetic 1% lidocaine (20ml) at the site of entry, focusing on the 4 layers of chest wall: epidermis, subcutaneous tissue, muscle and parietal pleura. I place the sutures prior to inserting the trocar, again with the intent to be ready to quickly insert and secure a chest tube to re-expand the lung if necessary. The trocar is inserted into the pleural space in a rotating motion, and suction is applied in tandem with respiration so that an equivalent amount of air is aspirated into the pleural space to keep the lung collapsed. Adhesions, when encountered are severed by forceps or cautery. The pleural cavity is examined in a systematic fashion (diaphragm, the lung, costal and mediastinal pleura). Pulmonologists who intend on performing flex-rigid pleuroscopy should be knowledgeable about thoracic anatomy and confine biopsies of parietal pleura over the rib. At the end of the procedure, a chest tube 20F is inserted and directed apicoposteriorly, connected to underwater seal and suction until complete lung re-expansion has occurred. The chest tube is removed when the fluid drainage is less than 200 ml, and I usually keep the tube in place for 48 hours following talc poudrage.

Quality Control

I will now address the pros and cons of flex-rigid pleuroscopy in comparison with rigid thoracoscopy and discuss some safety tips. The advantages of flex-rigid pleuroscope are: **(1) s**imilar in handling to that of the flexible bronchoscope; **(2)** good quality video image **(3)** 2.8 mm working channel for accessories commonly used for flexible bronchoscopy **(4)** compatible with light source and video processor used for flexible bronchoscopy and gastrointestinal endoscopy at no additional costs; **(5)** ability to aspirate fluid under direct visualization; **(6)** good maneuverability of the flexible tip around adhesions thereby obviating the need for a second point of entry except to control massive post-biopsy bleeding (very rare); **(7)** talc pleurodesis can be performed at the same sitting as palliation for malignant pleural effusion following complete evacuation of fluid and parietal pleural biopsy. Moreover anesthesia of the pleura with 1% lidocaine (up to 25ml) can be administered by means of a spray catheter before talc poudrage to minimize pain[1]; **(8)** The 7mm-flex-rigid pleuroscope inserted through a 8mm inner diameter flexible trocar (Fig 2) allows air to enter the pleural space as fluid is removed thereby keeping the lung partially collapsed, and large volumes of fluid can thus be evacuated without risk of re-expansion pulmonary edema.

Pooled diagnostic accuracy of flex-rigid pleuroscopy for the evaluation of exudative pleural effusions based on 17 studies was 91% with 100% specificity. There were minimal complications and no mortality.[2] In addition, flex-rigid pleuroscopy can be safely performed as an outpatient procedure.[3]

Deficiencies of the flex-rigid pleuroscope exist and include: **(1)** the suction channel is small and thick pus or blood can obstruct and proceduralist may have to use alternative modes; **(2)** biopsy of smooth thickened parietal pleural biopsy and adhesiolysis may be difficult with the flexible forceps as it lacks the mechanical strength of the rigid forceps and electrosurgical knife is an alternative. However investigators have found no difference in yield[4-6]. To improve the diagnostic yield multiple biopsies should be performed over the same site for deeper and representative specimens as well as electrosurgical technique;[7,8] **(3)** Excessive bleeding after biopsy though rare, may not be readily controlled with the pleuroscope as illumination becomes poor and the suction channel becomes obstructed by blood. This should prompt the pleuroscopist to quickly apply external compression, create a second point of entry for other instruments such as electrocautery or a peanut wand to tamponade the bleeding site, and to re-expand the underlying lung.

Table 1: Indications for rigid or semi-rigid pleuroscopy

Clinical Scenario	Type of Procedure
Diagnostic thoracoscopy for indeterminate, uncomplicated pleural effusion where suspi-	Flex-rigid pleuroscopy* or use of rigid telescopes under local anesthesia
Trapped lung with radiographically thickened pleura	Rigid optical biopsy forceps* or flex-rigid pleuroscoopy with flexible forceps performing multiple bites over the same area to obtain specimens of sufficient depth or use of flexible forceps and IT knife
Mesothelioma is suspected	Rigid optical biopsy forceps* or flex-rigid pleuroscopy with IT knife
Pleuro-pulmonary adhesions	Fibrous: Rigid optical biopsy forceps* or flex-rigid pleuroscopy with electrocautery accessories Thin, fibrinous: flex-rigid pleuroscopy with flexible forceps
Empyema, split pleural sign, loculated pleural effusion	Rigid instruments (VATS)* or conversion to thoracotomy for decortication
Pneumothorax with bulla or blebs	Rigid instruments (VATS)* for staple bullectomy

(*) denotes preferred procedure

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Figure 1: Flex-rigid Pleuroscope with Flexible Trocar

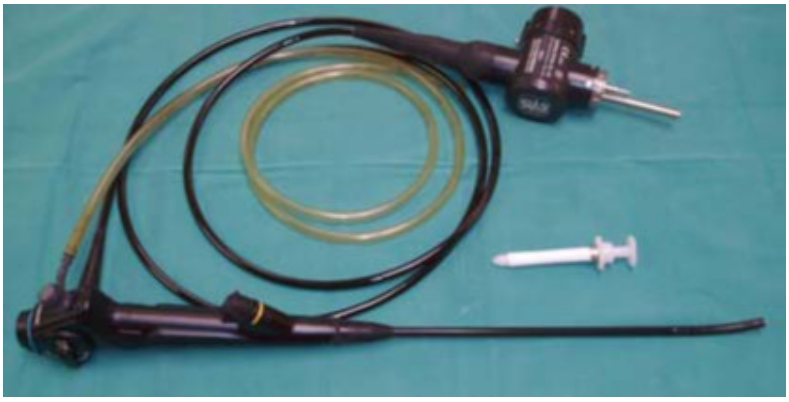


Figure 2: Pleuroscope inserted into Trocar

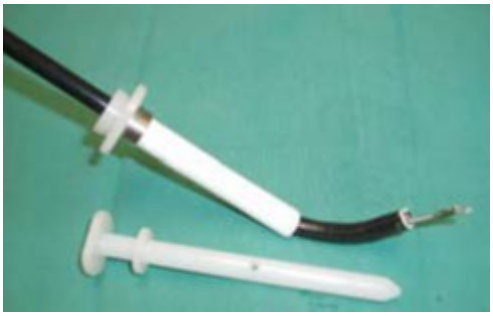
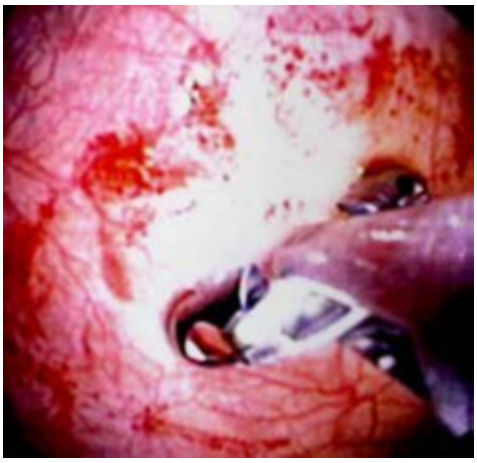
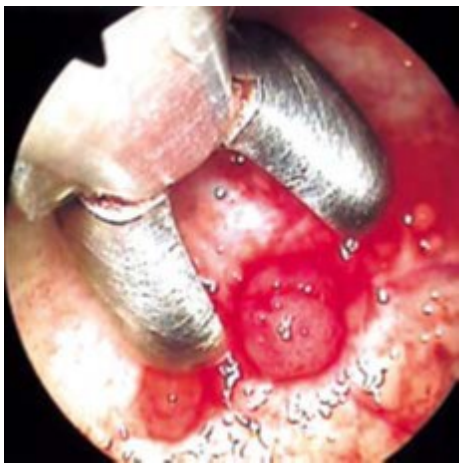


Figure 3: Flexible forceps vs Rigid forceps



a) 2mm flexible forceps



(b) 5mm rigid optical forceps

Education and Training

Under the leadership of Dr. Syed Arshad Husain, a large group of trainees were introduced to various elements of the Bronchoscopy Education Project such as bronchoscopy assessment tools, checklists and step-by-step technical skill instruction. Didactic lectures and individualized learner-centric instruction were part of the Fundamentals of Bronchoscopy© curriculum. The WABIP gratefully acknowledges Drs. Angshu Bhowmik, Tudor Toma and other instructors for their enthusiasm, the leadership management team of Maidstone Hospital for the use of their state-of-the-art academic training center, and all those companies providing equipment support.

Figure 1: Dr. Angshu Bhowmik, medical consultant from Homerton University Hospital Trust, (NHS Foundation) making technical points during the BBG educational program held in Maidstone, UK

Figure 2: Hands-on bronchoscopy instructors and lecturers Drs. Syed Arshad Husain, Angshu Bhowmik, and Tudor Toma standing (from left to right; three gentleman wearing suit jackets and neckties in front row) with course participants at recent bronchoscopy educational program held at Maidstone Hospital, Kent United Kingdom.

Figure 1

. **Figure 2**

Research

Endobronchial Ultrasound (EBUS) Transbronchial Needle Aspiration (TBNA) Can Diagnose Lymphoma As Good As Surgical Techniques?

Despite a revolutionary success of EBUS-TBNA in diagnosing and staging lung cancer and other diseases involving mediastinum such as sarcoidosis, the yield of EBUS-TBNA in diagnosing Lymphoma has been significantly lower than the surgical techniques.
A recent study from Moonim et al. from London, UK shows a very significant improvement in the yield of EBUS-TBNA in the diagnosis and sub-typing of lymphoma with a novel strategy for tissue triaging and processing.
The unique feature of this study likely responsible for high sensitivity, specificity and positive and negative predictive values is the strategy of triaging the tissue sample from bronchoscopy suite after initial onsite evaluation by the cytopathologist into different ancillary testing pathways such as immunohistochemistry, flow cytometery, cytogenetic or molecular testing. This strategy optimizes the sample in yielding the right diagnosis.
With the above-mentioned strategy, Dr. Moonim's group was able to correctly diagnose 88% of de novo and 100% of relapsed lymphoma. They were also able to sub-type lymphoma into Hodgkin, non-Hodgkin, high grade and low grade to allow adequate treatment without further testing in upwards of 84% of patients. These results are very comparative to our current surgical approach.

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WABIP News

ITEM 1: The WABIP is proud to welcome two new member societies; the Paraguayan Bronchology Group of the Paraguayan Pulmonary Society, under the leadership of Doctor Domingo Perez, and the newly formed British Bronchoscopy Group under the auspices of Dr. Syed Arshad Husain.

ITEM 2: The World Bronchology Foundation has begun planning its humanitarian aid efforts for 2014 and 2015. The newly formed Board of Directors is working on its 2014-2015 budgets and is studying proposals. Projects usually include equipment donations, a period of on-site training, and follow-up. Previous regions visited by the WBF include Mauritania, Mozambique, Argentina, Ecuador, Bolivia, and Vietnam. Please contact the WBF with inquiries or suggestions by writing Michael Mendoza at admin@wabip.com.

ITEM 3: The WABIP is proud to announce that awardees have been selected for the Killian, WABIP-Dumon, and Becker young investigator awards. Recipients will be honored at the WCBIP/WCBE opening ceremony.

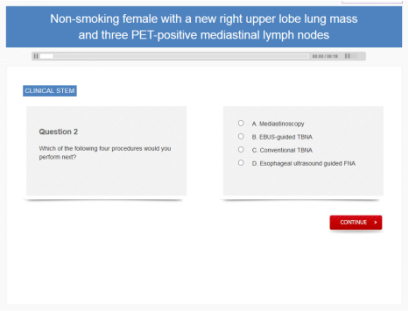
ITEM 4: The WABIP is also proud to announce the selection of awardees of the WCBIP Video Festival. Awards given for imaging, innovation, and science will be presented during the WCBIP/WCBE opening ceremony. Furthermore, the video selected as the jury selection best overall video will be shown at the WCBIP/WCBE opening ceremony. Other videos will be available for viewing at and near the WABIP booth.

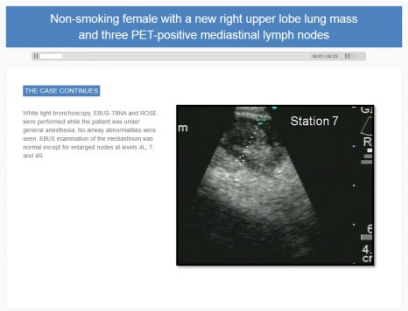
ITEM 5: The WABIP thanks all international regents, regional and national bronchology association leaders, WABIP committee chairs, task-forces, and committee members for their diligence and volunteerism. Without their help, our organization would not be the exciting and innovative professional medical society it has become today. To learn more about the WABIP and how you can become more involved please visit with Michael, Roway, and Judy at the WABIP booth!

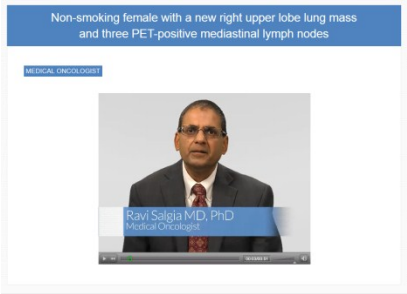
SPECIAL ANNOUNCEMENT

The WABIP is launching a series of THREE webcasts* pertaining to lung cancer diagnosis and management, focusing on the bronchoscopic retrieval and processing of small volume specimens for molecular analysis and biomarker-directed treatment. Webcasts will be distributed worldwide, and shall also be permanently accessible on the WABIP server at the following URL: wabipacademy.com

Webcasts include interactive questions with detailed explanatory answers, PDF files, downloadable PowerPoint presentations, still image and video material, as well as audio and video expert commentaries by guest faculty from Interventional Pulmonology, Oncology, Thoracic Surgery, Cytopathology, and Medical Ethics. Sample these webcasts at the WABIP booth in Kyoto!







*A collaborative project with support from Pfizer Oncology

Links

www.bronchology.com	Home of the Journal of Bronchology
www.bronchoscopy.org	International educational website for bronchoscopy training with u-tube and facebook interfaces, numerous teachiing videos, and step by step testing and assess ment tools
www.aabronchology.org	American Association for Bronchology and I nterventional Pulmonology (AABIP)
www.eabip.org	European Association for Bronchology and Interventional Pulmonology
www.chestnet.org	Interventional Chest/Diagnostic Procedures (IC/DP) NetWork
www.thoracic.org	American Thoracic Society
www.ctsnet.org	The leading online resource of educational and scientific research information for cardiothoracic surgeons.
www.jrs.or.jp	The Japanese Respirology Society
sites.google.com/site/asendoscopiarespiratoria/	Asociación Sudamericana de Endoscopía Respiratoria

NEW 5 YEAR DATA

Established long-term effectiveness and safety

Newly published data confirm Bronchial Thermoplasty (BT), delivered by the Alair™ System, as a safe and minimally invasive procedure that provides a long-term reduction in asthma exacerbations for patients with severe asthma.

Fewer respiratory-related emergency room visits

- **84% reduction in emergency room visits** for respiratory symptoms at 1 year compared with sham-controlled patients, with reduction maintained out to 5 years[1,2]

Fewer exacerbations, with effectiveness maintained out to 5 years

- **32% decrease in severe asthma exacerbations** (requiring systemic corticosteroids) at 1 year compared with sham-controlled patients, with reduction maintained out to 5 years[1,2]

  —The decrease in severe exacerbations over 5 years included a substantial reduction in the use of systemic corticosteroids associated with those exacerbations[2]

- No increase in hospitalizations, asthma symptoms, or respiratory adverse events over 5-year period[2]

View the 5-year clinical trial results at BT5years.com

Brief Statement of Relevant Indications for Use, Contraindications, Warnings, and Adverse Events: The Alair Bronchial Thermoplasty System is indicated for the treatment of severe persistent asthma in patients 18 years and older whose asthma is not well controlled with inhaled corticosteroids and long-acting beta-agonists. The Alair System is not for use in patients with an active implantable electronic device or known sensitivity to medications used in bronchoscopy. Previously treated airways of the lung should not be retreated with the Alair System. Patients should be stable and suitable to undergo bronchoscopy. The most common adverse event of BT is an expected transient increase in the frequency and worsening of respiratory-related symptoms. Rx only.

CAUTION: Law restricts this device to sale by or on the order of a physician. Indications, contraindications, precautions, and warnings can be found with product labeling.

NOW AVAILABLE from Boston Scientific
for the treatment of severe asthma in adults

Bronchial Thermoplasty™

References: 1. Castro M, et al, for the AIR2 Trial Study Group. *Am J Respir Crit Care Med.* 2010;181:116-124. **2.** Wechsler M, et al; for the AIR2 Trial Study Group. *J Allergy Clin Immunol.* 2013; 132:1295-1302.