New Hope with the Scope: Introduction

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The first bronchoscopy was performed by Gustav Killian [1] in Freiburg, Germany, in 1887. During the early years of the development of bronchoscopy, the indications for the procedure were primarily therapeutic: removal of foreign bodies and dilation of strictures from tuberculosis and diphtheria. In the early part of the 20th century, Chevalier Jackson [2], the father of American bronchoesophagology, further advanced bronchoscopic techniques and designed modern rigid bronchoscopes. Again, the primary indication was often therapeutic. In the 1970s, Dr. Shiketo Ikeda introduced the flexible fiberoptic bronchoscope primarily as a diagnostic instrument. Bronchoscopy soon shifted from being a therapeutic procedure performed by thoracic surgeons and otolaryngologists to a primarily diagnostic procedure performed by pulmonologists [3]. Currently, apart from thoracentesis and pulmonary function testing interpretation, bronchoscopy is the most commonly performed procedure by pulmonologists.

As pulmonologists have gained expertise within the field of bronchology, the diagnostic use of the flexible bronchoscope has expanded and there has been a growing interest in the use of the instrument for therapeutic purposes. The worldwide epidemic of lung cancer, which often leads to airway obstruction by malignant neoplasm, but also the stenoses due to benign disorders have replaced foreign body removal as the main indications for therapeutic bronchoscopy. Modern technology has given bronchoscopists numerous adjunctive therapies in addi-

tion to the classic forceps used by Killian and Jackson. These newer therapies include laser, stents, electrocautery, cryotherapy, and others and can be applied through either rigid or flexible bronchoscopes [4].

On the other hand, thoracoscopy had been advocated by Jacobaeus [5] in 1910 for the exploration of serous cavities. According to the excellent historical review by Moisiuc and Colt [6], the first thoracoscopy was performed in Dublin in 1865 by the Irish physician Francis Richard Cruise [7] and it was reported in 1866 by Dr. Samuel Gordon [8] at the end of the case presentation of an 11-year-old girl with empyema. In spite of this, Jacobaeus still deserves the honor to be considered as the father of thoracoscopy, because he overcame the problems involved in collapsing the lung to obtain a better endoscopic view by inducing pneumothorax and he used thoracoscopy both as a diagnostic and therapeutic tool.

Nowadays, thoracoscopy is usually performed by pulmonologists in the endoscopic suite under local anesthesia and with intravenous conscious sedation/analgesia; it is mainly used for diagnostic purposes (especially in pleural effusions) and for talc pleurodesis ('poudrage') to prevent recurrence of persistent pleural effusions or pneumothorax. Unfortunately the number of procedures has decreased worldwide and is increasingly replaced by video-assisted thoracoscopic surgery, although this technique requires general anesthesia and double lumen tracheal intubation, and is performed almost exclusively in the operating room [9].

More recently, a number of high-technology endoscopic techniques were introduced into our daily routine. As these techniques have already shown great clinical potential, we thought it timely to cover them in a Thematic Review Series in *Respiration*, which consists of 4 articles, the first one appearing in this issue. The newest techniques are still under investigation, but hopefully will open up new treatment modalities for our patients suffering from various lung diseases.

The first contribution to this series by Herth et al. will focus on the current knowledge of endoscopic lung volume reduction (ELVR). COPD is a significant and growing challenge throughout the world. It is difficult to interpret prevalence data, primarily due to varying definitions of COPD. Nevertheless, it is currently the fourth leading cause of death and, in 2000, the World Health Organization reported there were 2.74 million deaths worldwide due to COPD [10]. Despite advances in care, treatment of COPD remains supportive and we are often unable to alter a relentless progression of disease. Currently, there is a great deal of interest in new and developing technologies that allow physicians to perform ELVR [11]. The devices receiving most attention are endobronchial valves, umbrellas, coils, biogel or even steam, which are applied via a bronchoscope. The devices are placed in targeted lobes with the aim of causing atelectasis, thereby reducing the volume of the thoracic cavity and restoring a more favorable alignment of the respiratory muscle system. The hope is that patients undergoing ELVR may benefit in the same way in which surgical patients in the NETT (National Emphysema Therapy Trial) benefited, with very little risk [12].

Apart from investigating the tracheobronchial tree, interventional pulmonologists have a longstanding tradition with procedures directed at the pleural space. A variety of instruments can be employed to access the pleural cavity. Historically, rigid equipment has been the most widely used, although nowadays semirigid and miniatur-

ized tools are also available [13]. In a second contribution Lee et al. will discuss the advances in video technology and improved endoscopic instrumentation which took place within the last decade. They have prompted a resurgence of interest in minimally invasive chest procedures among thoracic surgeons and interventional pulmonologists, and renewed enthusiasm for pleural investigations to manage both simple and complex pleural diseases.

The third review by Eberhardt et al. [14] will highlight the new lung cancer treatment options, which have become available through the use of different navigation techniques. Navigation techniques were designed to guide bronchoscopic tools to predetermined locations within the periphery of the bronchial tree. The use has pushed the diagnostic yield of flexible bronchoscopic procedures closer to the sensitivity obtainable through transthoracic CT-guided procedures; the limitation is still the size of what the nodules [15]. Normally, an extended working channel can carry either the sensor probe or a flexible forceps/brush/needle, and computer software converts CT scans into multiplanar images with 3-dimensional virtual bronchoscopy reconstruction.

Instead of using the system as a diagnostic technique only, great potential can be seen in the possibility to apply navigated therapy to small coin lesions. It has already been shown that accurate deployment of fiducials to bronchoscopically invisible peripheral lung lesions for a stereotactic body radiation treatment [16] and navigation of high-dose brachytherapy probes are feasible [17].

Finally, the development of smaller scopes, better CCD chips and small fibers has made it possible to nearly reach the accuracy of a pathologist in characterizing endobronchial findings [18]. Endocytoscopy, optical coherence tomography and alveoloscopy are under investigation in various centers. Thiberville et al. will summarize the impact this has had on diagnostics and therapeutics of different lung diseases and how it may lead to further improvement.

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