The rigid bronchoscope: an obsolete instrument?

Moira Chan-Yeung
Member, Education and Research Committee,
Hong Kong Museum of Medical Sciences Society

Until the era of bronchoscopy, inhalation of a foreign body could result in a multitude of problems such as chronic lung abscess, fistula formation, chronic ill health and malnutrition, even death. Techniques such as lobectomy or pneumonectomy had yet to be developed to remove the affected lobe or lung. Although instruments were available to inspect body cavities such as the mouth, nose, ear, vagina, rectum and urethra, inspection of the larynx and the trachea presented great difficulties due to the lack of light. Direct inspection of the airways became feasible only after three major inventions: (1) instruments for inspection, (2) suitable light sources, and (3) adequate anaesthesia.

In 1854, the first problem was solved by Manuel Garcia, a singing teacher in London, who observed his own larynx using a dental mirror. Two years later, a laryngologist Ludwig Turck used a dental mirror for his work in the diagnosis and treatment of laryngeal diseases. Nonetheless, the indirect and reverse view of the anatomy posed difficulties for most laryngologists. Surgery on the larynx was also hindered by inadequate light and lack of local anaesthesia.[1]

The first light source for inspection of body cavities was invented in 1805 by a practitioner, Philipp Bozzini, from Frankfurt. It consisted of a box containing a candle, the light of which was reflected by a hollow mirror into a split metallic tube. For organs that could not be visualised by direct inspection, he used this tube with a mirror to reflect the light and image. The illumination from this awkward light source, however, was poor and inadequate for examination of the stomach and the airways. When Thomas Edison invented the electric bulb in 1879, and Mignon miniaturised it for distal illumination of the endoscope, the reality of bronchoscopy became a little closer. The second problem was solved.[1]

FIG. Rigid bronchoscopes of varying sizes with forceps, donated by Ruttonjee Sanatorium in 1995 to the Hong Kong Museum of Medical Sciences Society

In 1884, Jellinek, a Viennese laryngologist, first introduced cocaine that eliminated the reflexes of the pharynx and the larynx and allowed passage of the endoscope for inspection of the airways. The three inventions were now in place and bronchoscopy became a reality.[1]

In 1895, Gustav Killian in Mainz, Germany, passed an endoscope through the larynx to the bifurcation of the trachea in a tracheostomised patient for the first time. He then practised on corpses without tracheostomies to confirm his previous observation that the bronchi were flexible and elastic before he attempted the procedure on healthy volunteers. In 1897, Killian removed the first foreign body via the bronchoscope. He became well known for his careful work after many publications and lectures, and physicians from around the world flocked to him to learn the techniques of rigid bronchoscopy.[1]

Chevalier Jackson, from Philadelphia, was the first to construct an 'American bronchoscope' with a light carrier using a miniaturised electric mignon bulb at the distal end and an extra suction channel. In 1907, he published the first systematic textbook on bronchoesophagoscopy and dedicated it to Killian, the Father of Bronchoscopy. Jackson persistently refused to patent his different inventions, instead wanting them to be used as widely as possible—a spirit to be emulated by the younger generation.[2]

In 1940, the optic telescope and in 1962, fibre illumination were introduced to enhance the rigid bronchoscope. From then on, rigid bronchoscopy was used extensively for the diagnosis and treatment of a number of lung diseases where lesions were in the trachea or in the major airways.[2]

Broader application of bronchoscopy became possible only after the development of flexible instruments that could be easily introduced under local anaesthesia. In 1964, when Shigeto Ikeda from Japan first used a flexible fibre-optic bronchoscope, he created quite a stir. The fibre-optic bronchoscope received wide acclaim as a revolution in bronchoscopy.

While the flexible fibre-optic bronchoscope is now used routinely in most endoscopy units, and a great many new inventions have been associated with this instrument, the rigid bronchoscope still has a place in the management of certain lung diseases. For particular interventional procedures such as laser and photodynamic laser therapy for lung cancer, endobronchial stenting, and transtracheal puncture of the carinal lymph nodes, the rigid bronchoscope remains the preferred instrument for many clinicians and investigators in Europe. The rigid bronchoscope (Figure) is not obsolete but retains a vital place in modern surgery.

References

1. Becker HD. Bronchoscopy: the past, the present, and the future. Clin Chest Med 2010;31:1-18.
2. Becker HD. A short history of bronchoscopy. In: Ernst A, editor. Introduction to bronchoscopy. New York: Cambridge University Press; 2009.