

A brief history of tracheal access and laryngoscopy through the ages

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Introduction

The earliest reports of elective intubation date back to the late 19th century. Tracheostomy was the only known method to access the trachea and relieve upper airway obstruction before this point.

Bronze to Iron age

One of the first known references to tracheostomy is found in the 'Rig Veda', an ancient Indian book of medicine written around 2000 BC that describes the spontaneous healing of a throat incision.¹

Depictions found on Egyptian artefacts such as the 'Slab of King Djer' circa 3700 BC may be an even earlier portrayal of tracheostomy. Though many believe the explanation to be more sinister (Fig. 1).²

Hippocrates (460-380BC) first described tracheal intubation using a tube made of tin but condemned tracheostomy for risk of bleeding secondary to carotid artery injury.

Alexander the Great (356-323 BC) reportedly performed an emergency tracheostomy with his sword on one of his soldiers suffering asphyxiation due to an inhaled bone.¹ During later part of 2nd century BC, **Asclepiades of Bythinien**, a prominent Roman physician, is believed to be the first to have performed elective tracheostomy to treat 'inflammatory' conditions of the floor of the mouth and larynx.³

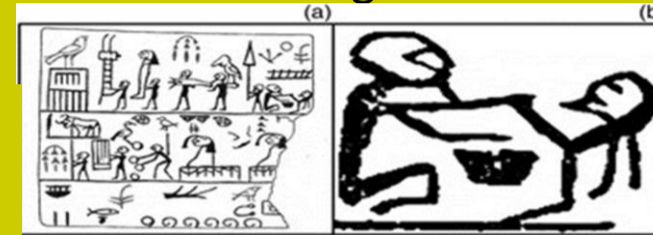


Figure 1 (a) The Slab of King Djer (b) section depicting tracheostomy or sacrifice?

Middle Ages

Almost 1400 years passed with little mention of airway procedures in middle ages historical text perhaps due to recognition of risk of catastrophic haemorrhage and the idea that cartilaginous structures could not heal, most likely contributed to this stagnation.³ Notable exceptions include the work of **Paul of Egina**, the Byzantine physician of the 7th century, who made a small step towards the modern laryngoscope while describing a polished steel instrument ('Glossotrochus'), basically used to maintain depression of the tongue and provide illumination of the fauces.⁴

Early modern period

As modern medicine flourished during the Renaissance period, many descriptions of airway management can be found. In 1543, Flemish anatomist, **Andreas Vesalius** published 'De Humani Corporis Fabrica' (On the Fabric of the Human Body) following his study of human cadavers (Fig. 2) revolutionising understanding of anatomy. He also demonstrated that the lungs of a dying animal could be inflated by breathing through a reed placed into the trachea. It was possibly first description of positive pressure ventilation, unfortunately unnoticed for centuries ahead.⁵



Fig 2: De Humani Corporis Fabrica⁵

Late modern period

Indirect Laryngoscopy: In 1807, **Dr Philipp von Bozzini** of Germany, developed instrument called the "Lichtleiter" composed of two tubes, employed a candle and mirrors to direct light through one of the tubes and to visualise an illuminated larynx through the other. He was the first one to introduce the idea of an external light source to reveal aspects of body cavities.⁴

In 1929, **Benjamin Guy Babington** of London introduced 'glottoscope' describing tissue retraction with a tongue depressor and directing sunlight with an array of mirrors to provide an indirect view of the larynx. Interestingly his colleague, **Dr Thomas Hodgkin**, apparently coined the term 'laryngoscope'.⁴ **Manuel Garcia II**, a Spanish singer also described a 'laryngoscope' consisting of mirrors. In 1881, he published astonishing details of vocal cords movements during the breathing in his paper "physiological observation of the human voice".⁶ Controversy exists as to whether Babington or Garcia first developed the technique of laryngoscopy. **Dr Johann Czermak** of Budapest adapted Garcia's technique of laryngoscopy in 1857 by focusing an artificial light more reliably than sunlight using concave mirrors.⁶ He may have been the first to describe external laryngeal manipulation to improve laryngeal views.⁴

Direct Laryngoscopy: In 1895, German physician **Alfred Kirstein** (Fig. 3) had breakthrough towards elective intubation by developing the 'autoscope' (Fig. 4) a combination of proximal electrical light source and a handle with a blade to retract supraglottic tissues, lifting of the epiglottis, and good quality direct visualisation of the larynx. His descriptions of ideal head and neck positions as well as the vector forces involved remain a mainstay of modern anaesthetic practice.⁷

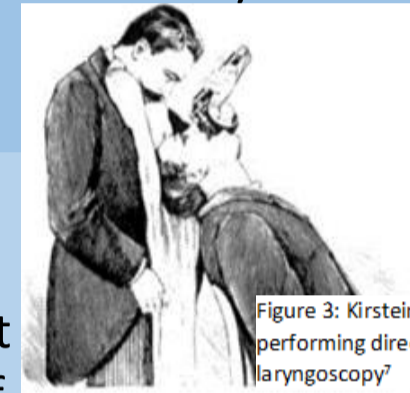


Figure 3: Kirstein performing direct laryngoscopy⁷

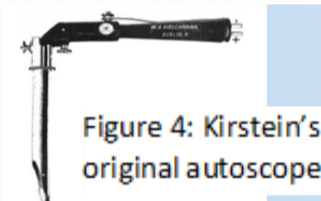


Figure 4: Kirstein's original autoscope⁷

The first documented combined use of a direct laryngoscope and tracheal intubation in the lying position came from Pennsylvanian **Professor Chevalier Jackson** in 1913. He introduced a distal light source to the blade to provide adequate visualisation while approaching the larynx from the lateral aspect as opposed to the midline approach employed Kirstein's autoscope.⁴

It was **Dr Henry Harrington Janeway** from New York who became the first anaesthetist to have ever published on direct laryngoscopy and intubation and also first to include batteries within handle of a laryngoscope for a direct light source.⁶ In 1926 **Sir Ivan Magill** designed a foldable handle and blade. In 1941 Texan physician **Robert Miller** designed the straight blade. Subsequently, New Zealand born Professor **Robert Reynolds Macintosh** developed the curved blade, designed to be inserted from the side of the mouth and recommended placing the tip of the blade in the vallecula to reliably improve the view of the glottis.⁸

Space Age:

In the late 20th century, we went back full circle to where it all started i.e. to indirect laryngoscopy using fibre optic technology and a multitude of devices and adjuncts, from flexible scopes to rigid optical stylets and more recently video-laryngoscopes.^{9,10} In contrast to the original indirect laryngoscopes developed by **Bozzini, Babington, and Garcia**, aimed to visualise unseen larynx, modern indirect laryngoscopes empowers anaesthetists to see which might be impossible by any other means and to safely manage the huge variety of airway challenges.

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