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The first laryngectomy

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Introduction

IT is one hundred years since Gussenbauer (1874) reported the first laryngectomy, carried out in 1873 by Billroth, a member of the German surgical school, which flourished in the second half of the nineteenth century, and which established surgery of the internal viscera. As a preliminary, the political, economical and technological factors leading to the emergence of this school will be considered.

In the political field, the most important event, as for much of the rest of European History, was the death of Charlemagne in 814. According to the Frankish laws of inheritance his Empire was divided equally between his three sons. In the western part the church gained the upper hand and imposed the law of primogeniture, so that France remained politically stable for almost a thousand years; the middle part of the kingdom was soon divided between the other two, whilst in the Eastern half of Charlemagne's empire, the Frankish laws of inheritance continued to be applied, so that by 1800 there were 365 separate German-speaking states. This division prevented economic and cultural growth and there was a strong desire for German unity.

In 1848, Europe was swept by revolution, which in Germany was inspired by not only democratic, but also nationalistic feelings. These culminated in the foundation of a united Germany, in 1870, when Wilhelm

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was crowned the first German Emperor at the end of the Franco-Prussian War. This was thus an era of rising national fervour.

On the economic front, Germany was changing rapidly from a rural to an industrialized urban community in the years from 1850 to 1870. This was due in large part to the establishment of the Zollverein, or customs free area, another example of the German desire for unity. The growth of industry led to the establishment of large conurbations which provided the surgical schools with the opportunity for acquiring concentrated experience.

Two of the principal German industries were textiles and chemicals. Two by-products of these industries were to have an enormous influence on the development of medicine; the aniline dyes and the anaesthetic gases. The usefulness of the anaesthetic gases, first applied to a human being about 1848, needs no comment, but it is often not realised how important has been the effect on medicine of the aniline dyes, because by allowing staining of the tissues they put microscopy on a practical basis.

The microscope was invented by Van Leeuwenhoek in the seventeenth century, during the Golden Era of Holland, but was not applied to medicine until Gehrlach showed about 1850 that the tissues could be stained differentially—firstly, rather poorly with natural dyes, and then with much greater success with the artificial aniline dyes. This discovery allowed the development first of histology under Henle, Schwann and Kolliker, and then of histopathology under Virchow. These men were all pupils of Muller, Professor of Physiology at Berlin, as was Helmholtz who established the theory of hearing; all these men appear to have received their inspiration from Muller.

In the second half of the nineteenth century, the stage was then set for medical advance: a prosperous people living in large conurbations, subject to intellectual ferment, having at their disposal technological advances which allowed accurate diagnosis to be made for the first time in history, and with anaesthetics available so that it was possible to explore the body cavities. Many 'surgical firsts' were thus recorded at this time.

Development of laryngeal surgery

Up to this time little attention had been paid to laryngeal cancer, because there were no effective methods of examining the larynx and a pathological examination of abnormal tissue could not be made. The disease was thus rarely diagnozed, until Czermak, about 1860, put Garcia's discovery of the laryngoscope on a firm footing and Virchow in 1856 established histopathology.

There had been only a few sporadic reports of removal or cauterization of 'growths' via a laryngo-fissure, such as Albers report of Brauer's

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operation in 1834 (a 'Warty' tumour of the larynx was cauterized via a laryngo fissure with mercuric nitrate; the episode ended fatally). In 1853, Buck of Philadelphia, also reported removing a tumour via a laryngo fissure without anaesthetic. The patient suffocated some eighteen months later while changing her tracheostomy tube. He also summarized all forty-two 'morbid growths' of the larynx reported up to that time.

A further factor restricting progress on total laryngectomy had been the experimental work of Czerny, who in 1870 had carried out total laryngectomies experimentally in dogs, of whom four out of five died, so that it was felt that total laryngectomy was not an operation which the human being could withstand.

It has often been stated that Watson of Edinburgh carried out the first laryngectomy, for syphilis, in 1866. Watson's own paper shows this to be completely untrue—the patient was only submitted to tracheotomy during life, and his larynx was demonstrated at a pathological meeting after his death. The confusion appears to have arisen as a result of an ambiguous statement by Foulis (1881) some fifteen years later in which he quotes a letter from Watson describing this case, and in which Watson says that he removed some of the soft tissues from the larynx. There is no evidence that Watson removed the larynx itself, and this is borne out by his original description of the case.

The first laryngectomy

The subject of the first laryngectomy, reported to the German Surgical Society in 1873 by Gussenbauer in the absence of Billroth, was a 36-year-old religious instructor who had been hoarse for three years. A subglottic tumour, mainly on the left side, was found by a laryngologist and treated by cauterization with silver nitrate and injections of liquor ferri. With the passage of time, the tumour grew, causing stridor, which was relieved by repeated removals of bits of the tumour. Eventually, pieces of the tumour were examined histologically, and a diagnosis of epidermoid carcinoma was established. Operation was decided upon, and the patient was admitted to Professor Billroth's clinic in November 1873.

Billroth decided to carry out a hemilaryngectomy because he felt that a total laryngectomy was not justifiable, in the light of Czerny's work referred to above. Accordingly the patient was operated on on 27 November 1873. He was first anaesthetized and a tracheostomy done through the first tracheal ring. The anaesthetic was continued through a Trendelenburg cannula, that is an endotracheal tube with inflatable cuffs (Fig. 1).

The larynx was opened by an incision which divided the cricoid cartilage in the midline and the thyroid cartilage just to the left of the midline. The carcinoma was excised preserving the right vocal cord, the wound closed, and the tracheostomy cannula removed.

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The patient's postoperative course was apparently entirely uneventful. By the middle of December, laryngoscopic examination showed massive granulations on the operated side of the larynx. These were originally

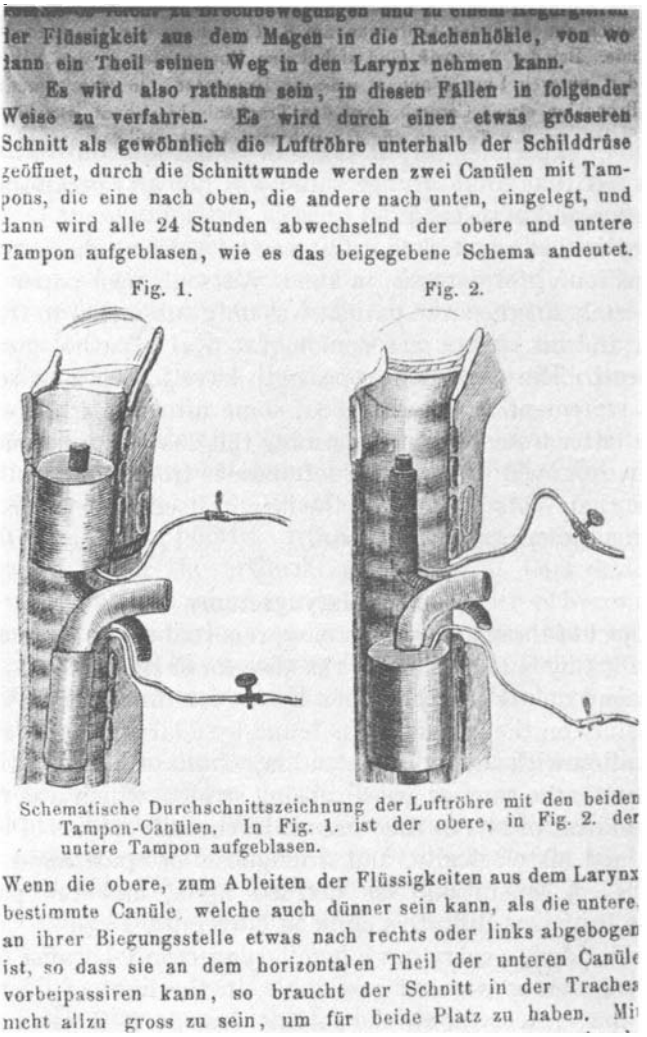


FIG. 1.

regarded as being benign, but an examination under anaesthetic on 31 December 1873, clearly showed that the tumour had recurred. The anaesthetic was lightened, or rather the patient woke up from the anaesthetic of his own accord, and the position was explained to him. He consented to total laryngectomy and was anaesthetized again. The larynx was mobilized on each side and the superior thyroid arteries ligated. There

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was considerable bleeding during this stage, but the blood was cleared from the trachea by the patient, who repeatedly woke from the anaesthetic and coughed the blood out of his trachea. The trachea was then divided, and the anaesthetic cannula was introduced into the trachea.

The thyrohyoid membrane was divided last and the larynx removed, leaving the hyoid bone and the epiglottis in place. Sponges were left in the wound for several minutes, and when they were removed, there was no bleeding, so no attempts were made to secure hemostasis. The edges of the trachea, after removal of a further two rings were stitched to the skin, as were the edges of the pharyngeal mucosa. The operation ended with reviving of the patient by administration of wine through the feeding tube.

Four hours after operation there was, not surprisingly, a brisk reactionary haemorrhage. This was dealt with, and the patient was again revived by wine. His course was uneventful thereafter and he began to swallow food on the eighth day. Why the food did not come out of the large pharyngeal fistula is not apparent from the article.

The second part of the article is devoted to a description of the various types of artificial larynx which were designed for the patient. The final result is shown in Figure 2. Its purpose is fairly obvious. The apparatus was a T-shaped tube, one limb being for the trachea and the other passing through the fistula into the pharynx. The pharyngeal limb and the external

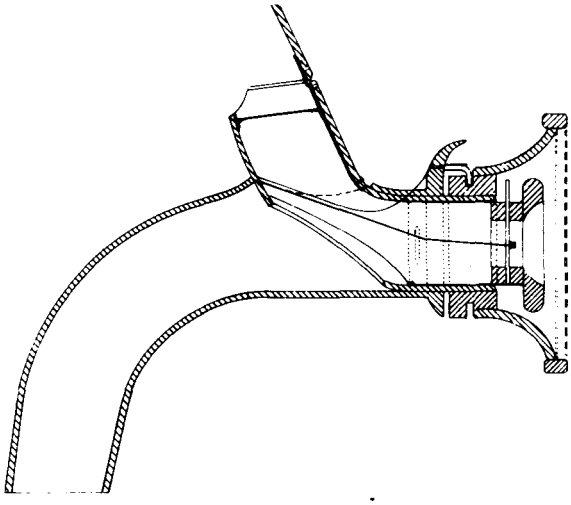


FIG. 2.

opening both had one-way valves so that the expiratory stream was forced into the pharynx but food was prevented from entering the trachea. This device appears to have been successful and is said to have given the patient a loud and clear, if monotonous, voice. This apparatus appears

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to have been widely adopted, and is referred to in Morrell MacKenzie's textbook as Gussenbauer's apparatus. The instrument in common use was an improved modification, designed by Foulis, a forgotten Glasgow surgeon who was also one of the pioneers of laryngeal surgery.

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