

Some historical aspects of the surgical treatment of the infected maxillary sinus

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SUMMARY

Sinus surgery probably originates from the time of the New Kingdom of ancient Egypt. Instruments were used to remove the brain through the nose as a part of the mummification process.

The interest in the pathology of the maxillary sinus started to rise in the 17th century. Antral trephination for suppuration was the most common maxillary sinus operation in that period. An oro-antral fistula was often created by the extraction of a molar to drain the infected maxillary sinus daily. Later on the anterior wall of the maxillary sinus was opened through the canine fossa and was kept open for irrigation. Caldwell (1893), Scanes Spicer (1894) and later Luc in 1897 closed the canine fossa incision after an intranasal antrostomy and the removal of the infected mucosa. This so-called Caldwell-Luc procedure is still the most commonly used maxillary sinus operation today. After the introduction of the endoscopy in the beginning of this century endonasal surgery has been developed in the last decades into one of the important surgical procedures for maxillary sinus infections today.

Although the origins of the surgery of the maxillary sinus probably date from the trephination technique used for instance in old Egypt the treatment and the interest for the infected maxillary sinus has been ignored for ages. The anatomy of the maxillary sinus has been mentioned in the work of Leonardo da Vinci but the description is brief and incomplete.

Since the description of the anatomy of the sinuses in animals (human dissections were illegal for many centuries) by Galen (201-131 B.C.) it was believed that the sinuses only contained fluid and mucus which was produced by the brain and the pituitary gland and was excreted and collected in the sinuses and subsequently released into the nose. Andreas Vesalius (1514-1564) who was a



Figure 1. The extraction of a molar of the upper jaw as engraved by Lucas van Leyden in 1523 (Rijksmuseum Amsterdam).

lecturer in anatomy in Padua published in 1543 “De Humani Corporis Fabrica” and he described the maxillary, frontal and sphenoidal sinuses and stated for the first time that the sinuses contain air. For centuries the treatment of the infected maxillary sinus must have been the extraction of a healthy or infected first or second molar of the upper jaw to create a permanent oro-antral fistula which could be irrigated daily (Figure 1).

An important step in the evolution of anatomy and the treatment of the infected maxillary sinus must be considered the publication in 1651 of a book of Nathaniel Highmore (1613–1685) who practised in Sherborne in Dorset, England (Figure 2). In this book entitled “Corporis Humani Disquisitio Anatomica” he described extensively the “antrum genae” and he also mentioned the vicinity of the teeth. Since that publication the maxillary sinus has often been called the antrum Highmori. William Cowper (1666–1709) described in the book of James Drake entitled “Antropologia Nova” (1707) for the first time the method to open the



Figure 2.
Nathaniel Highmore
(1613–1685)

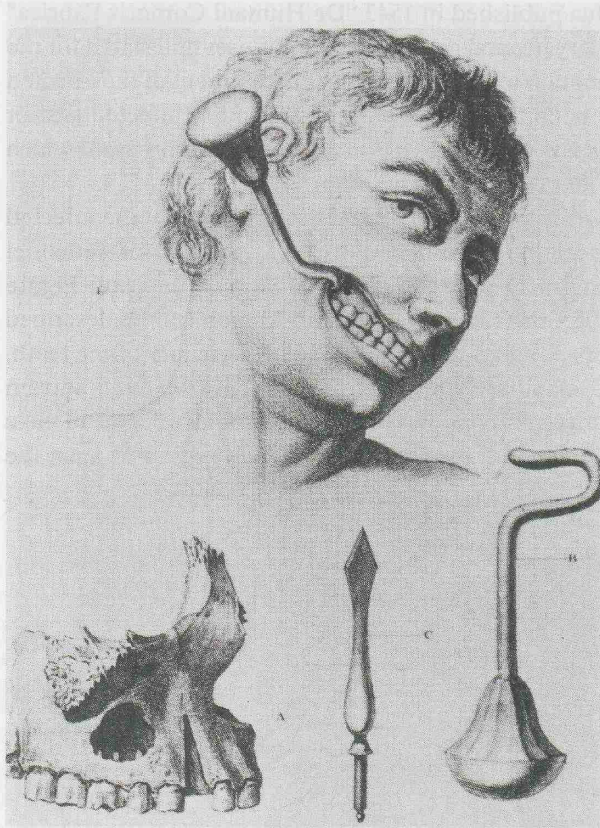


Figure 3.
The method of Lamorier (1696-1777) as demonstrated in the work of Bordenave in 1768. (From J. Willemot et al., 1981).

antrum Highmori through the alveolus after first having removed a tooth. Since then this type of operation bears the name of Cowper. In 1743 a French surgeon from Montpellier, Louis Lamorier (1696-1777) presented a paper at the Royal Academy of Surgery of Paris in which he devised an external approach to the maxillary sinus. The antrum Highmori was opened via the space between the molar tuberosity and the third molar tooth. This method has been unnoticed for at least two decades after its publication. Jourdain in 1765 and later Bordenave in 1768 resurrected Lamorier's technique (Figure 3).

In 1771 John Hunter (1728-1793) published in his "Treatise on the Natural History of Human Teeth" a method of perforating the antrum from the nasal surface. This procedure of puncturing the antrum through the middle meatus was almost the same as the method that Anselme-Louis-Bernard-Berchillet Jourdain (1734-1816) had recommended in 1760. These techniques of the lavage of the maxillary sinus seemed to be forgotten in the beginning of the nineteenth

century. For example Jacques Louis Deschamps (1740–1824) of Paris recommended in 1804 in his work, which extended to 300 pages, maxillary sinus drainage by removing an offending tooth. Callisen (1740–1824) from Denmark regretted in 1824 that the procedure of John Hunter has fallen into oblivion. In the first half of the nineteenth century no further advances were made in the surgical treatment of the infected maxillary sinus.

As stated in the outstanding multi-author work “Naissance et développement de l’otorhinolaryngologie dans l’histoire de la médecine” (1981), edited by Jacques Willemot, the second discovery of the maxillary sinus diseases took place in the last decades of the nineteenth century. This period of the early 1880’s is also considered the beginning of the development of modern rhinology. Concerning the treatment of the infected maxillary sinus Johan von Mikulicz-Radecki (1850–1905) from Vienna and Breslau and later Herman Krause (1848–1921) from Berlin developed in 1886, respectively in 1887 a rather thick trocar for the puncturing the antrum via the inferior meatus. The French laryngologist Leopold Lichtwitz (?–1909) from Bordeaux modified the trocar into a long fine strong cannula.

In 1897 an American laryngologist Howard Lothrop (1864–1928) from Boston published his unnoticed paper on his method of a large opening in the inferior meatus. A few years later in 1902 Raymond-Charles Claoué (1864–?) from Bordeaux published a similar surgical method. All these conservative methods were completely put aside when the “new” radical surgical procedure was introduced.

This operation was described independently by three authors. George Walter Caldwell (1866–1918) from New York (Figure 4), published the method in 1893, Robert Henry Scanes Spicer (1857–1926) from London (Figure 5), published his paper in 1894, while Henry Paul Luc (1855–?) from Paris (Figure 6), unaware of the work of Caldwell and Scanes Spicer published his *nouvelle* in 1897. The technique consisted of an enlarged canine fossa opening for cleaning the complete maxillary sinus with an intranasal antrostomy in the inferior or middle meatus. This procedure is now commonly called the Caldwell-Luc operation. From the beginning of the twentieth century the Caldwell-Luc operation was the almost sole treatment of a chronic sinusitis. In the twenties the attitude to the Caldwell-Luc procedure changed to more conservative treatment.

The post-operative pain, the introduction of antibiotics and the experience that most chronic suppurations of the maxillary sinus healed by puncturing and syringing may probably due to the fact that the Caldwell-Luc operation was less required and more reserved for failed cases.

The results of a retrospective study of the number of Caldwell-Luc operations performed in the period 1950–1985 in our University Hospital in Amsterdam clearly demonstrates the decline of the interest for the Caldwell-Luc method



Figure 4.
George Walter Caldwell
(1866-1918).



Figure 5.
Robert Henry Scanes Spicer
(1857-1926).



Figure 6.
Henry Paul Luc (1855-?).

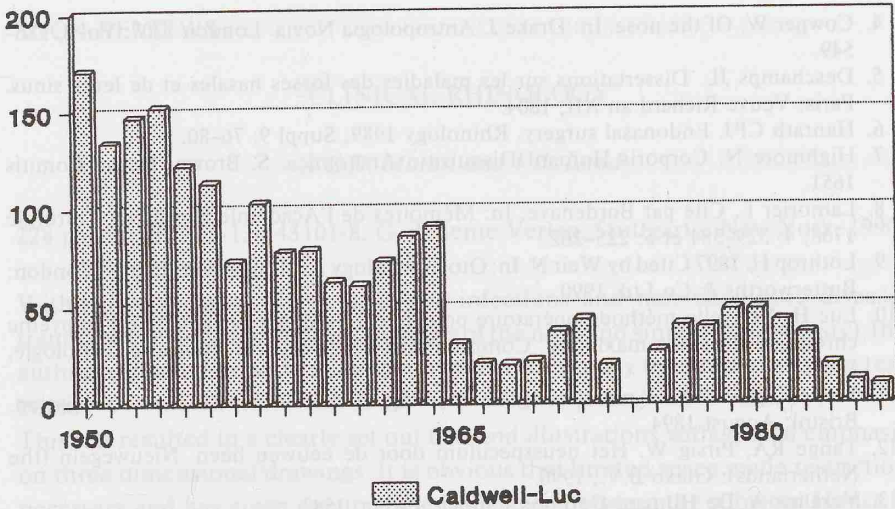


Figure 7. Number of Caldwell-Luc operations performed in the period 1950-1985 in the University Hospital, Amsterdam.

(Figure 7). The most commonly used approach for the treatment of the infected maxillary sinus nowadays is the regular antral wash-out followed by an intranasal antrotomy via the inferior meatus together with ephedrine nosedrops and oral antibiotics. In the seventies of this century the nasal endoscopy technique was generally accepted and introduced as a diagnostic tool and later developed as a surgical method of importance for the treatment of the infected maxillary sinus. This so-called functional endoscopic sinus surgery concentrates in most of the cases its surgical activity in the middle meatus. At this moment almost hundred years after the introduction of the Caldwell-Luc procedure the functional endoscopic sinus surgery seems to become the most promising and important surgical treatment for the chronic infected maxillary sinus for the future.

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