HISTORICAL CONTRIBUTION Rhinology, 28, 113-122, 1990

History of Rhinology: Nasal specula around the turn of the 19th-20th Century

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SUMMARY

This review is an excursion into the past to find the prototypes of the various nasal specula around the beginning of our century. The oldest prototype is documented in the ancient Hindu text Sushruta-samhita (6th century BC): a tubular nasal speculum. The bivalved forceps-like nasal speculum was mentioned by Hippocrates and can be followed with and without self-retaining mechanisms to the modifications of Killian and of Cottle. U- or Y-shaped springlike devices to open the nares have been known since the publication of Arnold de Villanova from the 13th century. They were reintroduced in a modification by Thudichum in 1868.

Fraenkel's speculum (1872) combines fenestrated blades with a screw-set for self-retaining. Duply (1868) modified the split and funnel-shaped ear speculum of Bonnafont, the branches of which can be varied by a screw. In addition to this description of the prototypes of specula a short development of the facilities to illuminate the inner nose is given starting with the sun light and ending with the glass fiberoptic.

Rhinoscopy as we use it today was introduced around 1860 mainly by the publications of the school of Vienna, especially by Friedrich Semeleder (1862) and Johann Nepomuk Czermak (1879). The term "rhinoscopy" was given by Czermak in 1858.

This diagnostic art quickly spread over the world, thus a variety of nasal specula in design, size, and material was available for the physicians around the turn of the 19th-20th century. Of course, it is impossible to follow the history of each single instrument which we can find in the catalogues of medical instruments and

Paper presented at the 12th Congress of the European Rhinologic Society including the VIIth I.S.I.A.N., Amsterdam (The Netherlands), June 1988.

museums all over the world. Almost all specula, however, can be derived from some prototypes, and this paper is an excursion into the past to follow the very beginnings of these first nasal specula.

The oldest method to look deeper into the nose is as old as mankind: manual elevation of the nasal tip and using the sun for better illumination. Paul of Aegina (625–690 A.D.) left us a description: "Figurato homine in sedili adversus solis radios et narium meatu sinistra manu explicato dilatatoque etc...". An illustration of this manual rhinoscopy is depicted in a manuscript of the 13the century by Rolando di Parma examining an injured nose.

Instrumental access to the inner nose is first documented in the time of the New Kingdom of Ancient Egypt (1540–1075 B.C.): the embalmers used instruments to remove the brain through the nares and through a perforation in the cribriform plate as one part of the process of mummification (Sudhoff, 1911). But it is not very likely that the embalmers used a nasal speculum during this procedure (Pirsig, 1989). The term "nasal speculum" first appears in a manuscript of the Arabian physician As Sayzari (?–1193) according to the investigations of Ségal and Willemot (1981).

Tube-like instruments of iron or lead were inserted into the nose for the instillation of drugs, for cauterization, or to protect the healthy tissues in the nose against the heat of the burning rod. One of the earliest tubular nasal speculum termed Nadiyantra is described in ancient Hindu medicine. In the Sanskrit text of Sushruta-samhita (6th century B.C.) it is recommended for the diagnosis of 31 nasal diseases (Chakravorty, 1971). Tube-like instruments were also taken as intranasal splints after reposition of nasal fractures.

A tubular nasal speculum is illustrated in a manuscript from the 12th century England (Oxford Bodley MS Ashmole 1462), and in the Wellcome Catalogue (fig. 69-1965) we find the following comment: "The surgeon holds in his left hand a metal tube with which to facilitate his work on the nasal passages. He has already cut the polyp, and blood is draining into a flask which is held by the patient".

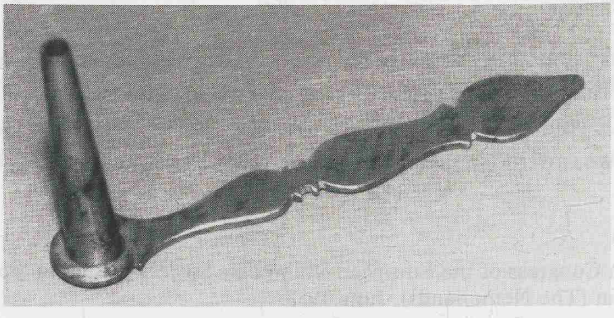

Figure 1.
Tubular nasal speculum with handle from the 17th century (Medizinhistorisches Institut Universität Zürich Nr. 1695).

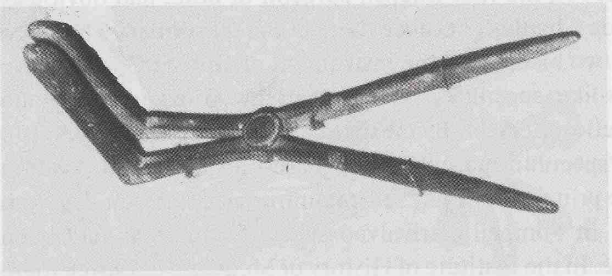

Figure 2.
Bivalved anal speculum excavated in Pompeji (National Museum Naples; author's photograph).

The tubular speculum has been in use through the centuries until today both for anterior rhinoscopy and mainly for otoscopy. Some physicians made it more manageable by adding a small handle to the anterior opening of the tube (Figure 1): this type of nasal speculum can be detected in the figures of Johannes Scultetus (1655) from Ulm, Pierre Dionis (1716) from Paris, and in newer modifications of Lennox Browne (1878), B. Löwenberg (1884) or Simrock (1902). Emanuel Zaufal (1833–1910) from Prague lengthened the tube to 11 cm for better visualization of the posterior nasal cavities and the epipharynx and devised a second modification with a self-retaining screw-mechanism.

The principle of a forceps-like speculum with two blades and a screw-lock was first mentioned by Hippokrates (460–377 B.C.) and known from the Roman period: in the ruins of Pompeji a bivalved anal speculum was excavated, and is shown in the National Museum of Naples (Figure 2) which in a smaller modification is very similar to the nasal speculum of Gustav Killian or Maurice Cottle. Guy de Chauliac (1298–1368) gave a definition of a speculum in his book "Chirurgia magna": speculum meaning mirror, is an instrument to dilate the natural cavities in order to be able to look deeper into their interior, like the nose, mouth, anus, and uterus. His bivalved forceps-like nasal speculum is depicted in the various manuscripts of "Chirurgia magna" (Figure 3).

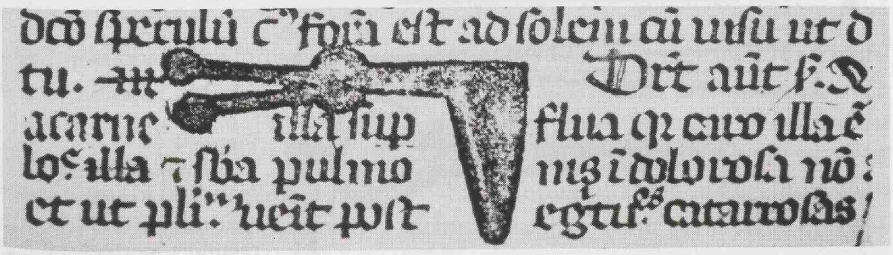

Figure 3. Depiction of a bivalved forceps-like nasal speculum in the manuscript Ms 322 of Guy de Chauliac; B. Inguimbertine of Carpentras (kind permisson of A. Ségal and J. Willemot).

John of Arderne (1306–1390), the first English surgeon of note, had obviously known the book of Guy de Chauliac, because there is a great similarity between his nasal speculum with two blades and the instrument of Guy de Chauliac. An addition to the forceps-like speculum is described by Giovanni Arcolano (?–1484) in his book "Practica Medica". By means of a crank Arcolano was able to keep the blades of his "speculum ad aperiendas nares" in a defined position (Figure 4). However, the principle of this "self-retaining speculum" arises from the Roman period, too: in Pompeji a trivalved speculum matricis had been excavated made of bronze. In the Institute of History of Medicine in Zürich there is a beautiful specimen of a bivalved nasal speculum from the 17th century (Figure 5).

Ambroise Paré (1505–1590) used a forceps-like nasal speculum which can be termed a "polyspeculum", originally designed to extract foreign bodies from wounds. In his "Les Oeuvres" (1575) we find an "ouvre-bouche" to open the mouth which reappears in a later edition of Guy de Chauliac's "Chirurgia magna" (edition Jobert, 1585) as "speculum ad dilatandas nares, quod etiam seruire in ano".

Cornelius van Solingen (1641–1687) from Leiden devised a forceps-like, self-retaining double speculum (Figure 6): one end for the nose, the other for the ears. The original double speculum of Solingen is still existant in the Boerhaave Museum of Leiden. On the pathway of the forceps-like nasal speculum from Pompeji to Cottle we pass famous milestones as the instrument-maker Jean Jacques Perret who depicted an elegant nasal speculum (Figure 7) in his book "L'art du coutelier expert en instruments de chirurgie", published in Paris (1772). On this pathway we meet the otologist Wilhelm Kramer (1801–1875) from Berlin who modified this type of speculum first for the ear and later for the nose, and Layos Markusovsky (1815–1893) from Pest who around 1860 looked into the nose with a speculum which was very similar to that of Arthur Hartmann (1849–1931) from Berlin in 1887 (Lajda, 1967).

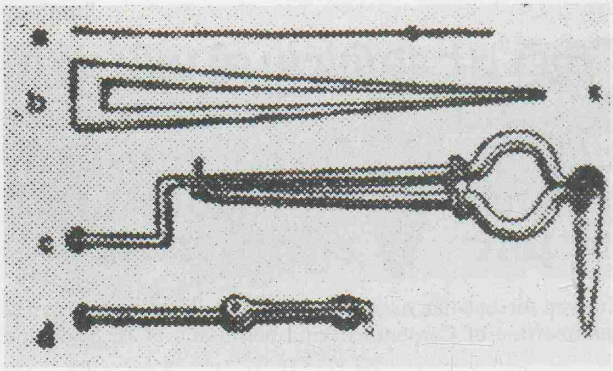

Figure 4.
Arcolano's bivalved forceps-like nasal speculum with self-retaining mechanism (kind permission of A. Ségal and J. Willemot).

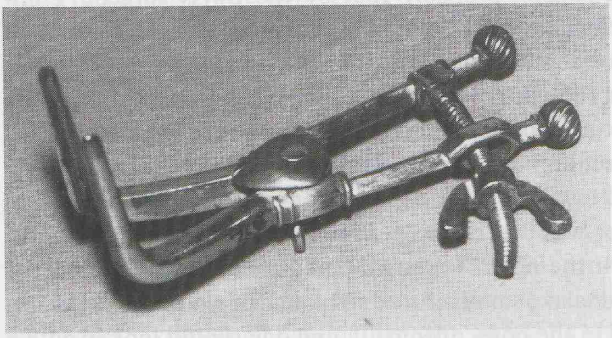

Figure 5.
Forceps-like nasal speculum with self-retaining screw-set from the 17th century (Medizinhistorisches Institut Universität Zürich Nr. 1692).

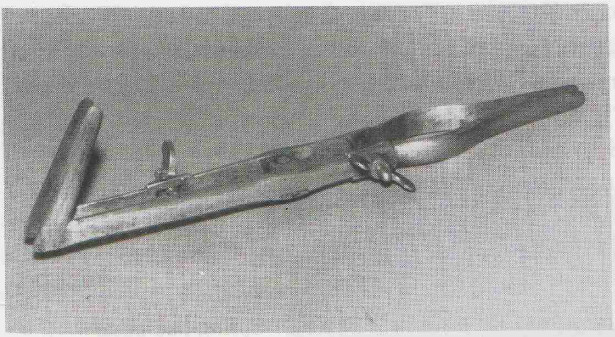

Figure 6.
Double speculum for nose and ear of Cornelius van Solingen from the end of the 18th century (Medizinhistorisches Institut Universität Zürich Nr. 1694).

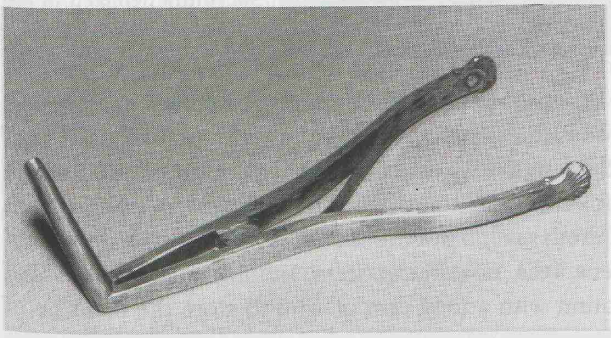

Figure 7.
Bivalved forceps-like nasal speculum made by Perret himself at the end of the 18th century. Perret's master-sign can be seen on both handles beneath the lock (Medizinhistorisches Institut Universität Zürich Nr. 1693).

Modifications of the forceps-like nasal speculum were described by Roth, Chiari, Ingals, Pilcher, M. Mackenzie, Cholewa, W. Busch, and Beckmann, before Gustav Killian (1860–1921) from Freiburg reported of his instruments for the "rhinoscopia media" in 1896. Killian, too, was the first to review the history of endoscopy in an excellent paper of 1915. A forceps-like nasal speculum with fenestrated blades was devised by J. Schnitzler (1879) from Vienna and by W.C. Jarvis from New York (1883).

With the introduction of hypophysectomy via transnasal routes in the beginning of our century the forceps-like type of speculum was used with very long blades

and a self-retaining mechanism, probably first by the Swiss surgeon Emil-Theodor Kocher in 1909. The trivalved forceps-like speculum excavated in Pompeji was modified for several organs in the 15th to 18th century. It was reintroduced for anterior rhinoscopy by Louis Elsberg (1837–1885) from New York in 1878. Brandi, Potter, Goodwillie and Scheff published other modifications of this trivalved speculum at the end of the 19th century.

A spring-like nasal dilator was described by Arnold de Villanova (1235–1312) from Montpellier in 1504: the nostrils "should be examined more deeply: for which purpose one should take a small bifurcated branch of wood like a forceps, and this should be placed in the nose, opening it, and one should look in with a lighted candle...".
A modification of this instrument of Villanova, in metal, was later depicted (Figure 8) by Pierre Dionis (1643–1718) from Paris in his book "Cours d'opérations de chirurgie" (1707).

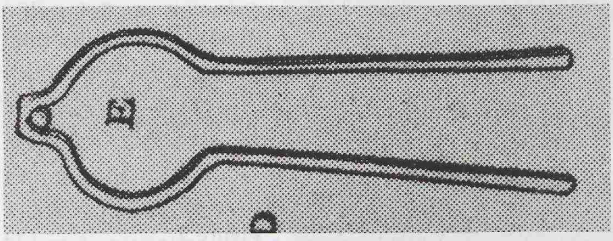

Figure 8.
Spring-like nasal speculum depicted in the surgical book of Dionis 1707.

In the 19th century this spring-like speculum became prototype for the nasal specula of Juracz (1881) or Palmer (1890), and for the self-retaining devices of Creswell-Baber (1880), Klamann (1882), Katz (1886) or Zarniko (1903). Folsom (1880) added to this spring-like speculum two fenestrated blades and a self-retaining screw and inspired several modifications as by Bosworth, Seiler, Shurley, Lublinsky, de Lens, Ives, Foerster or Stein. Heffernan (1905) provided his spring-like type speculum with a long arm of wire to store the bandage of gauze for tamponade beside one nostril.

Before continuing with another prototype of a nasal speculum I should mention some data of the progress in illumination. Julius Caesar Arantius (1530–1589) combined the principle of the camera obscura with a water lens. In his book "De humano foetu liber" (1587) chapter 21 deals of nasal polyps: Arantius investigated the patient in a darkened room and made a hole through the wooden shutter of the window to admit a ray of sun light. This was directed into the nasal cavity by elevating the tip of the nose. On cloudy days Arantius recommended light of a candle reinforced by a water lens to inspect the nasal polyps.

The Frenchman Pierre Borel (1620–1671) took a concave mirror to look into the depth of a nose and described the advantages of the amplifying effect of this mirror when investigating the nose with sun rays: "I perfectly see the shape, size and all what I want to know of the lesion". Nearly two hundred years had to pass before the ingenious invention for a better illumination was made by Friedrich Hofmann (1806–1886) from Würzburg in 1841 (Wahler, 1981). Hofmann perforated his concave mirror in its centre and investigated the ear with this mirror by means of the sun rays, candle or gazlight.

In 1868 Johann-Ludwig Thudichum (1829–1901) from London published an article on his nasal speculum which is still in use today in many English speaking countries: he combined a spring-like wire with solid blades from different metals or ivory (Figure 9). This idea found imitators like Wainwright, De Vilbis, Forster, Ballenger, St. Clair Thomson or Shah. Lennox-Browne mofified Thudichum's speculum as a self-retaining speculum (1875), and again this design was slightly modified by several surgeons such as Moore, Myles, Ovenden, Ray, Griffith, Delstanche, Spencer, Schmidt, Ramshorn, Patton or K. Takahashi.

Thudichum in his paper on "anterior rhinoscopy" – this term is his invention – used a small lantern of spirit-oxygen-lime light for nasal illumination and started his article in Lancet: "Away now with your oil-lamps!" Edison's improved electric bulb in 1879, however, was the next real milestone for improving the illumination in rhinoscopy. Four years later Paul Hélot and Gustave Trampé from Paris offered their frontal head-light with an electric bulb which is very similar to the head-light of our days before the glass-fiber period (Ségal and Willemot, 1981).

For France Emmanuel Simon Duplay (1836–1924) from Paris invented a nasal speculum going back on the prototype of Jean Pierre Bonnafont (1805–1891) who used his speculum (Figure 10) for the inspection of the ear (Bonnafont, 1873). Duplay's funnel-shaped nasal speculum is composed of two blades with a screw-mechanism for self-retaining (Figure 11). This type of speculum, still in use today in France, became very popular and was often modified: Charrière, Voltolini, Schuster, Bresgen, Mathieu, Moure, Vacher, Collin, Chatellier, or Portmann.

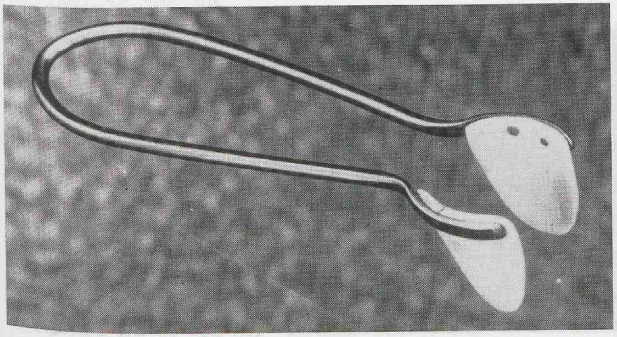

Figure 9.
Thudichum's nasal speculum with ivory blades (Institute of Laryngology & Otology, London; Ph. Nr. 87-2022).

Figure 10.
Ear speculum of Bonnafont used around 1850 (Medizinhistorisches Institut Universität Zürich Nr. L 137).

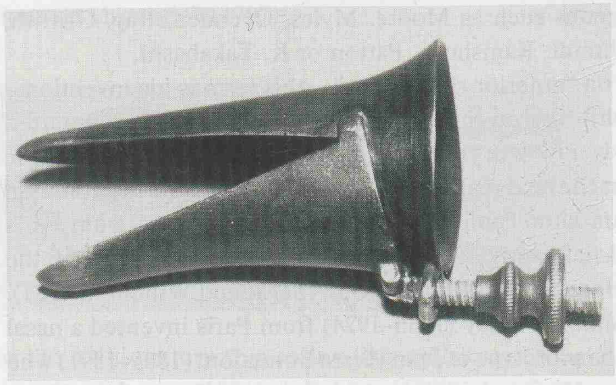

Figure 11.
Improved model of Duplay's nasal speculum used circa 1875 (Medizinhistorisches Institut Universität Zürich Nr. 8522).

In 1872 Bernhard Fraenkel (1836–1911) from Berlin developed a nasal speculum which became rather widespread in middle Europe. Fraenkel combined two fenestrated blades with a complex set screw which made it a self-retaining instrument (Figure 12). Aside from his own modifications we find derived devices published by Lucas, Leonard or Sturmann at the end of the 19th century.

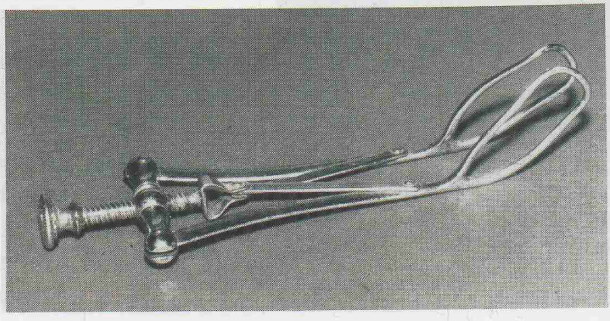

Figure 12.
Fraenkel's nasal speculum used circa 1880 (owned by the author).

Looking through the old catalogues of nasal instruments in the beginning of our century one gets the impression that each known ear-nose-throat specialist was only happy with his own creation of a nasal speculum. We detect nasal specula which combine solid or fenestrated blades, reversible blades, blades of different length in the same speculum, peculiar shapes of handles, and a variety of screws, cranks, springs and other types of self-retaining mechanisms to keep the nostrils open. Obviously the ideal nasal speculum has not yet been developed to fulfil all the criteria: fitting into each nostril, preserving the nasal mucosa, non-hurting, with self-retaining mechanisms to get the hands free, flexible for the anterior and posterior nasal cavities, self-illuminating, and not too heavy.
Different from the progressing means to illuminate the nasal cavities starting with the sun ray and ending with our actual head-lights with fiberoptic equipment, we have to conclude for the nasal specula: variatio delectat!

ACKNOWLEDGEMENTS

I would like to thank Dr. Christoph Mörgeli, Conservator of the Medizinhistorisches Institut der Universität Zürich, for his kind help in working on old nasal instruments in his Institute.
I would also like to thank Mrs. Reintraut Semmler who prepared the photographs, and Mrs. Christine Mader for typing the manuscript.

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