TREATMENT OF NASAL POLYPOSIS IN BYZANTINE TIMES

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The goal of this study was to describe the therapeutic methods and surgical techniques used during Byzantine times (AD 324-1453) for a disease that has occupied physicians since antiquity: nasal polyps. The original Greek-language texts of the Byzantine medical writers, most of which were published after the 17th century, were studied in order to identify the early knowledge of the definition, symptoms, conservative treatments, and surgical intervention in cases of this disease. A considerable number of conservative treatments, etiologic and local (with inunctions or blowing of caustic substances), with evident influence from Roman medicine, were identified even in the early Byzantine medical texts (4th century). Further, some surgical techniques were described that seem to constitute evolution of the Hippocratic tradition. From the study of the original texts of Byzantine medical writers, their interest in the rhinological diseases is evident; in the case of nasal polyps, new techniques were mentioned. The first meticulous intranasal surgical removal of polyps was described. These techniques, obviously developed during the Hellenistic period, initially influenced European medicine and later the rest of the world.

KEY WORDS — ancient medical instruments, Byzantine medicine, history of rhinology, nasal polyps.

INTRODUCTION

In Byzantium, the successor of the Roman empire and the political, cultural, and scientific center of the Western world from 324 until 1453, when it fell to the Turks, talented physicians paid considerable attention to diseases of larynx, pharynx, nose, and ears. Some of them were specializing in these from early times, as an extract of Ulpian (AD 170 to 228), included in the Pantect, the well-known Byzantine collection of laws, reveals.¹ The contribution of the Byzantine period to the history of otorhinolaryngology is considerable, because the physicians of that era preserved in their texts accounts of important pharmaceutical treatments and surgical operations of the celebrated ancient Greek physicians.² The works of the eminent Byzantine physicians, such as Oribasius (4th century), Aetius of Amida (6th century), Alexander of Tralles (6th century), Paul of Aegina (7th century), Leon the Iatrosophist (9th century), Theophanes Chryssovalantes (10th century), Michael Psellus (11th century), Nicolaus Myrepsus (13th century), and Ioannes Actuarius (14th century), contain extensive chapters concerning otorhinolaryngological topics.1,3

In the field of rhinology in particular, Byzantine physicians provided meticulous treatments for the disease of inflammation (rhinitis), ozena and nasal malodor, ulcers, anosmia, epistaxis, polyps, cancer, bruises, and fractures. Some of these physicians described special surgical techniques for some nasal diseases, and especially for the removal of polyps and reconstruction of the nose in cases of defects and fractures.⁴ Because most of them, especially in the early period (4th to 7th centuries), were trained in the famous Medical School of Alexandria, they followed Hippocratic, Hellenistic, and Roman traditions and compiled accounts from the relevant texts — many of them now lost — enriching medical science with their wealth of experience.²⁻⁴

Because only some incomplete descriptions of these topics are known in modern bibliography, usually quoted from translations,⁵ a new presentation of the methods of pharmaceutical and surgical treatments of polyps, based on direct translations from the original Byzantine medical texts, might prove useful for understanding the philosophy and techniques of our predecessors and the roots of modern rhinology.

MATERIAL

Definition and Etiology. Actius, giving a description of polyps, considers that they resemble the color and composition of the sea creature with the same name, and he adds that they are caused by thick and gluey humors descending from the head.⁶

Paul of Aegina begins his chapter "About Polyps" with a definition of the disease.^{7,8} The polyp, according to him, "is a tumor which is created in the nose

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and which takes its name from the marine animal because it resembles the flesh of this creature and its behaviour; as the animal protects itself with its tentacles, so the polyp reacts and extends itself in the nose of a sufferer, obstructing the nostrils and provoking dysfunction in breathing and talking."^{7(p144),8(p64)} The same opinion is later expressed by Theophanes Chrys-sovalantes (incorrectly known until recently as Nonnus).⁹

Ioannes Actuarius describes the tumor as a "hypersarcoma which obstructs the ethmoid openings and often spreads to the nearby openings of the nose and prevents inhaling and exhaling and the excretions of the nose."^{10(p449)}

Conservative Treatment. Oribasius first uses several substances, such as anemone or a mixture composed of grated myrrh, incense, egg white, and snails, applied to the head for 9 days as poultices.¹¹ After this, local treatment follows. He recommends inunctions using a feather to apply caustics that slowly devour polyps. For this purpose, he prescribes chyle of apples of cypress, roots of the herb dracontion, and other herbs or a caustic solution of quicklime, copper, niter, and alum dissolved in lime water.¹² The writer also suggests blowing various substances into the nose with a straw. Among these are flowers of copper, alum, iron, myrrh, incense, and the herb aristolochia. He further uses a chyle of chopped pomegranate that is boiled in a tin container so that it will be solid enough to be kneaded in particles that will be appropriate to insert into the nose. If the polyp is located deeper in the nose and can be easily approached from the mouth, Oribasius recommends inunctions of several dry drugs on the palate with feathers¹¹ or using a probe (specillum) called a milotris,¹³ the end of which is wrapped in wool.

Actius believes that the treatment must be first etiologically based on the drying out of the head with poultices or inunctions, especially on the temporal area, after previously completely shaving the head, and local treatment follows.⁶ He, therefore, applies, along general lines, the same treatment as Oribasius. Actius also uses a powder of alum, myrrh, sandarach, and copper that is inserted into the nose with a probe, after previously cleansing the nostrils with an infusion of aromatic wine. Another drug is alum with flowers of copper, which are dissolved in strong vinegar in a copper container left in the sun on a very hot day until the drug is dried out; then it becomes powder and is blown into the nostrils with a straw while the patient keeps his or her mouth full of water.

Aetius also suggests, for cauterization of persistent polyps, strong caustics, mainly with mustard seed, which is pounded in water and then forms small grained pieces.⁶ This drug is inserted into the nose after previously wrapping it in a piece of material, the beginning of which is left outside the nose so that it can be pulled out and removed after 1 day. Aetius confirms that polyps are easily removed with this treatment.

Actius also conveys to us a series of local treatments, either blowing or inunctions using a probe, taken from the ancient physicians Apollonius (1st century BC), Asclepiades from Bithynia (1st century BC), and Antipater and Galen (2nd century AD).⁶

The meticulous directions of Aetius even reach the point of his suggesting a special drug that contains dry rose petals for "eunuchs who have a softer-tex-tured body and are considered more sensitive." $^{6(p241)}$ He also confesses that in a drug administered to a rich man he added old aromatic wine "because the patient demanded it." $^{6(p241)}$

Surgical Intervention. Paul of Aegina recommends the removal or cauterization of polyps with iron cauteries.^{7,8} The writer classifies polyps as operable and inoperable. Hard, rigid, and almost black polyps are considered to be malignant because they have become cancerous and must not be operated on; on the other hand, fragile, spongy, and noninvasive polyps are not malignant and must be operated on.

For polyp removal, the patient is placed in a seated position exactly opposite to the sunlight. With the left hand the nostril is opened wide, while with the right hand, using the myrtle leaf–like sharp point of the "polypodic sword" (polypus knife; Fig 1A¹³), the



Fig 1. A) Polypodic sword (polypus knife). B) Polypoxestes (polypus eradicator). (Reprinted with modifications.¹³)

physician cuts the polyp at its base attached to the nose. Then he uses the other end of the same instrument, which consists of a basket (scoop), to pull out the flesh that has already been undermined. If the nostril is clear, conservative treatment is continued. If, however, parts of the polyp have remained, these are cleared with another instrument called a "polypoxystes" (polypus scraper, polypus eradicator; Fig 1B); the remaining parts are then removed with vigorous scraping and twisting.

After the operation, infusions of oxycraton (a solution of vinegar and milk) or wine are made into the nose; if the liquid flows through the palate to the pharynx, it means the operation was successful,^{7,8} otherwise, the "sawing" method follows.

In the sawing method a linen thread of medium thickness is taken and knots are tied at a distance of 2 or 3 fingers apart. The thread is then introduced into the opening of a double-headed probe (specillum). Then the other end of the probe is introduced into the nose, and via the nasopharynx it comes out through the mouth; each end of the thread is grasped and, with a push-and-draw movement, as if one were sawing, the fleshy polyps are rubbed away.

After this operation the opening of the nose must not be allowed to close, and for this purpose a piece of wadding that is formed like the wick of a lamp is used. After the third postoperative day, the "trochiski" (pills) of Antonius Mussa (a Roman physician of the 1st century AD) or other similar medicaments that dry the area are given. Later, healing "trochiski" are taken, and if necessary, leaded tubes are placed into the nose to prevent closure.^{7,8}

The malignant inoperable tumors, according to Paul, are cauterized with olivary cauteries.^{7,8}

Physicians later followed approximately the same conservative and surgical treatments described above. Leon the Iatrosophist recommended only surgical intervention,¹⁴ either with the appropriate instrument (polypus knife) or with the "sawing" method described by Paul of Aegina.

Theophanes Chryssovalantes suggested only conservative treatments similar to those of Aetius with blowing or inunctions.⁹ He followed the etiologic approach that Aetius had propounded, and for that reason recommended purgation of the whole body.

The famous physician and pharmacologist Nicolas Myrepsus¹⁵ (13th century) followed the prescriptions of Aetius, applying caustic powders locally.

DISCUSSION

Nasal polyposis seems to have occupied the Byz-

antine physicians from very early times; they tried to explain its cause and to apply the appropriate treatment.

Oribasius, from the 4th century, had already provided a series of conservative treatments, ^{11,12} without mentioning surgical intervention, although he was a renowned surgeon and preserved some ancient techniques such as those for aneurysms, ¹⁶ tracheotomy,³ and plastics of the face (rhinoplasty, etc), thus influencing later European medicine.⁴

Actius (6th century), on the basis of Oribasius' text and the works of a considerable number of ancient Greek physicians, also followed conservative treatment, aiming, as he maintained, to avoid surgery or cauterization.⁶ This remark indicates that he had knowledge of earlier surgical techniques. His conservative treatment is classified as local on the polyps and as general on the head. The former treatment had the aim of slowly dissolving the mass of polyps with caustics, a method meticulously described by Oribasius in early Byzantine times.^{11,12} He also adopted the general treatment of Oribasius and explained its etiologic role: to dry the excretions descending from the brain to the nose. It sounds curious today, but it may be completely understood if we have in mind that according to contemporary anatomic belief, liquids from the brain were thought to come down to the nose through small pores of the scleromeninx. This meninx was believed to be directly attached to the ethmoids, which are perforated with small pores (in Greek the word ethmoid means like a strainer). The excretions from the brain, passing through these filters, were believed to reach the nostrils.¹⁷

The conservative treatments of Oribasius and Aetius, aimed at devouring of the polyps by caustics, are quoted from the works of Galen, who first used similar substances, such as dracontion, pomegranate, copper, and sandarach, blowing them into the nose or applying them, using a probe wrapped with wool.^{18,19} It is evident that Oribasius and Aetius copied this knowledge from the works of Galen, but added new information and personal observations.^{6,11,12}

Cauterization with iron cauteries, practiced by Byzantine physicians, was obviously inspired by Hippocratic, Hellenistic, and Roman medical sources.

The surgical techniques, however, meticulously described only by Paul of Aegina, constitute evolution of the ancient techniques and are unique in the Byzantine medical bibliography.

It is well known that the surgical treatment of polyps had occupied the Hippocratic physicians (5th century BC). They had described nasal polyp removal techniques in some books of the "Corpus Hippocra-



Fig 2. Hippocratic techniques for polyp removal. A) "Sponge" technique. B) "Loop" technique. (Reprinted with modifications.⁵)

ticum."⁵ The writer of the work "Diseases II" (perhaps Draco or Thessalus, sons of Hippocrates) devotes an extensive analysis to the surgical removal and cauterization of polyps.^{20,21} He remarks that a polyp forms in the nose and "hangs down from the central cartilage like a uvula."^{20(pp246-7)} It has a soft consistency, and during breathing, the polyp moves in and out of the nostril. It affects the tone of the voice and causes snoring.

Hippocratic Techniques. The Hippocratic writer recommends 2 methods of surgical removal: the "sponge" and "loop" techniques.^{20,21}

In the "sponge" technique, a sponge is made spherical like a ball and is wound with a cord of Egyptian linen so that it is hard. The size is relative to the opening of the nostrils. Then the sponge is bound with threads a cubit in length, in 4 places. The threads are passed through the loop end of a flexible tin curette. The other end of the curette is inserted into the nose until it reaches the mouth and is drawn out of the mouth; then, placing a bifurcated guide under the uvula as a support, the physician avulses the polyps through the mouth, pulling the threads (Fig $2A^5$).

The second method, the "loop," is described in cases of spherical soft polyps projecting into the nasal cavity. In this technique, a small noose is made with a fibrous cord wrapped in fine linen. The other end of the cord is passed through the loop end of a tin curette that is directed through the loop end of a tin curette that is directed through the nose to the mouth (Fig 2B). Then the noose is placed into the nostril, adjusted, and stretched over the polyp by means of a bifurcated guide. Then, using a support under the uvula, the physician avulses the polyps, pulling the cord through the mouth. These Hippocratic techniques were used in Europe until at least the 19th century.⁵

Further, the Hippocratic writer describes open surgical intervention in a case of a hard polyp "making a sound like a stone"^{20(pp250-1)}: by performing an incision of the skin of the nostrils externally with a scalpel, the polyps are removed and then cauterized. Then the wound of the incision is stitched together and is healed with ointment. It seems that this may be a case of a rhinolith and not of real polypectomy.

The same writer, in another case of a hard polyp, proceeds to cauterization with 3 or 4 irons through a syringe that is used as a protective tube to avoid burning of the nearby nasal area.^{20,21} The treatment is completed with powder of black hellebore.

It is very possible that all these cases of polyps referred to by the Hippocratic writer are not polyps but might be other forms of tumor, perhaps cancer; he refers in particular to "some forms of cancer present on the end of the nasal cartilage which must always be cauterised."^{21(pp200-1)}

Roman Techniques. Celsus (1st century AD) believes that polyps are a form of tumor, white or reddish, attached to the bone of the nose, filling the nostrils and extending toward the lips and backward toward the mouth, causing problems of breathing.²² They are usually soft but are sometimes very hard and are thought to be cancerous. The Latin writer expresses views about the surgical operation of these tumors similar to those of Byzantine writers, believing that the malignant form is inoperable.²² For the soft benign polyps, he prefers surgical removal with a lancet with a sharp spearhead, taking care not to damage the cartilage under it.²³ After the detachment of the polyp, it is extracted by an iron hook. Then the nostril is gently filled with folded lint to stop the bleeding. The healing process is continued with application of medicaments.

In cases of cancerous tumors, Celsus prefers the application of caustics to dry up the tumor.²² He prescribes a drug consisting of minium from Sinope, copper ore, lime, and sandarach that is inserted into the nostril with the use of lint or a feather.²²

The similarities in the therapy described in Celsus' work to those of the Byzantine texts are due to the fact that all the eminent Byzantine physicians had studied in the famous Alexandrian Medical School, and Celsus had used a considerable number of medical sources derived from the Hellenistic period.²⁴

A century later, Galen refers to the removal of polyps with a "narrow small lancet, completing the procedure with cleaning the roots of the polyps with a scraper."^{25(p785)} He does not give any further information (there may have been a detailed description in his lost book about surgery), but probably the method is the same as that described later by Paul.

In conclusion, the treatment of nasal polyps during the Byzantine period was conservative (etiologic and local with caustic substances) and surgical. The Byzantine physicians followed the pharmaceutical treatments of ancient Greek physicians, mainly those of Galen, and practiced surgical methods resembling those of Hippocratic tradition, such as the "sawing" technique and cauterization, but also introduced conventional surgical techniques. The description of the intranasal removal of polyps by Paul of Aegina is unique in the medical Byzantine bibliography, and

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6. Olivieri A. Aetii Amideni libri medicinales V-VIII. Berlin: B. Teubner, 1950:234-42. more meticulous and understandable than the similar brief one of Celsus and Galen. The hypothesis that this method developed during the Hellenistic period (3rd century AD), when anatomy and surgery flourished, appears rational, as it is completely unknown in the Hippocratic bibliography and was briefly mentioned by Celsus and Galen in the Roman period.

The development of special delicate instruments (such as the polypodicon sword and polypoxestes) during the Hellenistic and Roman periods^{13,26} certainly improved intranasal surgical techniques. Further, the fact that the Byzantine doctors were not only compilers of the ancient texts, but gifted physicians possessing wide practical experience, as is evident from their many personal additions to the ancient texts,^{16,27} is obvious in Oribasius' and Aetius' extracts. It is well known that Byzantine medicine influenced European medieval medicine during the Salernian period.²⁴ Bruno da Longoburgo (13th century) employed a technique following that of Paul of Aegina, as he conveys in his Chirurgia Magna.²⁴ Rudolph Voltolini practiced the ancient Greek techniques for the removal of polyps until the 19th century,⁵ and perhaps other physicians were aware of these, among them the inventors of new instruments such as G. Falloppius, who devised a polyp snare, and Fabricius ab Aquapendente, who employed a socalled forceps (angulated scissors).²⁴ Recent research discovered that rhinoplasty was also transmitted from Byzantium to Italy and influenced modern European surgeons.4

The treatment, therefore, of polyps in Byzantine times seems to represent a further paradigm of the ancient Hippocratic, Hellenistic, and Roman traditions that later were transmitted to and influenced European rhinology, constituting remarkable roots of the modern methods of confrontation.

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