REFRESHER COURSE FOR GENERAL PRACTITIONERS**ACUTE AND CHRONIC SINUSITIS**

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During the past twenty years sinusitis has become a medical rather than a surgical disease. Increasing knowledge of the underlying pathology has indicated that the loosely applied term "sinusitis" covers two entirely different pathological conditions. The first, conveniently named suppurative sinusitis, is a disease primarily nasal, with or without secondary infective effects in other organs, and accounts for about 30% of all cases. The second is a general disturbance of the body, with associated changes in the nose and nasal sinuses, and is responsible for some 70% of cases. For the purposes of this article it will be named non-suppurative sinusitis.

The pathology of suppurative sinusitis is that of infection in general, with minor modifications due to its situation. Treatment of this type, provided it is planned with due regard to the anatomy, physiology, and pathology of the nose and nasal sinuses, is therefore followed by gratifying results. The pathology of non-suppurative sinusitis remains obscure. In the present state of our knowledge the majority of cases seem to fall into three groups: the allergic, the endocrine disturbances, and the dietary deficiencies, in that order of diminishing frequency.

Accuracy in diagnosis of the type of sinusitis in question is the keystone to successful treatment. This point cannot be over-stressed. Until recent times all cases of sinusitis were treated as for an infection. The end-results, in cases of non-suppurative sinusitis, have been poor. As these account for 70% of all cases, it is not surprising that there has arisen in both medical and lay circles a despondent and even a fearful state of mind regarding sinusitis and its treatment.

Applied Anatomy

Sinus disease is common in children. At birth all the sinuses are present, but with the exception of the maxillary (the size of which has been compared to a small pea) they are extremely small. By the age of 5 most of the sinuses have reached an appreciable size—the maxillary, for instance, has an average capacity of 5 c.cm. From this age onwards detailed examination (including x-ray films) will disclose that sinusitis, both infective and non-infective, is often present.

The complications of sinusitis are fortunately rare, for when they do occur they carry a grave risk of death. Infection of the orbit usually begins quietly as an orbital swelling, with or without constitutional symptoms. If expert treatment be delayed, meningitis, cavernous sinus thrombosis, or brain abscess may result. The two diagrams will serve as reminders of the applied anatomy.

Physio-pathology

The function of the nasal sinuses is uncertain. The suggestions that they act as resonating chambers for the voice or as a means of lightening the skull (Vesalius) seem most reasonable.

An account of nasal disease should rightly begin with a survey of nasal function. The main function of the nose is that of an air conditioner which delivers to the lungs a

supply of air free from dust and bacteria, and never varying in temperature or humidity. The efficiency of the nasal machine is impaired by faulty design, by wear and tear from past battles with the environment and infection, and (often forgotten) by the effects of fatigue, anxiety, and indifferent food.

The mucous membrane of the respiratory portion of the nose and nasal sinuses consists of two layers:

(1) A surface epithelium of tall columnar cells bearing cilia, with supporting cells and goblet cells secreting mucus, all lying on a basement membrane.

(2) A deeper submucous layer or stroma, composed of connective tissue in which lie rich capillary loops, veins and arteries, lymphatics, and serous and mucus glands.

There are many minute openings in the basement membrane to permit the passage of cells and fluid between the surface and deeper layers of the mucous membrane.

In addition to the phagocytic defence mechanism found in all tissues to safeguard against invasion by foreign agents, the nasal and sinus mucous membrane has a defence peculiar to that part of the body—the mucociliary barrier. This deserves special mention, as it has an important bearing on treatment. The defence breaks down when the cilia stop beating or, as often happens in the nasal sinuses, the secretion is too viscid or too great in quantity to be moved. Ciliary activity continues unimpaired through a wide range of temperature, but drying of the epithelium rapidly causes cessation of movement. It therefore follows that ventilation of the nose itself has an important bearing on the efficiency of the mucociliary defence and on sinus drainage.

Normal nasal respiration exerts a suction effect which greatly assists the removal of secretion from within the sinuses. Water stops ciliary action and oil hinders it. In normal saline, however, vigorous movement continues for long periods. Normal saline is therefore the most suitable vehicle in which to dissolve drugs used in nasal treatment.

Cocaine in strengths above 2.5% and adrenaline in 1 in 1,000 dilution cause temporary paralysis. The advantages of this combination of the two drugs in local analgesia are well known, but repeated application of either for the purpose of vasoconstriction is undesirable. Menthol, thymol, camphor, and eucalyptus oil all inhibit ciliary action. Some sulphonamides are unsuitable owing to their high alkalinity; in powder form they increase the task of the cilia. Ephedrine in normal saline, in strengths up to 3%, and penicillin in strengths from 500 to 5,000 units per ml. do not interfere with ciliary activity when used for short periods. The repeated application of bland solutions such as normal saline produces pathological changes in the nasal mucosa of experimental animals. In practice, the habit of using vasoconstrictor drops is easily acquired, and some cases of vasomotor rhinitis are due solely to this daily irritation.

The essential pathology of non-suppurative sinusitis is oedema involving all layers of the mucous membrane.

Persistent oedema eventually leads to prolapse of the mucous membrane with the formation of polypi.

Diagnosis

In the majority of cases it is possible to differentiate between non-infective and infective sinusitis by clinical examination. Careful history-taking is of prime importance. There must, however, remain a percentage of cases which will tax the diagnostic ability of the most experienced rhinologist. In mixed types of sinusitis it is sometimes difficult, even after repeated examinations, to decide which of the two factors is the more important.

Non-suppurative Sinusitis

History.—The patient's description of himself as a sufferer from frequent summer or winter colds should be accepted with reservations. The cold may not necessarily be of infective origin. House-dust sensitivities are usually more severe in winter, and pollen sensitivity is worse during May and June. It is always wise to ask about other allergic disturbances such as migraine, urticaria, and asthma in the patient or his family. The onset of non-suppurative sinusitis is usually insidious, but one may be misled by the history of a sudden attack following swimming, influenza, or even the constant use of nose drops, which may act as the stimulus to start the allergic cycle.

Signs and Symptoms.—The typical case shows widespread pale oedema of the mucous membrane, polypi, and hypertrophy of the turbinates. Abundant secretion, usually colourless and sticky, is present in the nose and nasopharynx. It is rare to find a red mucous membrane in non-suppurative sinusitis, but this may occur during the acute stages of an allergic attack or when there is an added acute infection. Obstruction, discharge, sneezing, and itching are pronounced. Headaches are frequent. Some are due to pressure changes in the sinuses, others are migrainous. Asthmatic attacks and gastro-intestinal symptoms are common.

X-ray films show abnormalities in several sinuses, often on both sides of the nose. The lining membrane is in the main grossly and irregularly thickened. Both the mucous membrane and the bony walls lack definition.

The sinus secretions are sticky and present the appearance of mucus or mucopus, but on microscopical examination it is rare to find pus cells. Eosinophils, if found, point to the allergic variety of non-suppurative sinusitis. Cultures remain sterile or give a feeble growth of organisms of low virulence.

Suppurative Sinusitis

History.—There is usually a clear association with a severe upper respiratory infection, a severe cold, one of the infectious fevers, or a swimming-bath infection. About 15 to 20% of cases in this group are secondary to dental infection.

Signs and Symptoms.—One sinus or group of sinuses is usually involved, the maxillary most commonly. In the early stages nasal examination shows unilateral hyperaemia and swelling, with purulent discharge in that side. Later, the nasal signs are few and easily missed. Hyperaemia, with or without crusting, is localized to the region of the infected ostium. Signs of infection are often more obvious in the nasopharynx. Unilateral purulent or mucopurulent discharge or a dry glazed appearance on one side of the nasopharynx is suggestive of infective sinusitis. Local symptoms, except in the early stages, are surprisingly few. Headache is uncommon; discharge is scanty and often unnoticed. The occasional complaint of a bad smell is suggestive of sinus suppuration. Secondary symptoms are more prominent: deafness, repeated sore throats, and bronchitis are common complaints. Most frequently there is a state of vague unexplained ill-health accompanied by depression.

X-ray examination shows that the main changes are confined to one sinus. In the acute stage the x-ray appearances resemble those of non-suppurative sinusitis. Later, in the chronic stage, the shadow is dense and well defined.

Nasal and Sinus Secretions.—Pus cells and bacteria are found in quantity. Streptococci are the organisms most often cultured.

Treatment of Non-suppurative Sinusitis

After making a diagnosis of non-suppurative sinusitis one must go back to the history. What is behind it all? What acted as the trigger? Is the patient ill-fed, exhausted mentally, or suffering from some endocrine dysfunction? Has he acquired a sensitivity? What is the allergen?

In general, any treatment which succeeds in permanently relieving the oedema of the nasal and sinus mucous membranes will automatically relieve both the sinus

symptoms and the frequently associated mild secondary infection. Completely successful treatment is not so common that palliatives can be ignored. Of these, ephedrine ($\frac{1}{4}$ – $\frac{1}{2}$ gr. (16–32 mg.) t.d.s.) by mouth, administered with a barbiturate (e.g., phenobarbitone $\frac{1}{4}$ – $\frac{1}{2}$ gr. t.d.s.) if side-effects are pronounced, is most useful in controlling oedema. Antihistamine drugs also control oedema, and give their best results in hay-fever subjects. The regular local application of vasoconstricting drugs for this purpose is an undesirable practice which may in time make the condition worse. Palliation can sometimes be obtained by traumatizing the nasal mucosa with caustics and ionization.

The details of treatment of the allergic state are beyond the scope of this article, but certain points must be mentioned. Treatment by desensitization is regarded by many as time-wasting and ineffectual; further, there is no doubt that injections have occasionally been followed by severe reactions, and that they have made some patients considerably worse. Against this must be set the striking results which sometimes follow this treatment. There are two theories of desensitization, the older method of giving increasing doses of the allergen, and the newer, as advocated by Hansel, of beginning with infinitely small doses and keeping these constant as soon as relief is obtained. He maintains that with his method the ill-effects of desensitization are avoided, and that the percentage of good results is increased. Complete avoidance of allergens is seldom possible, but there is no doubt that patients are helped when contact with their particular allergen is reduced. For example, the housewife with a dust allergy gains enormous benefit when she throws away her brushes and feather duster and buys a vacuum cleaner.

Endocrine disturbances play an important part in a small number of cases. The influence of the sex glands on the nose has long been recognized. Nasal and sinus symptoms may begin or become worse during puberty, menstruation, or pregnancy. Sinus symptoms of the non-suppurative variety, appearing for the first time at the menopause, usually respond without difficulty to treatment by ovarian hormone. Nasal obstruction and discharge figure among the symptoms of myxoedema. There are undoubtedly some individuals in whom minor derangements of the thyroid gland produce well-marked sinus and nasal symptoms.

Dietary deficiencies are regarded by some as a frequent cause of non-suppurative sinusitis. Satisfactory results are reported from vitamin B therapy, high doses of ascorbic acid, and the use of vitamin P. Crude liver extract is effective in some cases.

Surgical treatment is occasionally needed in non-suppurative sinusitis. Obstructing nasal polypi should be removed. Irrigation of sinuses to remove thick masses of secretion, whether infected or not, affords at least temporary relief from headaches.

True suppurative sinusitis can occur in patients with non-suppurative sinusitis, and should be treated by the usual methods for that condition. Radiation produces fibrosis with arteriosclerotic changes in the sub-mucosa and a consequent diminution of oedema; it is therefore of value as a palliative and is useful in delaying the return of polypi.

Treatment of Infective Sinusitis

Acute Infection: Early Stage.—The aim of treatment in this stage—the first seven to ten days—is to preserve the mucociliary barrier, to aid drainage from the sinuses, to relieve pain, and to diminish the virulence of the invading organisms. Trauma, even of a minor degree, such as is

caused by antral puncture, is likely at this stage to spread infection, and should be avoided. Extra moisture should be supplied by steam inhalations unadulterated by antiseptics. The good effects of nasal breathing are maintained, and oedema is reduced by the local application of ephedrine, 0.5 to 3% in normal saline, or by giving the same drug by mouth. Should unwelcome side-effects, either local or general, occur with its use it is advisable to employ other vasoconstrictors like amphetamine by inhaler.

Most cases of acute sinusitis are mild and resolve spontaneously. Severe attacks with fever and pain should be treated energetically with both sulphonamides and penicillin (e.g., sulphadimidine 1.5 g. four-hourly for 2–3 days, then 1.0 g. four-hourly; penicillin 30,000 units three-hourly). Given in adequate doses in the early stage of infection these are extremely effective, hastening resolution and preventing complications.

Acute Infection: Later Stage.—Should symptoms continue unabated into the second or third week it is an indication that the sinus is not draining sufficiently. This is the time for sinus irrigation, and for this some degree of specialized training is required. One or two washings, by diluting and removing the products of infection, will usually allow the mucociliary barrier again to function and normal resolution to take place. Experimentally, short-wave diathermy has been shown to be the only method of raising the temperature within the sinuses. By reason of the local heat it stimulates the defence mechanism of the blood and of the connective tissue in the mucous membrane. It must be remembered, however, that short-wave diathermy causes a temporary increase in the swelling of the lining membrane. It therefore follows that short-wave diathermy must not be used until the sinus is draining freely and there are no signs of obstruction. When used at this stage of the disease it will hasten resolution.

It is well to keep in mind that there are some cases of sinusitis that will not get well whatever the method of treatment, and this leads to the problem of chronic sinusitis. This complication may take place quietly, and neither the patient nor the doctor may be aware of it. For this reason all cases of sinusitis should be re-examined a month after the subsidence of the acute attack. At the same time, contributory causes of the acute attack may be searched for—such as adenoids in children, septal deviations in adults, and a quiet dental infection. The doubtful case may be reviewed, and the possibility of a previously existing non-suppurative sinusitis ascertained by careful examination.

Chronic Suppurative Sinusitis

The mucous membrane of the sinuses has an amazing vitality. Even when chronic sinusitis has existed for a considerable time and the sinus is filled with foul pus the mucous membrane may yet recover and normal function be re-established by adequate drainage alone. It is now generally agreed that it is better to give the mucous membrane a chance of recovery before considering radical surgery.

The antrum is the sinus most prone to chronic suppuration, and therefore is the master sinus. Gravity drainage and aeration provided by an accessory opening near the floor of the antrum usually brings about resolution in secondarily infected neighbouring sinuses, such as the ethmoids, as well as in the antrum itself. Should this fail to occur, however, and the antrum recover alone, it will generally be found that the ostia of these sinuses are blocked by mechanical causes in the vicinity, such as polypi, a high septal deviation, or enlargement of the middle

turbinate. Removal of these obstacles will usually lead to resolution of infection. Treatment of chronic suppurative sinusitis along these lines, provided it is given enough time, will usually lead to resolution; radical surgery entailing stripping of the lining membrane is rarely necessary or desirable.

During the chronic stages of suppurative sinusitis, antibiotics and sulphonamides are rarely necessary or useful. They should, however, be used vigorously and in the same manner as for acute sinusitis when an acute exacerbation occurs in a patient with established chronic sinusitis. There is little advantage in incorporating either of the above drugs in irrigating fluids. Short-wave diathermy should be used for chronic sinusitis only when the sinus is unobstructed. Vaccine therapy is sometimes useful in the patient with a mild chronic infection without gross obstruction.

Diagrams by Miss Sylvia Treadgold

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THE PAN-AMERICAN DOCTORS' CLUB

BY

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We are told that there is nothing new under the sun, but during a visit to Mexico I came across something that for me had a certain novelty. It was a country and week-end club for doctors, organized on a luxurious scale and situated about sixty miles from Mexico City. There is a widespread and growing interest in this well-run club: I came into contact with it through my friend Dr. Antonio Buch, who studied medicine at St. Mary's Hospital, London, and speaks English with an impeccable accent. He will be glad to introduce British doctors visiting Mexico to the club if they will write to me for his address.

The *Club Panamericano de Doctores* was started in 1946. The club-house is a well-built structure with housing capacity for 140 persons, and with fine views over the surrounding countryside. The place formerly belonged to a Mexican nobleman and has excellent kitchens, dining-room, lounge, up-to-date bedrooms and bathrooms, and a breakfast terrace which adds greatly to enjoyment of the early morning. Here the Mexican doctor, and any foreign visitor who has the luck to be a guest, can relax, meet his fellow medicos, and discuss in a delightful atmosphere the advancement of medical science, which, by the way, is receiving great attention in Mexico.

For the comforts and amenities of the club an all-in daily figure of 3 dollars 40 cents (United States currency) is charged. The food is varied and well cooked; pasteurized dairy products such as milk, cream, butter, and cheese are served. There is a model dairy, with cold-storage for meats and other farm and perishable products, while adjacent land is being developed to meet some of the club's food needs. Fruit, of course, is plentiful, and includes bananas, oranges, apricots, peaches, and grapes. Apart from garages, stabling is provided, for the Mexicans are brilliant and colourful riders and seem born to the saddle.

There is almost everything in this club: a model laundry, a processing plant, a section which deals with ailments that may afflict the visitor and which gives helpful advice.

A view from the veranda.

Visitors to foreign lands often fail to appreciate the numerous health safeguards which surround them at home but which are absent in countries less well advanced in matters of public health and sanitation. At the *Club de Doctores* it is quite unobtrusively brought to mind that continued good health depends upon constant personal vigilance and a knowledge of the sources of danger.

As already remarked, the Mexicans are paying great attention to medicine in all its branches, and several hospitals I visited could compare with any of their kind in the world. The Aztecs, who preceded the coming of the Spaniards—the founders of modern Mexico—in 1519, were a well-organized people who possessed hospitals and nursing-homes which were admired by Cortes and other Spanish leaders.

A large part of the population are Mexican Indians, who live in villages and constitute the agricultural class. Every effort is being made to educate these people, but the Mexican authorities, always sympathetic and indulgent and with a sense of proportion, have a hard task to eradicate old customs and beliefs touching medical knowledge. Yet some of the local remedies are outstanding; in remote country districts I came across Indians who have a cure for snake-bite, an antidote made from herbs, the composition of which is unknown to us. The majority of these people, rather than resort to present-day methods of treatment which are there for the asking, rely among other