X.

REMOTE RESULTS OF FOCI OF INFECTION IN THE NOSE AND THROAT.*

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In selecting this subject it is fully realized that nothing new and startling is being offered—in fact, it may seem a bit trite, but yet so great is its importance that one may be pardoned for repeating much that has been said by others. However, there are certain phases of this subject that have not been sufficiently emphasized, and which will bear repetition at this time. There is no question that a great majority of the foci of infection causing local and systemic disease occur in some part of the head, yet we must not ignore other infecting areas of the body, as the gall bladder, appendix, prostate glands and seminal vesicles, pus tubes, infected bronchi, etc. The fact that so many infecting foci occur in the field embraced in our specialty places a great obligation upon us, not only to search with painstaking care every possible area of infection within the field of our special work, but also to inform the profession in general of the great danger lurking in the cavities and crypts of the nose and throat. The teeth and the alveolar processes, and the middle ear and mastoid cells, while not strictly coming within the scope of this paper, will on account of their intimate relationship be necessarily referred to but not discussed at length. It is a well known fact that the tonsils may receive their infection from an infected nasal sinus or from a pus pocket around a tooth (pyorrea alveolaris). Then again the sequence of an infection of the middle ear or a mastoid from an acute sinuitis or an acute tonsillitis is one of the most frequent in our experience. The teeth with the adjacent tissues and bony processes may contain hidden foci which are difficult to locate, and which frequently require the aid not only of a dentist, but also the services of a competent roentgenologist. Our work is becoming

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so concentrated, and so much is demanded of us in the way of accuracy of diagnosis that medical men no longer stand alone, but must work in closer cooperation with others engaged in special lines of work. There is no place where "team work" counts more for the patient's good than in fathoming a hidden focus of infection which is causing some serious local or systemic disturbance. A competent, up-to-date dentist who is able correctly to interpret X-ray findings can be of the greatest help in reaching a correct diagnosis. While those who live in smaller cities may lack some of the laboratory facilities afforded by the larger medical centers, they can, by grouping themselves with careful workers in other fields of medicine and dentistry, do much to locate hidden foci of infection. In this way only can we in these difficult cases merit the reward and satisfaction which comes from rendering our patient the greatest possible service in ridding him of the immediate causes of some local or systemic disease. In the majority of cases these patients first fall into the hands of the family physician or the general diagnostician, and we are called upon to render judgment in our own field of work. Our task is often a difficult one, for we are at times unable to say that the small sinuses of the head and deep crypts of the tonsils are free from infection. There are, however, certain symptoms and physical evidences which tend to convict these areas of playing a rôle in the systemic infection. Of this, more will be said later. The work of the dentist is a bit easier, for in the majority of cases a close examination of the teeth and the gum margins, together with a careful X-ray film of the alveolar processes, should reveal evidence of dental trouble. Certain rare forms of granuloma may not show on the film.

The question of focal infection as a factor in producing systemic disease is not new, for members of our profession have been diligent in urging its importance for a number of years. However, it is only within the last decade that the medical profession has begun to fully appreciate its importance. The close relationship of acute rheumatic fever, endocarditis, and chorea to acute tonsillitis was early recognized. Some writers, however, failed to interpret the relationship of these symptoms to the source in the tonsils, as was evidenced by the term "rheumatic sore throat." Even now we occasionally hear the

laity use this misleading term. It is worthy of note that Osler, who has been a leader and pioneer in everything affecting internal medicine, in the second edition (1897) of his Practice of Medicine offered these theories as to the cause of rheumatic fever: (1) The metabolic, (2) the nervous, and (3) the germ theory. Although he leaned to the germ theory at that time as to the causation, yet he speaks of the inconstancy of the microorganism found in the disease. In a later edition he classes acute rheumatic fever among the "Specific Infectious Diseases," instead of the "Constitutional Diseases." It is interesting to note in this early edition of Osler's Practice of Medicine (1897), the accuracy with which he describes the pathology of chorea as expressed in the following statement:

"Embolism of the smaller cerebral vessels has been found, as might be expected, in a disease with which endocarditis is so frequently associated; and, based upon this fact, Kirkes and others have supported what is known as the embolic theory of the disease." He says, further, in reference to the microbic origin of the disease, that "In favor of this view it has been urged, as it is impossible to refer the chorea to endocarditis, or the endocarditis in all cases to rheumatism, that both have their origin in a common source, some infectious agent which is capable also in persons of exciting articular disease." It is noted that nothing is said specifically in reference to the tonsils, though strong argument is offered in favor of the infectious origin of chorea. It was much easier to trace the association of acute rheumatic fever and chorea to an acute tonsillitis than it was later to associate the arthritis, endocarditis, nephritis, cholangitis, appendicitis and other remote lesions to a focus in the head which was apparently latent and giving no symptoms. It was not till the wonderful work of Rosenow[1] was published showing the transmutability of various strains of pathogenic organisms of the streptococcus-pneumococcus group, and also the tissue affinity of certain pathogenic cocci for certain tissues of the body that the subject of focal infection assumed fresh interest. It explained certain difficult problems, as the inconstancy of the type of organisms found in certain conditions as rheumatic fever. Rosenow by his own discovered methods of culture was also able to find in the fluids of inflamed joints and the nodes adja-

cent thereto organisms which had been overlooked by other careful observers. He was also able to produce by intravenous injections of rabbits with culture obtained from infected areas corresponding lesions in a large percentage of cases. The same result was obtained by injecting the organism found in the original focus of infection. By altering the character of the culture medium he was able to develop in the organism affinity for certain tissues. For instance, Rosenow succeeded in cultivating the streptococcus pyogenus on media containing kidney extract, which produced kidney lesions in animals inoculated. Tissues of other organs, as the gall bladder, appendix, etc., were treated in the same way, and there was developed a corresponding lesion in the inoculated animal. It is thought that these organisms acquire certain pathogenic elective tissues affinity in the foci of infection.

According to Billings,[2] "The main and fundamental principles which have been proved are: (1) The apparent confirmation of the transmutability of the members of the streptococcus-pneumococcus group in varieties of morphology, cultural characteristics, biologic reactions, and also of general and specific pathogenicity; (2) The acquisition of pathogenic elective tissue affinity by bacteria in foci of infection in culture media and serial animal passage." To be convinced of this as a scientific fact it is only necessary to read carefully the writings of Rosenow and Billings.

It is natural that the upper respiratory tract should bear the brunt, so to speak, of focal infection when we consider the complicated anatomic structure, with enclosed cavities and pockets all covered by a delicate layer of mucous membrane. In this connection it is interesting to quote from the experience of George B. Wood:[3] "Experimental work has shown that the tubercle bacilli can pass through the unaltered cryptal epithelium, and recently in a series of experiments I found that the anthrax bacilli will also penetrate through the normal cryptal epithelium, and that to the exclusion of other portions of the pharyngeal mucosa. After gaining entrance to the tonsillar parenchyma the action of the toxin of the anthrax bacilli destroys the vitality of the tissues and points the way for a secondary invasion of staphylococci and other organisms."

Then again the nose and throat are constantly exposed to

the danger of infection from the air and food. It is a well known fact that the mouth is normally inhabited by a large flora of saphrophytic and parasitic organisms. It is generally agreed that the tonsils, including the lingual and pharyngeal glands (adenoids), take first place as a focus of infection. with the sinuses of the head, teeth, and ear contributing their quota of systemic disturbance. After the first decade in life the importance of the teeth as foci of infection is greatly increased as the result of their decay, which requires capping, crowning and plugging. "Overdentistried" teeth become great sources of danger as infecting areas, and should at once arouse suspicion when endeavoring to locate the hidden focus.

A variety of microorganisms have been isolated from foci in the nose and throat, chiefly the streptococcus hemolysans, streptococcus viridans, streptococcus mucosus, micrococcus catarrhalis, pneumococcus, staphylococcus, grippe bacillus, diphtheria, and pseudodiphtheria bacillus, tubercle bacillus, and a few other pathogenic microorganisms. The number of local and general diseases caused by the entrance of microorganisms into the general circulation is a large one, and is being gradually increased. Diseases which are due to confined areas of infection form a large and important group. The character and type of a primary syphilitic focus in the nose or throat is so unlike the usual type of confined infections under consideration, and is likewise rare, that it may well be omitted from discussion.

The diseases which may have their origin in foci of infection in the head are acute rheumatic fever, endocarditis, pericarditis, myocarditis, chorea, pleuritis, arteritis, nephritis, gastric and duodenal ulcer, cholecystitis with and without gall stones, pancreatitis, appendicitis, neuritis, myostitis, adenitis, Hodgkin's disease, iritis, acute thyroiditis, goiter, osteomyelitis, spinal myelitis, brain abscess, labyrinthitis,[4] erythema nodosum, herpes, urticaria, and bronchial asthma. The last named, bronchial asthma, is so different in its character and relation to the infected focus that it will be considered entirely apart from the other diseases. It does not seem advisable to divide the diseases considered to arise from foci of infection into acute and chronic, as is sometimes done, for often there is no sharp line dividing one from the other. The acuteness of

the reaction to an invading organism may depend upon: (1) the character and virulence of the organism; (2) their number, (3) the resistance, local and general, of the individual. Rosenow has shown that the local environment of certain organisms in a given focus particularly as to the oxygen tension, may not only alter their type morphologically and culturally, but also change their virulence. They may also develop a certain tissue affinity (tropism) in the focus which markedly affects the location and type of the disease. However, certain types of organism show a predilection for the tissue found in the crypts of the tonsils or adenoids, the sinuses of the head, the teeth and the alveolar processes, or cavities of the ear. For instance, the streptococcus viridans is the organism most frequently found in diseases of the alveolar processes, and is also found in the heart valves, and in the blood of patients suffering from chronic infective endocarditis. The streptococcus hemolysans is the usual organism found in acute septic sore throats, and likewise in the affected joints and endocardium. Tubercle bacilli are found in the crypts of the tonsils and adenoids, from whence they break through the barrier and invade the glands of the neck and mediastinum. When this local resistance is overcome they extend still further and invade other tissues of the body.

Organisms from foci of infection reach the system either through the blood stream or the lymphatics, more frequently by the former. Through the act of swallowing, virulent material from the nose and throat may reach the general circulation from the gastrointestinal tract. After reaching the general circulation they find lodgment in the capillaries and terminal arterioles producing capillary embolism. Adami says it is more like a thrombosis. When bacteria are halted in the blood stream there is produced at the site proliferation of the endothelial lining and an exudation of leucocytes and plasma cells. At times there occurs a hemorrhagic exudate, and there may be a resulting formation of scar tissue. It is now thought that appendicitis, peptic ulcer, and cholecystitis may be produced in this way by a lodgment of the organism from a focus in the small vessels of the submucous layer of the organs. General surgeons have often noted the occurrence of appendicitis following an attack of acute tonsillitis. It would

likewise be easy for a focus in chronically diseased tonsils or elsewhere in the head to cause serious lesions in distant organs without attention being directed to the primary focus. This is really what usually happens. Loeb,[5] in 1910, called attention to a series of cases of acute nephritis due to tonsillar infection. On account of the hematogenous nature of the infection the type of disease in the kidney is usually a glomerulonephritis. In case of severe toxemia due to absorption of soluble toxins, as in scarlet fever and diphtheria, there is produced a diffused nephritis (large white kidney). There may be more than one primary focus in the head, so it is not sufficient in searching for the origin of the systemic disturbance to say that the patient has a focus, as in the tonsils, the teeth area, the sinuses or the ear. Should one focus be removed and others left to continue their discharge of virulent organisms into the circulation, our patients would not receive the benefit from surgical procedure which they had reason to expect.

On account of the great difficulty in giving the tonsils a "clean bill of health," so to speak, however innocent they may appear, the writer is in the habit, particularly in adults, of calling in the services of a competent dentist, who makes use of X-ray films in his work, in order that no focus of infection in the teeth and alveolar processes may be overlooked. The sinuses of the head and ear with the mastoid region should be examined with great care, calling into use the roentgenologist when necessary. By proceeding in this way we may spare our patient a needless operation. Richardson[6] has emphasized the importance of caution in diagnosis before resorting to needless tonsillectomy. French[7] has been using a method of transillumination of the tonsils for the diagnosis of inflammatory conditions. We shall await his final report with interest. The hypodermic needle has been used in the search of a hidden foci in the tonsil. Shambaugh[8] rightly says: "As regards the appearance of the faucial tonsil which is a focus for systemic infection, it is quite clear that the size of the tonsil is no index of the menace this structure may be to the individual." It is true that the small tonsil frequently contains a dangerous focus for systemic infection; on the contrary, the writer is inclined to be more suspicious of the large tonsil in the adult. In children there is frequently seen a type of

tonsil which projects prominently into the throat, and which is only slightly covered by the pillars. This type, while apparently large, is less likely to give systemic trouble on account of better drainage of the crypts. There is another type of tonsil which always arouses our suspicion. It is the type particularly in children which is apparently small, so well is it buried behind the pillars of the fauces. On removal, however, its size is found to be surprisingly large. It is covered by the pillars, and the mucous membrane of the palate interfering with the drainage of the crypts, especially those of the upper lobe, places the owner in constant danger of systemic infection. Coolidge and Garland[9] have weighed tonsils removed, and their results were surprising in showing only slight variation in size. The irregularly shaped tonsil with fissures projecting beneath the surface of the gland should always excite our suspicion. When the mouths of the crypts show exudation of purulent material we have positive evidence of the infected tonsil. Firm pressure on the tonsil made through the anterior pillar will often reveal a cheesy purulent exudate. In chronic tonsillitis there is often noted a peculiar livid redness of the pillars not noted in the relatively healthy gland. The tonsillar gland near the angle of the inferior maxilla is likely to be quite palpable in case of chronic tonsillitis, though this is not invariably the case. It is remarkable how many people go about harboring these infected foci in the tonsil with no local or systemic symptoms. However, when one's resistance is lowered by overwork, undernourishment, bad hygienic surroundings, exposure to heat or cold, overindulgence in alcohol, or excesses of any kind, the confined focus may become active and there may ensue symptoms of both local and constitutional disease. We have a parallel to this condition in tuberculosis of children which may remain latent for years in the glandular system, till later in life, when something lowers the resistance and active tuberculosis has its beginning.

In searching for foci of infection in the sinuses every means should be employed to reach a correct diagnosis of their condition. While X-ray findings are considered of more value than transillumination, yet the latter is often of distinct value, especially in the maxillary sinus, and is particularly useful on account of its simplicity. Irrigation of the suspected sinus

is the best proof of the presence or absence of pus. The X-ray is absolutely essential for the examination of the teeth and the alveolar processes, and is helpful in cases of suspected mastoiditis.

The pharyngeal tonsil (adenoids) on account of better drainage of its crypts is less likely to contain a focus of infection than the faucial tonsil. Yet tuberculosis of this gland occurs with a considerable degree of frequency. Many times inflammation in the nasopharynx is evidenced by enlargement of the posterior cervical group of glands. Goodale[10] has emphasized for us the importance of infections arising from the lymphatic glands on the posterior wall of the pharynx. The secondary foci of infection arising from the nose and throat may be more virulent than the original source of infection. The appendix or gall bladder may form secondary foci supplying pathogenic bacteria to other organs of the body. The establishment of these secondary foci explains why infectious arthritis continues to spread from one joint to another or to the endocardium, long after the primary focus has been removed. This fact should make us a bit guarded in our prognosis of these difficult cases, but yet our duty in removing the primary focus is none the less urgent. In our efforts to make a diagnosis of a focal infection we should take a careful history of the case. This is just as important as the physical findings, especially is this true in reference to the faucial tonsils. The patient will often give a history of frequent attacks of tonsillitis, especially in early childhood. He may have had scarlet fever, or diphtheria, which was followed by a "weak throat." There may be a history of incomplete tonsil operation where a portion of the gland was left with the mouths of the crypts sealed by scar tissue. A former cervical adenitis or ear trouble is very important. Inquiry should be made as to the occurrence of rheumatism. In young children this may be evidenced by what is known as "growing pains." The patient should be questioned in regard to the teeth, particularly in reference to plugging, crowning and nerve killing. In regard to the nose, the patient should be asked as to the occurrence of socalled "nasal catarrh," freedom of nasal breathing, headache, and a history of influenza attack. Many cases of chronic

sinuitis have their origin in an old untreated grippal infection of the sinuses.

As preventive treatment is now the order of the day, it would seem that we as specialists should do our part in educating the public through our patients to take those precautions which will in a measure safeguard them from the kind of infection under consideration.

Chronic focal infections which work such havoc on the human organism often have their origin in an acute infection of the nose or throat during childhood. We should teach that all acute colds are contagious, and so far as practicable patients suffering from the disease should be isolated. This is all the more important in children on account of their greater susceptibility, and because of the greater seriousness of both immediate and remote results. Hastings[11] has emphasized the harmfulness of swimming pools and sea bathing during attacks of acute rhinitis. There is danger of driving the infection into the sinuses of the head and to the middle ear. In case of the public swimming pools there is likewise danger from a public health standpoint. Patients with acute colds should be taught to cough and to sneeze into gauze to be subsequently burned, just as our tuberculosis patients are required to do. The latter is far less contagious than the former. The patient should be cautioned in blowing the nose, to obstruct only one side at a time, in order to protect the middle ear. There is also a danger in nasal douches in the hands of our patients, and their use is seldom justified. Complications of an acute cold are much less likely to ensue if a patient from the beginning is put to bed and the usual local and constitutional treatment instituted. Many cases of acute rhinitis are complicated with sinuitis, and Davis[12] has shown how frequently acute ethmoiditis occurring in children is overlooked. Again, ethmoiditis at this time may be the starting point of a chronic process in later life. There is another danger in the increasing popularity of sleeping porches for young children in all kinds of wintry weather. If used in cold weather at all, there should be ample protection from the wind. In certain cases of acute rhinitis, laryngitis, and bronchitis, cold is surely harmful. Morse[13] has emphasized this in cases of bronchitis and laryngitis complicating pneumonia. Mothers should

be taught that earache is not to be regarded lightly and requires more than the instillation of sweet oil or laudanum. They should likewise be impressed with the fact that a running ear is a positive danger, and requires the most skillful care a specialist can give. Many chronic foci in the ear and mastoid have their origin in the neglected ears of childhood. It is a common observation that the number of ears requiring mastoid operations has been greatly reduced since tonsillectomy and adenoidectomy have become more general, and likewise more thorough. The public should be instructed in reference to the importance of oral hygiene, and the dentists can contribute their share in this direction. Thorough cleansing of the teeth with a good brush is absolutely essential to keep the gums and teeth in a healthy condition and to prevent deposits from forming around the gum margins. To this end a regular visit to the dentist is necessary, and attention should be given to early decay of the teeth before extensive necrosis has taken place. Contrary to the general opinion, the first teeth should receive the same care as the permanent teeth. On account of the close relationship between the roots of certain teeth and the antrum, their care assumes a twofold importance. As already referred to, there is a close relationship between infected gums and alveolar processes and tonsillitis.

The treatment of focal infection in the nose and throat depends upon whether the case be acute or chronic. Obviously the treatment of an attack of acute tonsillitis with arthritis will differ from that of a case of chronic tonsillitis with joint involvement. There are two well established methods of relieving an individual of an infected focus, one by entire removal, and the other by drainage. In chronic tonsillitis we resort to the former, and in sinuitis we practice drainage. In acute tonsillitis, with or without secondary foci of infection, it is not advisable to remove the tonsils. Billings says the course of acute rheumatic fever is not materially affected thereby. Without going into the details of the medical care of acute tonsillitis the writer would urge the use of salicylic acid in sufficient dosage, as it seems to have a specific effect on the streptococcus rheumaticus or its toxin. Barnes[14] advises swabbing the tonsils with 50 per cent nitrate of silver, if seen early in the course of the disease. A peritonsillar ab-

scess should be incised as soon as pus formation has taken place, which is usually about the third day, as fatal septicemia may result from too long delay of this surgical procedure. Without going into the details of the management of acute sinuitis, suffice to say its care should not be neglected. An early convalescence depends upon adequate ventilation and drainage. Shrinking the mucous membrane of the nose with such agents as a weak solution of cocaine or menthol solution is desirable. The Coffin[15] suction apparatus is often used to facilitate drainage from the infected sinus. Irrigation of an infected antrum, preferably through the natural opening, is essential for the successful treatment of maxillary sinuitis. The importance of early incision of the drum membrane in acute otitis media has been so generally recognized that it seems unnecessary to emphasize it at this time.

Chronic foci of infection in the nose and throat as a rule demand surgical treatment. The tonsils being the most important will be considered first. Nothing will be said as to the technic of their removal except that the operation must be thorough, with a minimum of trauma to the surrounding tissues. So serious for the patient is the systemic disturbance arising from foci of infection in the tonsil that we are rarely justified in the use of halfway measures, as incision of the crypts or the use of the cautery or curette. In case of very slow coagulation time of the blood, or extreme old age, we may be justified in doing less than a complete tonsillectomy.

Albuminuria with casts, instead of being a contraindication, may be a positive indication for tonsil removal. This condition of the urine in two recent cases of children operated on by the writer cleared up promptly after tonsillectomy, and the ether itself had no harmful effect, as shown by urinary findings following the operation. Billings[16] says in this connection: "Infectious acute nephritis due to specific elective tissue affinity of certain bacteria, especially members of the streptococcus group, demands an early removal of the focal cause. By this means death may be prevented, and if the anatomic injury to the kidney is not too great the function may be preserved to a degree consistent with health for many years." In adults, however, with kidney complications local anesthesia should be used.

Valvular heart disease (if compensation is not broken) is no contraindication for tonsillectomy. In older children and adults local anesthesia should be used. Though the operation cannot repair the injured valve, it might spare the patient a fresh invasion of bacteria, with serious consequences to the valvular lesion.

In chorea personal experience with tonsillectomy and adenoidectomy has been so satisfactory that the author is inclined to urge operation in these cases in the absence of other foci of infection. Three recent cases cleared up promptly and suffered no serious disturbance incident to the operation. The fact that they had no complications with secondary foci in the joints or elsewhere may explain the favorable results following the operation. Crowe,[17] on the other hand, with a large experience, advises against operation in chorea.

Without attempting to give the dental treatment for infection of the teeth and alveolar processes, the dentist's attitude is not infrequently too conservative, showing a tendency to treat these infected foci where an extraction of the affected tooth would better safeguard the patient's health.

Bronchial asthma, as distinguished from the socalled cardiac and renal asthma, is now regarded in the light of an anaphylaxis. This phenomenon was first noted by Theobald Smith, and later by Rosenow and Anderson.[18] Auer and Lewis[19] and Meltzer[20] also showed the similarity of anaphylactic paroxysm to bronchial asthma. They explained that it was due to a spasm of the bronchioles and not caused by a nervous reflex, as was so long held by many clinicians. They were able to demonstrate the symptoms of spasmodic asthma in guinea pigs after severing all nervous connection with the spinal cord. Babcock[21] was one of the first clinicians to emphasize the connection between bronchial asthma and foci of infection in the nose. Since that time Mathews,[22] Lewis and others have added their clinical observations. In the discussion of this subject in the light of foci of infection, consideration will not be given to certain types of asthma which are intimately associated with the ingestion of certain foods, and with asthma and hay fever due to pollens and emanations from the horse.

We must regard spasmodic asthma in an entirely different light from other systemic diseases which have their origin in

foci of infection in the nose and the throat. In the diseases previously considered there was a bacteremia with emboli in capillary vessels of various organs of the body. In asthma, however, we have the absorption of a protein substance to which the cells of the body have been sensitized; it may be a proteid of bacterial origin, or in some cases the products mucus or pus found in the sinuses. Mathews[22] from his experiments reached the conclusion that "mucus or pus, either infected or sterile, is capable of acting as an antigen and that the products of bacteria are not essential in producing either sensitization or shock." Whether these findings can be wholly accepted or not, the fact remains that the relief of our patients depends upon ridding him of these areas supplying the system with sensitizing proteids. The frequent association of nasal polypi with asthma has long been noted, but it was thought that the former was only a symptom or local manifestation of the constitutional disease.

Lately we have regarded nasal polypi as a symptom of chronic sinuitis often due to hyperplasia of the ethmoid cells and not necessarily a purulent ethmoiditis (Beck[23]). The treatment of this type of asthma must be based on an accurate diagnosis obtained from a careful history of the case, followed by a thorough examination. Carefully made X-ray plates are of great service in determining the condition of the sinuses. That most brilliant results may be obtained in the treatment of these cases where one sinus alone is involved has been demonstrated by two recent cases. The antrum cases seem to respond particularly well to treatment. The structure of the ethmoid offers difficulties which may require time and patience in eradicating the focus. The secret of success in all cases is thoroughness of drainage.

In January of the present year (1917) the writer operated upon a man of middle life who had come from New England to Asheville seeking climatic relief for his asthma. After spending several months in the mountains without benefit, he decided to have an operation performed upon his nose. His was an unusual condition in that he had a single pendulous polyp attached in the region of the bulla ethmoidalis on the left side. This was removed and the cells adjacent to the point of attachment were curetted. As was to be expected,

he had asthma in rather severe form for several days following the operation, but since that time to the present day, more than three months, he has not had a sign of asthma, in spite of several attacks of "cold." Frequently we encounter cases where the result of operations are not so satisfactory, but failure or partial success in these cases may be attributed to our inability to eradicate the foci of infection in the nose or the presence of foci elsewhere in the body. Unfortunately, there is often a complicating bronchitis, or a bronchiectasis, which is a source of the sensitizing proteid. It may be in just such cases that Freudenthal[24] and Horn[25] have had success through the establishment of better drainage by the passage of the bronchoscope. Although the foci of infection in asthma are most frequently in the sinuses, yet we must not disregard other foci in the head and elsewhere in the body. Babcock[26] reports a case which kept well so long as the gall bladder was draining, but in which there was a return of the spasmodic symptoms with a stoppage of discharge from the infected gall bladder.

A consideration of this subject would not be complete without a brief reference to the use of socalled vaccines in the treatment of foci of infection in the head, for even the enthusiastic advocates of this therapy do not pretend that it will supplant surgical treatment in these chronic infected areas. It was held for a long time by careful workers in this field of medicine that the action of vaccines on various infectious processes was specific, and that the only ones worthy of consideration were the autogenous vaccines. It was found very difficult at times to isolate the particular organism which was the cause of the inflamamtory condition; especially was this the case in open foci in the nose and throat. Then again, as previously referred to, recent workers have shown how certain pathogenic organisms, particularly of the streptococcus group, vary as to their strain under different environments which markedly alter their pathogenicity and likewise their selective tissue affinity. These recent discoveries have necessarily modified our views as to the efficacy of autogenous and stock vaccines. However, we cannot ignore the clinical experience of such careful workers as Coates[27] and others, particularly in chronic suppurative ears. There seems to be

ground for hope that in the future there will be developed a nonspecific protein substance which on injection will contain offensive and defensive substances against the invading organism and its toxin, without giving in to the violent reaction, the chill, high temperature, and marked leucocytosis following their use. It is hoped that these careful laboratory workers will continue their efforts along this line till an efficient antigen is found which will be without danger to the patient.

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