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## Tonsillitis: its causes, complication and treatment

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TONSILLITIS

IT'S CAUSES, COMPLICATIONS AND TREATMENT

E.E. Gingles

## TONSILLITIS, IT'S CAUSES, COMPLICATIONS AND TREATMENTS.

E.E.Gingles.

Diseases and hyperplasias of the tonsils have been so emphasized in recent years in public health work among children, and given so much attention by the medical profession that information regarding its cause and treatment is of popular interest. Tonsillitis and other throat conditions appear to constitute 5-10% of the measurable illness from all causes and from 15-20 % of illnesses due to respiratory diseases. (I) The causes of tonsillitis differ greatly among the writers on the subject and the bacterial flora seems to vary with the seasons, geographical location and the bacteriologists conducting the investigations. The treatment is also varied, due to the patients religious faith, scientific knowledge, physical condition, social and financial standing in the community, geographical location, rural or urban residence, and the doctor he chooses or is chosen for him. From the recent literature I shall attempt to draw conclusions on the subject. I will not be able to cover the literature completely for it is too voluminous, but will use articles

written by prominent men on this subject. In order to understand the causes of tonsillitis, one should be familiar with the location, structure, and function of the tonsils. I shall cover these subjects briefly in way of introduction.

The normal tonsil when developed is a globular mass of lymphoid tissue lying on either side of the fauces in a recess, the sinus tonsillaris, which is formed by the palatal arches. It is the largest of the lymphoid nodules of respiratory and alimentary tracts, and differs from other such nodules in its size, its compactness and in the extent and complexity of its crypts. It may be nearly spherical in shape, though it is usually much greater in its longitudinal than in its anterior posterior diameter and is somewhat compressed from within outward. It has an internal and an external surface, an anterior and posterior border, and a superior and inferior pole. It is originally developed in two lobes, a lower and upper which fuse shortly after birth. Their line of demarcation may be seen after the full development of the organ. It is attached to the wall of the sinus by a root which includes a variable portion of its outer surface and of its anterior and posterior borders. This attached surface is covered by a fibrous membrane, the capsule of

which is continuous with the fibrous mucosa of the surrounding mucous membrane. From its inner surface there extends a series of fibrinous trabeculae which divide the tonsil into lobes. All other surfaces of the tonsil are covered with epithelium. It presents on its epithelial surface the openings of from ten to twenty pits or crypts, which extend deeply into its substance practically as far as the capsule. (2) There is an abundant blood supply to the tonsils, each tonsil receiving blood from five different arteries, terminal branches of the external carotid artery. The veins form a tonsillar plexus and drain into the internal jugular vein. The vascularity of this area makes it a "danger zone" for surgical procedures. (3)

It appears probable that the chief function of the tonsils is to favor immunity by acting as vaccine laboratories of the body. In common with other subepithelial lymphatic glands they are not only the breeding grounds, but also the training schools for lymphocytes; and by their autovaccinating activities they confer on their owner immunity against myriads of bacteria (4). It is commonly known that the lymphatic system of the body is a drainage system and that the lymph glands have a

definite protective function. If we consider then, that the tonsil is structurally a lymph gland, is it beyond reason to suppose that it has definite function?

Hypertrophy may take place for two reasons. First, because of the constant irritation to which the gland is subjected; and second, because nature thus provides greater exposed epithelial surface to take care of any increased bacterial invasion. The hypothesis advanced by K.H. Digby (4) is, that lymphatic structures protect the body against chance infection by a process of continual autovaccinations. Immunity against the organisms is acquired by the individual without suffering from the disease. On rare occasions the lymph nodule is overcome and disease develops, but the body has meanwhile become better able to withstand a general invasion.

The internal secretion theory advanced by Masini (5) attributes to the tonsil a function similar to that of the suprarenal glands. No evidence of a lack of such secretion has been manifested after tonsillectomy and therefore this theory is of little importance.

A hemopoietic function of the tonsil is based on definite histological findings and in this service the tonsils play a very important though by no means indis-

pensable part.(6) The tonsils should be respected as functioning organs, especially in children, and should never be removed without adequate cause. But when such cause exists the loss of functioning power should not be used as an argument against their complete extirpation.

Acute tonsillitis occurs in sporadic and epidemic forms. The sporadic variety occurs in young persons although infants are rarely attacked. Chronic enlargement of the lymphatic structures of the throat is a predisposing cause of tonsillitis as well as certain general conditions such as exposure to cold, dampness and fatigue.

As tonsillitis is a communicable disease we come to more specific causes for the epidemic form. Epidemic tonsillitis may be caused by infected milk as was proven in an outbreak in Boston in 1911. Acute tonsillitis is usually caused by some type of streptococcus (7), although H.M.Cohe (8) states that the staphylococci is the predominant organism in adult pathological tonsils and the streptococci more common in children under 12 years of age. E.Wirth (9) found hemolytic streptococci in 53% of adult cases and in 58% of children. This streptococci of the beta type is the strain that is frequently responsible for the disease, although the alpha type, strep-

teococcus veridens, the pneumococcus and the staphylococcus albus and aureus are said to cause it occasionally. E. Wirth also found pneumococcus in 23% of adult cases and 42% of children. Polvogt and Crowe (10) found the staphylococci in only 8% of the tonsils removed by tonsillectomy. They also found that the hemolytic streptococcus was the predominating organism in 91% of the tonsils examined after removal. Tonsillar infections due to this latter type are accompanied by general systemic disturbances, fever, toxemia, malaise, and general debility. In other forms the symptoms are not so extreme.

The streptococcus may be present in simple angina or diphtheria or may be present and cause no inflammation at all. Bloomfield (11) found 41% of a group of non-tonsillectomized nurses with throat cultures positive for hemolytic streptococcus at a time when tonsillitis was not present in the group. Davis (12) found that if repeated cultures were taken from the throats of students that sooner or later the beta hemolytic streptococcus would be found.

Although Wirth (9) found that six apparently normal tonsils in healthy individuals were steril we find a widespread distribution of hemolytic streptococci in the throats and tonsils of well persons. This has led to the



theory that tonsillitis is an autogenous infection, that is an infection produced by organisms normally in the throat. Jordan (I3) says "the mucous membrane constitutes a favorite abiding place for streptococci; the tonsil usually harbors them. Consequently any lowering of the resistance of these tissues from either local or general causes gives the signal for a speedy invasion. In throat infections of all sorts, streptococci are usually present." We may therefore consider fatigue and exposure of the body to sudden changes of temperature as attributing factors in the disease of tonsillitis.

Bloomfield and Felty (I4) disagree with the autogenous infection theory and maintain that tonsillitis is not autogenous but is caused by new infection. The throats of nontonsillectomized nurses were cultured in September before tonsillitis appeared in the group. Of those who in September were carriers of the hemolytic streptococcus, 2% had tonsillitis during the following winter against 41% of those who were not carriers in September. Of those who had a history of a previous attack of tonsillitis and were carriers in September 3% had tonsillitis during the following winter as against 62% of those who had a history of a previous attack of

tonsillitis but were not carriers in September. The number of persons considered was not large but the differences seem definite. The authors conclude that tonsillitis is not an autogenous infection but that the carried organisms keep up a sort of chronic vaccination, the protective effects of which wear off rapidly when carriage ceases. The lower rate of persons with no history of tonsillitis was interpreted as indicating a natural possession of a lower degree of susceptibility to this type of streptococcus infection. This idea differs from that of Holt (15), who states that one attack of tonsillitis predisposes to another.

Other etiological factors which cause a small percentage of tonsillar disease are the Klebs Loeffler bacillus, the tubercle bacillus, influenza bacillus and the bacillus capsulatus. The last two, together with the diphtheroid bacilli are more prevalent in the spring, the micrococcus catarrhalis in the fall but the staphylococcus and the streptococcus type are not affected by the seasons.

Although McCrae (16) defines acute tonsillitis as "an acute infection sporadic or epidemic, involving the structures of the tonsillar ring usually due to organisms

of the streptococcus class, " E.Wirth of Heidelberg(9) in his series of cultures from pathological tonsils says that the etiology of tonsillitis is not definite. Therefore in summing up the findings in literature on the causes of tonsillitis I would say that there is no one specific organism which is responsible for tonsillar infection but that given a body with lowered vitality and any one of a number of different virulent organisms in great enough numbers to produce inflammation may constitute the cause;the streptococci,the staphylococci and the Klebs Loeffler bacilli being the most common offenders.

Many systemic infections arise through the entrance into the blood or lymph streams of organisms from the tonsillar crypts,either with or without primary lesions in the tonsils themselves.(17) Among the more important of the focal infections which may be of tonsillar origin are acute or chronic arthritis,endocarditis,pericarditis,myocarditis,chorea,acute or chronic glomerular nephritis,neuritis,myositis,cervical adenitis of simple inflammatory or tuberculous origin,and chronic toxemia without localized lesions other than those in the tonsils themselves. This last condition may be characterized by debility, sometimes with marked anemia;or gastric disturbances and

neurasthenia may be the most prominent symptoms. Many other infections and toxemias have been attributed to the same cause, among which may be mentioned appendicitis, pulmonary gangrene, infectious jaundice, and certain skin lesions such as erythema nodosum, erythema multiforme and acne. Exophthalmic goitre has been considered as possibly a toxemia with like origin. In some of these the relation of the tonsil to the disease has not been above question; but we must admit that septicemia of a low or high grade of virulence may be of tonsillar origin and it is evident that the infection may manifest itself by the most varied localizations, depending on the character and virulence of the organism and the condition of resistance present at the time in the different tissues.

The close relationship that often exists between acute and articular rheumatism and acute tonsillitis has been observed for many years. After considering data from a 10 year follow up study of 2200 tonsillectomized children A, D. Kaiser (18) concluded that they suffered from 30 - 50% less often from first attacks of rheumatism than the nontonsillectomized children. At times the joint and throat lesions are simultaneous in their onset, while

again the tonsillitis precedes the arthritis and may even completely subside before the joint lesions develop. A fair percentage of the cases develop endocarditis. More rarely we find pericarditis or myocarditis. The bacteriology of the lesions is not constant. Poynton and Payne (19) from the tonsil of a patient with acute tonsillitis identified a diplococcus (diplococcus rheumaticus) which was identical with the one they had previously found in the lesions of arthritis, endocarditis and myocarditis. Both organisms produced similar lesions in joints and hearts of animals. Since this observation was made much conflicting evidence has been presented concerning the etiology of rheumatic fever for the character of the cocci isolated by different investigators shows considerable diversity. The work of Rosenow (20) goes far in reconciling these differences. By varying the culture conditions the cocci were made to change from one form to another and their affinity could be transferred to muscle, myocardium or kidney. Apparently these organisms are not found in the tonsillar crypts but as Rosenow and Davis (21) have shown that transmutation of form and pathogenic properties may take place

under certain conditions between the various members of the streptococcus group. It is probable that either the streptococcus hymolyticus or the streptococcus veridens of the crypts may undergo transmutation to one of these intermediate forms after entering the blood current. Rheumatic fever is an indication for tonsillectomy but the operative procedure should not be attempted during the acute stage of the disease.(22)

Other diseases may be regarded as complications as they are often cured or the person rendered less susceptible to them after tonsillectomy. These are acute head colds, otitis media, scarlet fever and diphtheria.

Respiratory infections however, such as laryngitis, bronchitis and pneumonia are not benefited by tonsillectomy but actually occur more frequently after the removal of the tonsils.(18)

The treatment of tonsillitis is an art. Tonsillitis is generally a self limited disease and normally lasts only a few days. Symptomatic treatment is indicated to relieve suffering. Rest and increased fluid intake are aids to the body in producing resistance and are inexpensive. An ice bag, a poultice or hot fomentations to the neck are often comforting. The bowels should be open-

ed by a dose of calomel at night followed by a saline cathartic in the morning. The diet should consist of liquid food such as, the yolk of raw eggs well beaten with sugar, buttermilk or zoolak. The patient should remain in bed twenty four hours after the fever subsides. There are a variety of first aid methods practiced in every home. If the patient has a high temperature, 10 gr. of aspirin may be taken every three hours until this is normal. A steam kettle containing beech wood creosote or pine needle oil used every two hours loosens the viscid secretions and brings relief. The same result may be obtained by syringing the throat with a saturated solution of bicarbonate of soda. When the breath is offensive a solution of hydrogen peroxide may be sprayed on the throat several times daily, after which the mouth may be washed out with boric lotion, a weak solution of permanganate of potash or some other antiseptic mouth wash.

Because members of the medical profession do not agree as to the perfect treatment for tonsillitis, patent medicine companies have used their opportunity to defraud the public in selling quantities of remedies which are of no value in curing tonsillitis. In regard to these

patented medicines offered for tonsillitis I wish to quote The Consumer's Research, an association with headquarters in New York City, which informs its members as to the reliability and value of practically all advertised articles offered for sale in the United States. They say that pepsodent, listerine and other similar over advertised mouth washes are not recommended because of the high price and the slight benefit if any which might be obtained from the use of such remedies.(23) These may do no harm although some are strong enough to remove the protection nature provides and cause further irritation.

Aside from the general measures previously given which can be carried out in any home, a physician uses any one or more of a variety of treatments for a patient with tonsillitis. A thorough application of a solution of nitrate of silver, 2 drams to the fluid ounce of water, frequently aborts the attack if applied early. The silver solution should be painted upon the tonsils and adjacent inflamed mucous membrane by means of a swab of cotton and in croupous tonsillitis carried into the crypts after washing them out with hydrogen peroxide by means of the modified Blake canula. The relief experienced



by the patient as a result of the application is almost instantaneous and the application should be repeated once or twice daily until all inflammatory symptoms have subsided. The nares and pharynx should be washed by means of a spray from an atomizer containing Dobells Solution before making these applications, and a lozenge of guaiac and tannin may be subscribed for the patients use in the interval between the applications. When these measures do not abort the attack, and the fever and suffering of the patient are constantly increasing, tincture of aconite, in one drop doses every hour or two will give most excellent results. (24) The aconite repeated for six doses will reduce fever, promote diaphoresis and frequently abort the condition. A pediatrician may spray the tonsils with 1 to 10,000 adrenalin chloride followed by a hot poultice or an ice collar. The throat may be painted with glycerin and phenol, 5%, or boroglyceride and glycerin. Morell Mackenzie (25) claimed to cure tonsillitis by guaiacum lozenges, 3 gr. every two hours, if used in the early stages of the disease. Barnett (26) recommends "London paste" applied locally after a local anesthetic. This paste is caustic and destroys the tonsils in a manner

similar to cancer paste.

Treatment of diseased tonsils by radiation is being given considerable attention lately. Witherbee (27) says the xray method of treating chronic focal infection of the throat namely tonsils and adenoids, is not only safe and permanent, but will more thoroughly and completely remove this focal infection than any other method yet devised, surgical or otherwise, and furthermore the contraindications for operation in no way interfere with this procedure. The technique is comparatively simple. In the average case a seven inch spark gap, five milliamperes, 4 minutes time, 10 inch distance and 3 mm. of aluminum as a filter is used. The patient lies face downward, head turned to the side, as when making a radiograph of the lower molars. The area about the tonsil is exposed and the rest of the head is protected by lead. The number of treatments is usually about eight, given at intervals of two weeks, and both sides of the head are exposed at each treatment. This method is especially indicated in chronically infected throats of vocalists, those with rheumatic chorea, diabetes, endocarditis, haemophilia or any condition contraindicating operation.

Pacini (28) advises the use of ultra violet ray in conjunction with Witherbee's xray treatments, as do Simpson and Denman. (29) Lafferty and Phillips (30) report excellent results with xray therapy. Radium therapy is advocated by Withers (31) who claims that the constant radiation is better than xray. J.C. Scal (32) and C.F. Robinson (33) also advocate the use of radium especially in nonoperative cases. Diathermy destruction of the tonsils is advocated by Mackenzie (34) but the post operative effects are not good.

Lukens (35) who has made a careful study of the literature on the treatment of tonsillitis says, "I feel that the surgical treatment is the quickest, safest and most efficient method. In cases which cannot have surgery, radium seems to present the second choice with xray following a close third. The ultra violet ray seems to have only a local germacidal effect. I am convinced that electro-coagulation is not the proper treatment of diseased tonsils." McCrae (36) says, "the treatment for repeated attacks of tonsillitis and chronic tonsillar disease is removal of the tonsils." In regard to surgical treatment of tonsillitis Painter (37) believes that a

complete tonsillectomy should be done, including the removal of the capsule with it, as he thinks the capsule has the power to regenerate tonsillar tissue.

There are two methods of tonsillectomy in vogue at the present time; by means of the guillotine and by dissection. The first operation as now generally practiced was introduced by Whillis and Pybus, of England, in 1910, and is applicable to the great majority of cases. Ether given by the open method is the favorite anesthetic. The patient lies on his back on the table, and the gag is inserted before the face-piece of the inhaler is applied. As soon as relaxation is secured, indicating a suitable degree of anesthesia the head of the table is lowered; this prevents the entry of blood into the larynx. The guillotine is introduced like a tongue depressor, and the ring is applied so that the upper surface lies toward the tonsil. Beginning at the lower pole, the ring of the guillotine is passed over the tonsil. The distal end of the guillotine is then pushed well in behind the tonsil, which is at the same time levered forwards by causing the shaft to cross the opposite corner of the mouth and to take a horizontal direction. By pressing upon the tonsil with the left thumb or fore finger it is caused

to enter the guillotine, and is held there while the blade is pushed home with the right thumb. The exact pattern of the guillotine is of little moment and each operator has his favorite model. (40)

The dissection method is an operation which may be reserved for special cases, but it is only fair to state that by certain operators, it is employed in every case. Perhaps the usual practice is to employ it only for such cases as cannot be suitable for the guillotine method; for example, tonsils which have been the seat of quinsy, as a result of which the capsule is adherent to the surrounding parts and cannot be invaginated into the guillotine; or septic remains of tonsils which have previously been removed in part; or tonsils in adult patients who desire operation under local anesthesia. The anesthetic may be local or general but the local is preferred. The patient is seated in a chair in front of a good light and the operator, seated in front of him, seizes the tonsil with a vulsellum, and with scissors divides the mucosa close to the anterior pillar, so as to expose the capsule. By dissecting with a pair of scissors the tonsil is gradually separated from the faucial pillars; a snare is then passed over the vulsellum and tightened down

over the base of the tonsil so as to divide its final attachments. Partisans of this operation claim that the faucial pillars are never damaged, and that bleeding is slight and may be readily controlled. (40)

The guillotine method as devised by Sluder in 1909 and Whillis and Pybus in 1910 has since had many refinements of instruments and technique. Stein (38) uses a Beck Schenk snare and everts the tonsil in his operation. He gets complete enucleation without dissection in 90% of his cases. The ideal operation is one that removes all the tonsil tissue and leaves the muscle structures absolutely intact with little or no hemorrhage. This may be done by the Sluder method of everting the tonsil and using a wire snare. Stevenson (39) uses careful dissection without the use of any snare in his tonsil operations and says it is the only means of getting complete enucleation.

Education of the public mind regarding the function, diseases and treatment of the tonsils; careful diagnosis, helpful treatment and tonsillectomy only when necessary on the part of the attending physician, will do much to bring more of this type of patients under the care of a medical advisor. In this manner more knowledge on the

cause, complications and treatment of tonsillitis will  
be available.

## CASE HISTORIES

Tonsillitis varies so greatly, that unless a large number of case histories can be reported, no conclusions may be drawn. I will mention six cases which have come under my observation, and are of interest in that they show variance of tonsillitis in one family for three generations. Mother, daughter and granddaughter have had their tonsils removed with satisfactory results. Father son and grandson have retained their tonsils with no ill effects.

Case 1. Mother, age 64, music teacher. She gives a history of severe neuritis in her shoulders and some rheumatism in the knees for the past thirty years. There have been occasional attacks of tonsillitis. After her tonsillectomy four years ago she has not been troubled with neuritis and her general health is much improved. The rheumatism and attacks of sore throat remain about the same.

Case 2. Daughter, age 35, housewife. Six years ago she was advised to have a tonsillectomy because of her frequent sore throats and general poor health. The operation was performed and her general health



has greatly improved, the attacks of sore throat continue as before the operation.

Case 3. Granddaughter, age 6, school girl. Her tonsils were always large and she was a nervous child. A rather sudden loss in weight and continued listlessness resulted in a case of tonsillitis with severe cervical adenitis. Following this attack the tonsils were removed. Since the operation a year ago her general health and nervousness have improved remarkably. She has had one severe attack of sore throat since her tonsillectomy.

Case 4. Father, age 64, physician. Sore throat and tonsillitis occur rarely and are treated satisfactorily by gargling a mild antiseptic. No complications have occurred.

Case 5. Son, age 37, medical student. Has had acute attacks of tonsillitis once or twice each winter with occasional joint pains. The attacks are usually aborted by the application of 25% silver nitrate solution to the tonsils. No complications are in evidence at the present time.

Case 6. Grandson, age 3, pre-school child. His tonsils increase in size in the presence of nose and

throat infection but do not seem to cause him any pain. He keeps well while playing with children with infected throats. I believe his tonsils act as a barrier against infection.

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