THE RELATION BETWEEN THYROTOXICOSIS AND TONSILLAR INFECTION.*

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Considering the amount of attention which has been directed toward infection originating in the tonsil, and also the extended study of disturbance of the thyroid function, it seems rather surprising that so little consideration has ever been given to the possibility of relationship between the two. It would seem almost inevitable, that whichever avenue of approach an investigator used, whether his interest were in the tonsillar condition, or solely directed toward a consideration of thyroid pathology, he would sooner or later arrive at a point where the two lines of investigation would intersect. Yet a careful search of the literature reveals comparatively few instances of any such occurrence.

The writer's interest was first aroused to the possibility of some interrelationship between diseased tonsils and disordered thyroid in the routine course of oto-laryngeal practice. The extensively reported experiments of Kimball and Marine upon the public school girls of Akron and other Ohio cities have recently called the attention of the medical profession all over the country to the fact that goiter is especially prevalent in this particular section of the United States. In common with the other medical men located here, the laryngologist sees many patients who present some degree of thyroid disturbance, the vast majority of those patients being adolescent girls, or young women not many years past puberty. As the writer's interest was always in the indications of the tonsillar situation, and the goiter was considered only in the general survey of the patient's health and physical condition, it was some time before the conclusion was thrust upon him that there could be any definite connection between the two.

This is unfortunate in view of the present inquiry, for much valuable and interesting data was allowed to go unrecognized and consequently unrecorded, which, if available at present, might be of great assistance in illuminating a rather obscure subject.

It was not until many patients—in the course of investigation of their general condition following tonsil enucleation—had reported

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decided improvement in the goiter itself, and an undoubted amelioration of its characteristic symptoms, that it became evident that these circumstances must be something more than casual coincidence. Nervousness had been greatly lessened and irritability was much less evident, pulse rate was markedly lower, and there had been a gratifying increase in weight. The thyroid enlargement in many cases had undoubtedly decreased, and the whole physical and mental condition was much benefited.

Confirmation of these observations came from another source—that relatively small class of patients who presented themselves for tonsil enucleation giving a history of previous thyroidectomy without any marked amelioration of the goiter symptoms. Relieved of their infected tonsils, these patients reported a complete clearing up of all the thyrotoxic symptoms which had persisted after the thyroidectomy.

The repeated occurrence of these cases so impressed the writer with their significance that he resolved to extend his researches outside his own practice, and find out—if possible—whether other men working along the same general lines, had had opportunities for making observations of similar character. With this purpose in view he prepared a brief questionnaire covering those points on which he most desired additional information, and sent it to twenty-eight practitioners whom he believed to be so situated as to be able to supply the information he was seeking. Surgeons, internists and ear, nose and throat men were represented in the list, the idea being to get as broad a range of opinion, and as many different points of view as possible.

The response to the appeal was very gratifying. All the letters were answered, and although the majority modestly disclaimed possessing any information which they deemed valuable, the recipient of their kindness is compelled to differ with them. At the time the questionnaire was sent out the writer had found very little in the literature which had any bearing upon his hypothesis, and although further search revealed a number of records and reports of work along these lines, the personal communications still remain of the highest value and interest.

Of the twenty-eight men to whom inquiries were sent there were only six who felt unable to give any definite reply to the questions. Several of the remaining twenty-two were not in position to give exact answers to the questions as arranged in order, but the general observations and conclusions they did give were very valuable

and helpful. The results of the questionnaire may be summed up, using the different questions as headings:

1. *How many cases of goiter have you had in your practice, in which, according to the patient's history, the symptoms accompanying the goiter were apparently temporarily increased during an attack of tonsillitis?*

Thirteen replied positively that symptoms were always increased during an attack of tonsillitis; and but two had failed to observe any relationship between the two conditions. David Marine has often observed the phenomenon, but does not believe there is anything "specific in the reaction of these (goiter) cases to tonsil infection." Plummer, of the Mayo Clinic, is of the opinion that exopthalmic goiter "is sometimes aggravated by tonsillitis, while in other instances it is at least temporarily improved;" this answer, however, having "little if anything to do with the etiologic relationship of tonsillitis and exophthalmic goiter." Allen Graham calls attention to the fact that while tonsillitis undoubtedly aggravates both simple and exopthalmic goiter, the same phenomena have been observed in many other acute infections, "most notably tuberculosis."

2. *In how many cases, where adults presented an early stage of goiter, coincident with infected tonsils, was the growth of the goiter apparently arrested by the removal of the tonsils?*

All the replies to this question might be classed as "affirmative." Comparatively few were able to state an exact number of cases, but the consensus of opinion was undoubtedly that the removal of infected tonsils had a beneficial effect on all types of goiter. Dr. Crile states that "in general, fifty per cent are apparently arrested by the removal of any infection, whether it be teeth, tonsils, sinuses, etc." Allen Graham says that "it is unquestionably true that some patients who have both goiter and tonsillar infection are improved after tonsillectomy. This is strongly maintained by Dr. H. G. Sloan of this city (Cleveland, Ohio), who nevertheless recognized the importance of eradicating infection in the sinuses or any other focus, as well as the tonsils."

Albert J. Ochsner has seen many goiters arrested after removal of the tonsils, but in all of these cases the patients were directed to follow a highly specialized diet and were especially cautioned to drink only boiled or distilled water. Dr. Ochsner would, therefore, appear to consider the dietary regime as more likely to have effected the improvement. David Marine thought that while few, if any goiters were actually *arrested,* many were no doubt im-

proved by the removal of any focus of infection, while O. P. Kimball had "seen two cases of well advanced exopthalmic goiter cleared up entirely on the removal of very bad tonsils, plus the simple treatment of saturating the thyroid gland with iodine." In this connection it is interesting to recall the statement of Marine and Kimball, published last year[1], that of more than one thousand school girls who took iodine prophylaxis for a period of three years, only five showed an increase in the size of the goiter at the end of the period, and four of these five had enlarged and infected tonsils.

3. *How many cases, after a thyroidectomy, in which the symptoms persisted, were relieved by a tonsillectomy?*

A wide divergence of opinion was revealed by the answers to this question. Mithoefer, of Cincinnati, had never observed any such cases, while T. E. Carmody (whose figures are "only approximate") had seen two; J. M. Ingersoll of Cleveland estimated the number at about ten per cent of thyroidectomies, and James J. King of New York had an "impression" that one or two who were not relieved by thyroidectomy were relieved by subsequent tonsillectomy. While Crile was unable to give exact figures, he attributes the persistence of goiter symptoms after thyroidectomy to one of two factors: "1. Not sufficient thyroid removed. 2. Focus of infection has been overlooked." This is interpreted by the writer to mean that *if* the focus of infection *were* in the tonsils the goiter symptoms would continue so long as the tonsils remained unextirpated. J. A. Stucky of Lexington, Ky. on July 9, 1921 had seven cases still under observation where the usual symptoms persisted after thyroidectomy but "were relieved promptly by tonsillectomy." It is likely that Dr. Stucky may later be able to throw more light on this particular question. Several others had no data of any sort on which to base a reply to this question.

4. *How many cases of young girls at puberty, who have a beginning simple goiter, had their tonsils removed in early childhood, or at least before the symptoms of goiter were evident?*

The most of those questioned "fell down" on this question. "No data" was the reply of the majority. Dr. C. W. M. Poynter of the University of Nebraska considered it "particularly significant." He believes that "as long as we do not know what makes the tonsil susceptible to infection, we should begin by assuming that 'lowered resistance,' due to goiter acts, not in a specific way, but as any other devitalizing influence, as bad hygiene, etc." Wal-

lace Irving Terry of San Francisco thinks "it will be interesting to learn in a few years whether goiter with exopthalmus is less prevalent in young women who have had their tonsils removed in early life."

5. *In those who have not had their tonsils removed, how many were benefited or cured by a tonsillectomy?*

All who answered this question seemed to hold the opinion that in adolescent girls who were developing goiter, the removal of infected tonsils invariably had a beneficial effect on the thyroid condition. Dr. Crile says, "We feel that only very frank exophthalmic goiter patients are not cured by removal of focus of infection unless they also have thyroidectomy performed."

6. *Have you ever had a goiter case that also had infected tonsils, where, after a thyroidectomy had been done, the patient had no further tonsillar trouble?*

The only affirmative answer to this question was that of H. S. Plummer of the Mayo Clinic. All the rest answered: No, without any qualifications. The unanimity was decidedly striking.

7. *What per cent of goiters, in your opinion, are of toxic origin?*

This question was evidently somewhat vague, and consequently those who attempted to answer it, found considerable difficulty in making their replies satisfactory to themselves. Charles H. Major judged that about 40 per cent of the cases coming to his clinic are toxic. Allen Graham objected to the term "toxic goiter" as indefinite and "subject to various interpretations." In common with Ochsner, he feels that "the region from which the patient comes" is the most potent factor in the nature of the thyroid disturbance. The other replies estimated the number of toxic cases all the way from 50 per cent to "practically all." Marine thinks "relatively few exophthalmic goiters are of bacterial toxic origin."

Many of those questioned made valuable contributions to the discussion which were not directly included in the questionnaire. There is evidently a strong feeling, that treatment, especially the iodine therapy, so successfully administered by Marine and Kimball, or the special diet and regimen as advocated by Ochsner, have a much greater part in effecting cure or amelioration, than the removal of infection, in the tonsils or any other location. Terry believes that "focal infections play a considerable part in activating a hyperplastic thyroid, but unfortunately removal of foci of infection is not followed by many cures of the goiter." Marine re-

gards "most of the (goiter) cases as types of exhaustion as, for example, those following fright and prolonged worry," all acting "on the same mechanism within the body." He believes that "the suprarenal gland plays a very important role in the syndrome and it has long been known that this gland likewise plays an important role in infections." He adds that "one must bear in mind that the thyroid hyperplasia in goiter is accompanied by lymphoid hyperplasia irrespective of clinical associations," and this causes him to "seriously doubt that any cause and effect relation between lymphoid hyperplasia and thyroid states will be established."

Dr. Poynter sees "nothing in the juxtaposition of the tonsil and thyroid to warrant us in assuming a connection between them, either through lymph or blood channels." He thinks that if any relation exists it will be found to be through internal secretion, but adds that "a very large percentage of hypertrophied tonsils in conjunction with enlarged thyroids might be significant."

Emil Mayor wrote that while he was unable to give any exact figures, his experience led him to believe that "an early operation on the tonsils would have a very beneficial effect upon the (goiter) patient, retarding the growth, or even entirely preventing the further advance of a goiter that often is of toxic origin."

A careful examination of the replies, as a whole, would seem to lead one to the conclusion that most of these men have given little consideration to the possibility of an interrelation between infected tonsils and thyrotoxicosis. The consensus of opinion may perhaps be pretty fairly summed up in the words of Allen Graham who wrote:

"Regarding exophthalmic goiter, in the vast majority of cases neither on history or physical examination, can the tonsils be incriminated as the chief etiological agent, nor the factor that prolongs the syndrome, even granting that it (tonsillitis) might aggravate the symptoms when it occurs. On the other hand a considerable number of patients date the onset of their trouble from a previous systemic infection, not necessarily of tonsillar origin. Also a large number of cases develop in which the infection plays little or no part, so far as can be determined by history and examination."

The function of the normal tonsil is not fully known, indeed there is relatively firm ground under the feet of those who maintain that there is no such thing as a normal tonsil, inasmuch as practically each one removed can be proved to be more or less

pathologic. Anyone who has investigated the anatomy of the tonsils will immediately perceive how liable they must be to infection with all kinds of bacteria. The tonsils occupy an "open" position in the throat, that is, no food or air can find its way either to the stomach or lungs without first passing over these tissues. Moreover, deglutition opens up the tonsillar fossae in such a way that the mouth secretions continually come in contact with them. We know that the tonsil encloses a number of deep crpyts lined with highly sensitive epithelium. A cross section of the tonsil mass will disclose how these fossae, with their covering of columnar epithelium, reach far down, sometimes to the very root of the tonsil itself. Not infrequently one crypt communicates with others, and their delicate lining epithelium is directly in contact with the tonsil parenchyma, the chief constituent of which is mono-nuclear cells. Thus a great extent of absorbent surface is always open to infection, and in addition to this, the opening of a fossa is apt to become clogged during the progress of any inflammatory process, so that the infectious material which the crypt contains is sealed up within it. When we consider that the tonsil does not secrete, and has no avenue of elimination except through the mouth of the fossae, we can readily comprehend how this infective material must of necessity be gradually absorbed into the system[2]. Many years ago George B. Wood[3] demonstrated that bacteria will generate toxin in the crypts, and that if this bacteria is virulent, its first point of attack will be the cryptal epithelium. In the large majority of cases they gain access to the tonsillar parenchyma only after the toxins have destroyed the epithelium. When the bacteria have gained access to the tonsillar tissue, they find permanent lodgment only in the germinating follicules. The current in the interfollicular tissue tends to carry the bacteria toward the efferent lymphatics. Thus, a definite lymphatic connection may be established with many other parts of the organism.

During the war period the energies of the medical profession were so completely absorbed by the pressing problems of the battle area and evacuation hospital that all mere academic inquiries were laid aside and forgotten. To find anything bearing on a possible relation between thyroid and tonsillar infection it is necessary to search the literature which appeared before the world convulsion of 1914.

Up to the end of the nineteenth century the thyroid had received little attention as a possible factor in systemic disease. Its connec-

tion with simple and exophthalmic goiter, with myxodema and cretinism, was fairly well understood, but there had been comparatively few studies made of these conditions outside the regions where goiter was endemic. During the closing years of the century Roger and Garnier[4] published in *La Presse Medicale* and transactions of the *Societe de Biologie,* a series of papers on the thyroid gland, one of which dealt especially with the reactions of the gland to general infections, and the pathological changes taking place at such times. Thirty-three post mortem examinations were made, the material being taken from patients dying of such diseases as diphtheria, scarlet fever, cerebro-spinal meningitis, small pox and purulent staphylococcic peritonitis. These authors reported that the condition of the thyroid was about the same under all conditions, that neither the specific character of the infection, nor its virulence and duration seemed to make much difference in the condition of the gland under examination. Most of the lesions were characteristic throughout. The glandular hyper-secretion appeared less abundant in the diphtheria cases than in those of scarlet fever, but the diphtheria thyroids contained a greated number of desquamated cells, and the colloid material was more frequently altered. In one diphtheria case a parenchymatous hemorrhagic area was found in the thyroid.

These authors performed a number of experiments upon rabbits and guinea pigs, finding it an easy matter to infect the thyroids of these animals by injecting a culture into the center of the carotid artery, which had been previously ligated below the junction of the thyroid artery. The infection thus set up was practically identical with that observed in human subjects, although much more acute, and so brief in duration as to give little or no time for organic reactions to be established.

The conclusions drawn by these authors were that during the course of acute infections disturbances of secretion more or less profound, occurred in the thyroid "as in the other glands of the economy." After a period of hyperactivity, a period of diminution will follow or an alteration of function. Just as the liver at such times will secrete abnormal pigments, the thyroid will form colloidal material, atypical and peculiar to these conditions.

Roger and Garnier's investigations apparently attracted little attention in this country, and it was not until Billings, Rosenow and their co-workers began to publish the results of their researches on focal infection, that the possible relation of the thyroid to sys-

temic disturbances was brought to general notice in the United States. In his address on focal infection, delivered before the American Medical Association in 1914, Frank Billings[5] reported three cases of rheumatism, attended by acute tonsillitis and thyroiditis, attributing all three manifestations to a single focal cause. He went on to say that the interest of his clinic was aroused to the possibility of focal infection as a cause of goiter. He reported seven additional cases which "seemed to show that there is an infectious type of goiter with and without symptoms of exophthalmic goiter, which seems to be of toxic origin. The rapid subsidence of the goiter and the symptoms after the removal of the foci of infection in the jaws and tonsils, was a surprise." All of these patients gave a history of chronic tonsillitis. Dr. Billings ended by saying that to the list of acute conditions already known to be due chiefly to focal infection, we were now justified in adding several others including "certain infectious types of thyroiditis, with or without hyperthyroidism."

A year before Dr. Billings' address was made Clement F. Theisen[6] of Albany, New York, published some cases of acute tonsillitis complicated by an acute thyroiditis. These cases offer perhaps the best support which the present writer has been able to find in the literature of a close interrelation between infections of the tonsil and the thyroid. Theisen believed his cases to be of "particular interest from an etiological standpoint, as in all except one case, the inflammation of the thyroid gland occurred with or directly after attacks of tonsillitis. Two of these patients have each had two distinct attacks of acute thyroiditis, each time with an acute tonsillitis, and both have since developed well marked diffuse goiters." While Theisen does not wish to be understood as emphasizing the foregoing facts as important etioligical factors in the development of goiter, he feels that it is by no means impossible that the repeated inflammatory attacks to which the gland was subjected, may have, partly at least, been responsible for the subsequent chronic hypertrophy of the thyroid gland.

All of Theisens patients were young women. Briefly summarized, the cases were as follows:

Case 1: Age 20. Sore throat for several days before examination revealed a typical acute follicular tonsillitis. Thyroid enlarged and tender on palpation, the hypertrophy increasing during the course of the tonsillitis. The swelling of the thyroid had begun during the third day of "sore throat," and the patient stated that

the gland was not enlarged before the attack of tonsillitis. Under the usual treatment for tonsillitis, with an ice-coil about the neck, the attack subsided in about a week. Tonsillectomy was refused, and the next winter the patient again presented herself with a similar attack, "running the same course, and again developing with an acute tonsillitis. This patient came to the clinic at regular intervals during the next two years, and while there were no further attacks of acute thyroiditis, she developed a gradually increasing diffuse goiter. It is at least possible that etiologically there is a connection between her attacks of thyroiditis and the subsequent hypertrophy of the gland. *There is no doubt that the infection of the gland was each time caused by the acute tonsillitis.*"

Case 2: Age 22. Same history as preceding case. Patient was practically well in ten days, and was not seen again for about two months, when she came to the clinic with typical symptoms of hyperthyroidism.

Cases 3 and 4: 21 and 24 years old. Both stated that before the present attack they had no enlargement of the thyroid. One patient was just getting over a severe attack of acute tonsillitis, and the other was still having an acute attack (no mention of sequellae of hyperthyroidism in these cases.).

Case 6: Aged 19. Very severe acute tonsillitis which was followed by the development of acute thyroiditis. The attack ran the usual course and a year later another acute thyroiditis came on with an acute follicular tonsillitis. This patient has been under observation continuously, and has developed a well marked diffuse goiter, which started about six months after her last attack of thyroiditis.

Case 7: Aged 30. A very severe acute thyroiditis came on directly after an acute tonsillitis. "There was a good deal of dyspnea and dysphagia in this case, and within a few months after the attack, she developed a typical condition of hyperthyroidism."

In concluding this report Theisen remarks that he found very few cases recorded in the literature where acute thyroiditis occurred in conjunction with tonsillitis. A study of his case histories naturally suggests the possibility of overlooking the occurrence of thyroid involvement in acute tonsillitis. It seems reasonable to suppose that recurring attacks of tonsillitis might involve the thyroid, and eventually set up a chronic condition of hyperthyroidism, even if the thyroid symptoms were never sufficiently acute to be differentiated during the tonsillitis attacks.

Seven years ago Shurly[7] stated that his attention was called to the relation of the tonsils to thyroid diseases, "by the beneficial results of a series of tonsillectomies for the relief of recurrent tonsillitis and quinsy, attended by incipient typical and atypical Graves' disease. The prompt, permanent and prophylactic value of enucleation in this class of cases adds another definite indication to surgical procedure, which is given no attention in the literature. As acute and chronic tonsillitis and peritonsillar abscess are recognized as important etiologic factors in incipient exophthalmic goiter, tonsillectomy may then be classified as a prophylactic measure in our new and fashionable department of preventive laryngology."

The discussion which followed Dr. Shurly's paper brought out some interesting data on the relation of tonsil infection to thyroid disturbance. Greenfield Sluder of St. Louis stated that while the clinical relationship between the lymphoid ring and the thyroid gland was not clear in the minds of anatomists, it is an established fact that the lingual tonsil develops from the same bronchial arch, and in early foetal life there exists the thyroglossal duct which is closed early. It is sometimes found in the dissecting room, but the speaker had never been able to observe it in a living subject. He had observed marked improvement in goiters where all treatment had been directed toward the lingual tonsil.

Dr. George B. Wood of Philadelphia reported the case of a trained nurse who had recurring tonsillitis followed by exophthalmic goiter and hyperthyroidism. After removal of the tonsils the attacks stopped for six months, the goiter began to go down and the exophthalmos to disappear. Then followed a slight sore throat with a less severe attack of hyperthyroidism, and examination now revealed that the faucial tonsils had not been entirely removed, a small piece still persisting in the upper part of the tonsillar recess. When this was removed all symptoms of hyperthyroidism permanently disappeared.

Dr. Wood's explanation of this case was not by a direct relationship between the lymphoid ring and the thyroid gland, but rather by the presence of an infective process originating in the ring, which upset the metabolism of the body so as to produce goiter and hyperthyroidism.

Shamburgh of Chicago was of the opinion that the phenomena of thyroid disease suggested very strongly a condition caused by some focus of infection, as around the teeth, or latent in the faucial tonsils. This latter condition is often overlooked. When the

systemic condition develops in connection with a severe attack of acute tonsillitis, the tonsils are often suspected of being the focus, but if the infection is latent, and the patient does not complain of throat symptoms, the examiner may not think of the tonsils at all. Chronic tonsillar abscesses are frequently discovered in patients who give no history of "sore throat," and such abscesses are often unrecognized before the tonsils are extirpated.

Evans and his collaborators[8] made extensive observations on students entering the University of Wisconsin during the five years, 1910 to 1914, inclusive. Wisconsin being situated in the so-called "goiter belt," offers an excellent opportunity for researches on the subject here discussed. The tabulated results of these researches "afforded decided evidence of the actuality of a connection between nasal and throat affections, and the large occurrence of thyroid involvement. The recognition of the tonsils as a site of parasitism by *endameba gingivalis* (Gros) in the laboratories of the Universities of Pennsylvania and Wisconsin raised the question of a possible connection of this organism with the thyroid enlargements because of the evidence obtained of its part in the etiology of other conditions, for example, pyorrhea."

The authors emphasize the fact that in suggesting endamebiasis of the upper respiratory tract as possible causes of thyroid hyperplasia, they are not advancing these protozoa themselves as the specific producers of the toxins effective in producing the hyperplasia. If this were true there is no reason why everyone who is the host of these parasites (a high proportion of all adults), should not also be the subject of thyroid enlargement. Their belief is that the essential toxic factors are really the products of the bacteria associated with the amebae, and that these bacteria are the varients and the amebae the constants in many different infections in the mouth, tonsils and so forth.

Acting upon this hypothesis, they selected forty-one cases of cryptic tonsillitis with thyroid involvement for special study and treatment by emetin hydrochloride. Their conclusions touching the relations between tonsillar infection and goiter were that "inability to demonstrate endamebae in the thyroid gland renders improbable any direct causal relation of the amebic infestments of the tonsils *per se* upon the development of thyroid disturbances. However, the improvement, morphologically and symptomatically, in the treated cases leaves little doubt * * * as to an indirect relationship. A symbiosis of endamebae bacteria, leading to the elaboration and

absorption into the thyroid of selective thyrotoxic poisons, is at least conceivable in explanation of such relation."

One of the strongest supporters of the theory of infective interrelation between the tonsils and the thyroid is S. P. Beebe[9] of New York, who has from time to time put himself on record concerning it. He calls attention to numerous clinical observations on the relation of thyroid disease to previous infections. In this connection, it is well to remember that thyroid disturbances occur most frequently in persons of a thymo-lymphatic constitution, and it is these individuals who are most susceptible to infections. The terminal event in hyperthyroid patients is not infrequently an infection which has begun in the tonsil. A large percentage of patients with exophthalmic goiter have enlarged tonsils and adenoids. It is not uncommon to date the beginning of a thyroid enlargement from a particularly severe attack of tonsillar infection.

Infections in the nose and throat are undoubtedly the most common to which the human family is subjected, and the tonsil is one of the most important points of entry we have for infections, but in goiter the resultant conditions is a hyperactivity of a gland of internal secretion, and not a continued infection. It is obviously more difficult to explain such a result than to trace the connection between an acute tonsillitis and a septicemia, or an infected joint.

Infection does not in a large percentoge of cases produce such an enlargement of the thyroid gland that it would be recognized as a goiter, and it may be that the thyroid does not react in this manner except in those who are not quite normal in respect to the balance of their glands of normal secretion. If the thyroid secretion is an important element in the defense against infections, it is not impossible that it is stimulated to over-activity when occasion demands, and if the stimulus be ofted repeated it may lead to changes which we recognize as pathologic. Through the repeated stimulus to over-activity, the gland has become hypertrophied, and its heightened function continues long beyond the stimulus which originally calls it forth.

Clinically, there is an important relation between the infections in the nose and throat and hyperthyroidism. In patients between the ages of sixteen and twenty-four, from 35 to 40 per cent give a history of repeated attacks of acute tonsillitis and many have enlarged tonsils and adenoids. Rapid enlargements of the thyroid, with characteristic symptoms of over-activity, has often followed immediately after a particularly severe tonsillar infection. Such

patients bear these infections badly. Their convalescence is slow, and each attack is accompanied by severe prostrations quite out of proportion to the apparent severity of the infection. Dr. Beebe has observed that the leukocytosis in these cases is lower than that of non-goiterous patients, and that hyperthyroid patients often show a marked leukopenia with a relative lymphocytosis, indicating some influence on the blood picture operative when the organism is subjected to infection.

The tonsil infections to which exophthalmic patients are so often subject, constitute most dangerous and distressing complications, and the alert surgeon should always be on his guard against them. If there is active thyroid intoxication it is seldom wise to enucleate tonsils and adenoids, because such patients react badly to operations of any sort. The anoci-association methods so successfully employed by Crile in thyroidectomy, which Beebe described as "stealing the thyroid" ought always to be employed in all operative measures on cases of this type.

The writer has felt justified in quoting thus at length from Dr. Beebe's excellent paper, as the position he occupies is in most respects analogous to the writer's own, and the opinions brought out in the discussion which followed the presentation of the paper before the Laryngeal Section of the American Medical Association, so closely resembles those expressed by the recipients of the present writer's questionnaire. John F. Barnhill was emphatically of the opinion that the removal of diseased tonsils had no effect upon the progress of the goiter, or exerted any beneficial influence upon thyrotoxic symptoms. This was in 1914. In 1920, Dr. Barnhill made an address to this same section on *Surgery of the Thyroid*[10], in the course of which he said: "In the last six years I have made accurate notes as to the presence of diseased tonsils in all goiter cases. More than 90 per cent of all cases that I have examined have had clearly evident disease of the tonsils, and judging them from the most modern point of view as to what constitutes a diseased tonsil, I think all may rightly have been classed as having foci of infection in the tonsil. In more than 50 per cent of my cases of goiter in which operation was performed during this period, the tonsils were removed before the thyroidectomy, sometimes as long as a year previously, in the hope that the goiter operation might thus be avoided. It seems certainly true that after the thyroid is once diseased, the removal of the tonsils has little appreciable beneficial effect on the thyroid disease. Indeed, I have seen

the thyroid rapidly enlarge and the thyrotoxic symptoms increase after the performance of a most complete tonsillectomy. These observations, do not, however, form a good argument against the possibility that *the diseased tonsil may have been the original focus from which the thyroid received its infection.* Indeed, the frequent presence of infected tonsils in thyroid cases points almost certainly to a connection between the two diseases."

Approaching the question from the thyroid side, we have the assurance of Joseph C. Beck of Chicago[11], that he has frequently found the removal of one or both tonsils to be far more efficacious in preparing a patient for a thyroidectomy than ligation of the superior thyroid arteries which is "considered plausible procedure to cure a thyrotoxic disease, or arrest it so as to enable the surgeon to perform a more radical procedure, namely, thyroidectomy." He has also found "a fairly good number of thyroidectomized patients in whom the toxic condition recurred, to be much improved or completely cured by tonsillectomy." He believes that in all thyrotoxic cases it is better to proceed with a preliminary tonsillectomy, followed by the proper thyroidectomy than to reverse the procedure.

Another point of interest in connection with the thyroid and the laryngologist, is the early diagnosis of a thyrotoxic condition. The laryngologist is frequently the first to be consulted in reference to the headache and nervous phenomena, to differentiate between sinus disease, ocular conditions, and chronic focal infections particularly from tonsils.

Dr. Beck supported his contentions by reporting the following case:

Mrs. W., age 32 years, has had a somewhat small goiter for several years. As a child had many sore throats, then none for several years. Last winter had two severe attacks of tonsillitis, following which, the thyroid gland appeared to get somewhat larger. There appeared, also, all the classic symptoms of a thyrotoxic state without much exophthalmos. A competent internist counselled very strongly against major operation at this time. Under local anesthesia he removed her tonsils without any difficulty, either local or general. The thyroid gland receded in two weeks, and her general condition improved very rapidly after that. It is now three years and she has not had any recurrence of her thyrotoxic symptoms. Dr. Beck has had "a fair number of such cases with similar results."

Somewhat similar is a case recently reported by Greenberg[12] where a small goiter had been present for many years without other symptoms of hyperthyroidism. Following several attacks of "quinsy," typical thyrotoxic symptoms appeared, but were relieved by operation.

The purpose of this article, and of the investigation upon which it is based, is not so much to demonstrate a theorem, of the truth of which the writer is absolutely convinced, as it is to bring together the varying opinions and clinical observations of practitioners who have had occasion to deal with the subject from different angles, and in this way stimulate further study, research and discussion of what appears to him to be a highly interesting and significant situation. Beebe stated that his deductions were drawn from the history of approximately 3,500 patients who had thyrotoxicosis, and while it is quite possible for a practitioner to have a number of patients with thyroid disease who do not present infected tonsils or other apparent focal infection, he, nevertheless, felt that such infections are a very frequent accompaniment to thyroid disease, "constitutes an important factor in maintaining a condition which favors over-activity of the thyroid gland. One cannot see the effect of repeated infections in these patients without being impressed with their importance."

The writer would urge upon all nose and throat men the wisdom of making every routine examination include a careful scrutiny of the thyroid gland. While the consensus of opinion already cited seems to be that once thyroid disease is well established no amount of attention to tonsil conditions can bring about any improvement, we certainly have abundant evidence to show that a thyrotoxicosis in its initial stages may be retarded, or even completely aborted by the extirpation of infected tonsils.

The suggestion contained in Dr. Poynter's reply that he believed if a relation between the tonsils and thyroid is ever demonstrated, it will be through internal secretion, opens up a wide and fascinating field of investigation. The laborers in this field are more likely to be those who are approaching the question from the thyroid side, and upon them the writer would also like to urge the necessity of minutely considering the state of the tonsils of every goiter patient presented to them for the first time. Especially in those cases where a tonsillectomy has left a certain amount of tonsillar tissue in the throat, and the healed surface may still be mak-

ing infective pockets, it will be well to seek the cause of the thyroid disturbance in the tonsillar region.

It is in the hope of thus stimulating interest and—if need be—arousing criticism and opposition, which will result in a more widespread consideration of the entire subject, that the present effort to call attention to it has been made.

CONCLUSIONS.

The conclusions drawn by the author from the results of a canvass of practitioners, whom he believed to be in a position to give information regarding the possibility of a relation between goiter and tonsil infection were:

1. That comparatively little attention had been given to a consideration of this possibility.

2. That the majority believe goiter to be largely of toxic origin.

3. The tonsil is no more likely to be the focus of infection than any other location, e. g., sinuses, teeth, or gall bladder.

A survey of the scanty literature relating to this subject seems to indicate that those who have investigated the coincidence of goiter and infected tonsils, and have exhaustively considered their possible interrelation, incline to the belief that diseased tonsils may in many cases be directly responsible for goiter, both simple and exophthalmic.

It is urged upon the throat specialist that he give particular attention to the state of the thyroid gland in all cases of infected tonsils, and also upon those who are called upon to treat disordered thyroids, that they bear in mind the probability of an exciting factor in the presence of diseased tonsils.

NOTE: I have under observation at present ten cases, but have not been observing them sufficiently long in my estimation to incorporate a report of them in this paper.

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