PROGNOSIS AND TREATMENT OF TUBERCULOUS LARYNGITIS: AN ANALYSIS OF SIXTY-ONE CASES.*

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Until recent years, tuberculosis of the larynx has been classed along with tuberculosis of the bowels as the most unfavorable complication which can arise in the course of pulmonary tuberculosis. In fact, it has been and still is considered by most observers as fatal. The writer has heard many able laryngologists say that they never saw a case recover.

In face of such hopelessness, an optimistic contribution on the subject should be welcomed. Yet I am aware that doubt may arise in the minds of some of my hearers. Nevertheless, I shall not allow this to deter me from maintaing that tuberculosis of the larynx is not a hopeless condition, but one which has failed to yield to treatment because it has been diagnosed too late, and because when diagnosed, it has been treated wrongly.

My experience in the treatment of this condition, leads me to say that the prognosis in tuberculosis of the larynx is little, if any more grave than that of tuberculosis of the lungs.

The prognosis depends upon: First, the extent of the laryngeal lesion; second, the location of the lesion; third, the extent of the accompanying pulmonary condition, and fourth, the manner in which the condition is treated and the length of time such treatment is carried out. As in pulmonary tuberculosis, so here the extent of the lesion is very important. An early diagnosis offers greatly increased chances of cure.

Tuberculosis of the larynx always begins as an infiltration. In its earliest form it is not visible to the naked eye under ordinary conditions, but can be demonstrated by a tuberculin reaction. This early tuberculosis as recognized on inspection after a tuberculin reaction presents the same picture to the eye as the disease usually presents without tuberculin, after it has progressed a little farther. It appears as a slight hyperemia or congestion. The infiltration may remain as such; it may heal out, or it may extend, break down and form an ulcer. I have no doubt that many of these early infiltrations heal out, without having been recognized the same as they do in the lungs, leaving no recognizable symptoms or visible traces behind them.

These early infiltrations, which are none the less tuberculous, although they have not ulcerated, are rarely diagnosed as tuberculous. Many do not cause the patient to consult the laryngoiogist, and often when they are seen, they are treated as chronic catarrhal thickenings, until the patient becomes dissatisfied and stops treatment, or until the infiltration becomes more marked or an ulceration appears showing the true nature of the condition.

The experience of the laryngologist, however, has been almost exclusively confined to the treatment of far advanced conditions, either large infiltrations or more commonly ulcerations. These, while not hopeless, are very difficult to treat, and it is not surprising when we consider the disadvantages under which these cases have been handled and the measures that have been employed in their treatment, that they have shown so little encouragement to those who have attempted to treat them.

While the great majority of infiltrations can be apparently cured and even the severe ulcerations will yield to treatment in a fair proportion of cases, especially when the disease is in the early stage or in an inactive condition, when the pulmonary condition is far advanced and active, alleviation is all that can be hoped for, and the occasional healing that does take place is the exception.

During the two years between January 1, 1906, and January 1, 1908, in the Pottenger Sanatorium for Diseases of the Lungs and Throat, there were two hundred and eight patients who remained three months or more, and of these there were sixty-one, 29.3 per cent, who showed sufficient involvement of the larynx to cause symptoms, or to allow the diagnosis to be made upon laryngoscopic examination. This does not include many cases of slight infiltration revealed by local tuberculin reactions.

In order to illustrate the effect of the various factors mentioned above upon prognosis, I have arranged the following tables:

Table I shows the difference in prognosis according to the extent of the lesion. Whereas, 96 per cent of slight and moderately extensive infiltrations with ulcerations were apparently cured, only 16.67 per cent of the severe infiltrations with ulcerations were apparently cured.

TABLE I.

Showing difference in prognosis of tuberculous laryngitis according to the extent of the lesion.

Extent of Lesion.	No.	Appar'ly cured.		Arrested.		Improved.		Unimproved.	
		No.	%	No.	%	No.	%	No.	%
Slight and moderate infiltration	25	24	96	1	4				
Severe infiltration without ulceration ...	6	3	50			3	50		
Severe infiltration with ulceration	30	5	16.67	1	3.33	19	63.33	5	16.67

The prognosis also depends very much upon the location of the lesion. The portions of the larynx which are best supplied with lymph and blood, yield the most readily, because the protective bodies which are elaborated by the body cells can be applied more directly. Therefore, a lesion in the interarytenoid space yields much better than one involving the cords or the epiglottis.

The extent of the pulmonary lesions is of great prognostic importance. A slight or moderate infiltration will nearly always heal out in a patient in whom the disease has not seriously undermined the general constitution, while if the pulmonary condition is rapidly advancing and the general strength of the patient is failing, then more than an improve-

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ment on the part of the larynx must not be expected.

A severe infiltration or an ulceration offers a very fair prognosis in cases with slight pulmonary involvement, or in those cases with more extensive involvement, but where the disease is inactive and the general condition good; providing, in case of ulceration, the ulcer is so situated as not to cause dysphagia and interfere with nutrition. In many cases with advanced pulmonary trouble, the larynx will heal out although the lungs do not. In rapidly progressive pulmonary cases, the prognosis in laryngeal complications is bad and little can be hoped for through treatment, beyond the relief of the most pronounced symptoms.

TABLE II.
Showing difference in prognosis of tuberculous laryngitis according to the location of the lesion.

Location of Lesion.	No.	Appar'ly cured.		Arrested.		Improved.		Unimproved.	
		No.	%	No.	%	No.	%	No.	%
Interarytenoid space	10	10	100						
Int. space and arytenoids	13	13	100						
Int. space—aryt. and cords	22	6	27.27	1	4.55	14	63.18	1	4.55
Int. space—aryt. and ventricles	1	1	100						
Int. space—aryt. — cords and ventricles	8	1	12.5	1	12.5	5	62.5	1	12.5
Int. space—aryt. cords—ventricles and epiglottis	7	1	14.27			3	42.82	3	42.82

In my cases, the results classified according to stage and activity of the disease are shown in Table III:

TABLE III.
Showing the results obtained in laryngeal complications according to the pulmonary condition.

Stage.	No.	Appar'ly cured.		Arrested.		Improved.		Unimproved.	
		No.	%	No.	%	No.	%	No.	%
Slight and Moderate Infiltrations.									
1st									
2nd Inactive									
2nd Active	1	1	100						
3rd Inactive	14	14	100						
3rd Active	10	9	90	1	10				
Severe Infiltration Without Ulceration.									
1st									
2nd Inactive									
2nd Active									
3rd Inactive	2	1	50			1	50		
3rd Active	4	2	50			2	50		
Infiltration With Ulceration.									
1st									
2nd Inactive									
2nd Active									
3rd Inactive	4	2	50			2	50		
3rd Active	26	3	11.53	1	3.8	17	65.38	5	19.23
	61	32	52.45	2	3.27	22	36.03	5	8.1

We now come to the most important factor in prognosis—the manner in which the disease is treated. It must be borne in mind that tuberculosis of the larynx is perhaps always secondary; and, in nearly all instances, secondary to tuberculosis of the lungs; so it cannot be treated as a special entity, but must be treated along with the primary focus. No treatment of tuberculosis of the larynx can be considered that does not comprehend this broader idea.

I wish to offer a few suggestions regarding the diagnosis of tuberculosis of the larynx, for an early diagnosis of this condition is essential to successful treatment. Much of the failure on the part of the laryngologist is due to the fact that the disease has been treated only in its advanced stage of severe infiltration or ulceration.

Remembering that tuberculosis begins as an infiltration, and that this infiltration often exists for months without ulceration supervening, we should look upon all infiltrations of the larynx which do not yield to treatment after a reasonable time as suspicious. All such should call for a thorough skilful examination of the chest; and if it be found that a pulmonary lesion exists, then it is imperative that the exact nature of the laryngeal lesion be determined.

While I recognize very well that infiltrations occurring in the larynx during the course of pulmonary tuberculosis are not necessarily of a tuberculous nature, yet I also realize that these conditions are tuberculous more often than is generally believed, and I am positive that when they are present, it is imperative that a definite diagnosis be made.

Clinical experience shows that careful examination of the larynx of patients suffering from advanced pulmonary tuberculosis, reveals a lesion in about fifty per cent of cases; therefore, the seriousness of such infiltration is evident.

The skilled laryngologist who has the opportunity to examine the throats of many tuberculous patients will soon learn to make a diagnosis. For those who do not have this opportunity I would suggest the use of the tuberculin test. The larynx is an ideal location in which to observe the action of tuberculin. If the laryngeal lesion is tuberculous, a reaction will show after the tuberculin has been administered. When tuberculin is administered it causes a local reaction in tuberculous tissue, which can be detected before a general reaction with temperature appears. This manifests itself as a slight blush with a small dose, and may even appear as a slight congestion after a larger one. This usually appears from eight to twenty-four hours after a dose of old tuberculin has been administered, and passes off in from a few hours to a day or two thereafter. This diagnosis in laryngeal cases can usually be made with smaller doses than those commonly advised for making the tuberculin test. The usual method consists in administering 1, 2, 3, 5, 7, and 10 mgs., preferably at night, with one day intervening between the doses up to 5, and then about three days between 5 and 7, and 7 and 10. The larynx should be carefully examined at frequent intervals on the day following the injection. The larger doses will rarely be required. In fact, I have observed laryngeal reactions to follow minute doses of tubercle vaccines.

More important than the earliness of the diagnosis, the location of the lesion, and the character of the accompanying pulmonary condition, is the manner in which the lesion is treated. I wish at the beginning of this discussion to emphasize the fact that tuberculosis of the larynx cannot be cured

by local applications. Local applications may help to keep the parts clean and to relieve cough and pain, but we cannot conceive of them directly and favorably influencing the healing of the lesion, except as they cause a hyperaemia, thus facilitating the direct application of the curative agents found in the blood and lymph to the focus of disease.

Tuberculosis is an infectious disease. Its cure is brought about by the establishment of immunity. The body cells, stimulated by the toxins elaborated by the tubercle bacillus, are put upon the defensive and respond by the formation of protective substances, which neutralize the toxins and destroy the bacilli. In this manner, and this alone, is a cure brought about. It matters not where the lesion is located, whether in the lungs, the larynx, the glands, the kidneys, or the bones, the disease has the same cause and same pathology, and its cure is established in the same manner.

The general treatment of tuberculosis of the larynx, then, is the same as that of tuberculosis elsewhere, and only differs in as far as those symptoms which arise from the particular location of the lesions are concerned. There are three factors in the cure of tuberculosis:

First, the ability of the cells to respond and form protective substances;

Second, the stimulant which excites the cells to form protective substances; and,

Third, application of the protective substances to the focus of infection.

These principles apply just the same to tuberculosis of the larynx as they do to tuberculosis elsewhere.

The body cells must be kept healthy in order to be able to furnish the best response. Therefore, such measures as open air, carefully regulated rest and exercise, proper food, hydrotherapy, climatic change, and suitable tonics must be carefully employed.

The stimulant which naturally excites the cells to formation of protective substances, is furnished by toxins which are given off from the tubercle bacillus at the seat of infection. For some reason, in tuberculosis, this stimulant often fails, just why we do not exactly know; but it has been found that the toxins made from the tubercle bacillus (tubercle bacillus vaccines) can be introduced artificially into the body and produce the necessary stimulation. Since this stimulation is necessary in order to cause the cells to respond, the employment of specific vaccines becomes a very important part of treatment.

I wish to emphasize what must now be clear to all: that in the employment of vaccines, no new toxin is being employed; use is simply being made of the one which nature uses and without which the cells will fail to be stimulated to the production of anti-bodies.

The method of employing tuberculin and other specific vaccines in tuberculosis of the larynx is very simple. The initial dose should be small. The day following, the larynx should be examined. If there is no reaction (which shows as a slight hyperemia or congestion, according to its severity) present, then, that day or the next a larger dose may be given. This should be increased until a local reaction occurs. Then another dose should not be given until all signs of reaction have disappeared; neither should the quantity of vaccine be increased until the last dose has failed to produce a reaction. Given in this way, the dosage is absolutely under the control of the physician. Personally, I have learned more of the use and local action of tuberculin and have had my faith in its curative powers strengthened more by watching its effects in the larynx than by any other phenomenon associated with its administration.

The third factor is the application of the protective bodies, when formed, to the seat of the infection. In tuberculosis the areas of the disease are peculiarly shut off from the circulation, the foci being surrounded by a stagnation of the body fluids. Careful studies have shown that the fluids which are in contact with these foci are very poor in protective substances, owing to the fact that the fluids change so slowly that the antibodies are all used up in combating the infection. It is essential then, if possible, to hasten the circulation through the diseased parts and increase the amount of blood in them, and this can be done by such measures as the application of the sun's rays after the plan of Sorgo, whereby the patient treats his own throat by using a laryngeal mirror and focusing the sunlight, reflected by a mirror, upon the larynx; or by direct application of blue light taken from the sun's rays and reflected from large mirrors upon the larynx externally. In this connection, I would like to call attention to the hyperemia in tuberculous areas caused by the local tuberculin reaction. The value of this hyperemia produced by tuberculin has not been fully appreciated. Theoretically, such a line of treatment is an ideal one and should result in a cure in all instances, but there are many difficulties to overcome, the principal ones of which, as I see them, are:

First, the cutting off of the blood supply and the tendency to necrosis on the part of the tuberculous tissue; and,

Second, the stagnation of the body fluids in the neighborhood of the tubercles. These prevent the direct and complete application of the curative substances to the seat of infection and cause the cure to be produced at a great disadvantage.

Aside from the above curative measures there are others of value, such as rest and cleanliness. Local applications will not cure the disease, but they will relieve distressing symptoms, and in this manner give comfort. They should not be severe in their action. With my conception of the pathology and therapy of this affection, I can see no place for the employment of such remedies as lactic acid, and in practice I have never found them necessary. Bland applications, such as protargol, 5-10%; and argyrol, 10-25%, have given me good service.

I wish also to mention operative procedures, that I may protest against their employment. They were originally suggested because it was thought that the knife would remove the focus of the disease; but with greater knowledge of tuberculosis we know that this is impossible; the result of operation has proven anything but satisfactory. Following operation, the wound often heals, but in a very short time it breaks out anew and the patient is really worse off than before, because he has lost tissue and at the same time gained nothing. It is always a dangerous procedure to operate in tuberculous tissue, for the cut ends of the blood vessels are opened and stand ready recipients of bacilli to carry them to new tissue.

If it is the physicians' purpose to attempt to cure tuberculous laryngitis, I can conceive of operative procedures being called for only in the rarest of instances. If, on the other hand, the purpose is simply to palliate or temporize, then I can see how operation might relieve a severe dysphagia and make the patient more comfortable for a time, until ulceration occurs again, which is usually in a short time.

When ulceration has occurred the parts should be kept clean, and, if pain is present, dusting the part with orthoform will often give relief. When cough is severe I add 1-6 gr. of heroin to the orthoform, before dusting it into the larynx. Cold compresses to the throat at night help to relieve cough, thus serving a good purpose.

This simple treatment of tuberculous laryngitis has proven to be very satisfactory. There are other important factors which contribute to its success. First, the laryngeal infection is treated only as an incident connected with the pulmonary lesion; consequently, all the rational measures which aid in the cure of the latter are employed. The second important factor is time. When the patient is being treated for pulmonary tuberculosis he expects to devote from four or five months to one or more years to it, according to the severity of the case, and, consequently, this prolonged treatment affords the laryngeal lesion an opportunity to heal.

In Table IV I have classified my cases according to the result obtained and time of treatment.

TABLE IV.

Showing average length of treatment according to result obtained.

Results.	No. cases.	Average time in months.
Apparent cure	32	10 2-3
Arrested	2	9 1-2
*Improved	22	7
Unimproved	5	3 2-5

* Four of these were treated from three to five months.

In treating these cases in the manner in which it is usually done by the laryngologist, i. e., as a separate disease, I can see no bright future for tuberculous lesions of the larynx; but, by regarding them as a part of a tuberculous lesion elsewhere and treating them as such, offers an opportunity for classifying tuberculous laryngitis as one of the most curable lesions.

From my study and experience in the treatment of tuberculous laryngitis, I offer the following conclusions:

First, when tuberculosis of the larynx is diagnosed early the prognosis is about the same as tuberculosis of the lung when diagnosed early;

Second, chronic thickening in the larynx always calls for a careful expert examination of the lungs, to determine the presence or absence of pulmonary tuberculosis, and if the latter is found to be present, the evidence is strongly in favor of the tuberculous nature of the laryngeal lesion;

Third, local applications will not cure tuberculosis of the larynx. The cure comes through the patient's body fluids.

Fourth, tuberculosis of the larynx is not a separate disease, but a complication, and a rational treatment consists in the treatment of it as a part of a tuberculous process elsewhere, usually of the lungs;

Fifth, tuberculin and the other tubercle vaccines, intelligently administered, are of inestimable value in establishing immunity and bringing about a cure in tuberculous laryngitis.

DISCUSSION.

Dr. W. H. Roberts, Pasadena: This is a very comprehensive paper, as you will see when you read it in full. The salient feature of the paper is that it holds out hope to an apparently hopeless class of patients. I say hopeless because tubercular laryngitis is regarded by laryngologists as almost incurable, and it is for the reason that Dr. Pottenger has stated, that the laryngologist sees them only in the advanced stages, when little or nothing can be done. It is really the general practitioner who should make the early diagnosis in lesions of the larynx as in the lungs. Dr. Pottenger has struck the keynote when he says that tuberculous laryngitis is a part of the tubercular process and we can not cure it in itself without directing attention toward the underlying tuberculosis of the lungs. The doctor has arranged these tables in a very comprehensive and satisfactory manner, and in studying them you will see that a great deal can be done in the early cases, but comparatively little in the late cases. He treats them not as a laryngologist, but as a general practitioner, with tuberculin. There is no better place to observe the reaction of tuberculin than in the larynx, and in his paper he states what has been done and shows how beautifully the reaction takes place. If there is one thing more than another upon which emphasis should be laid in tubercular laryngitis it is in making an early diagnosis, and in applying early treatment, constitutional and local. The only thing we need do locally is to keep the ulcerated area clean, and relieve dysphagia. I think Dr. Pottenger's results are remarkable, in that through the constitutional treatment, by the use of tuberculin hypodermically, he is able to produce such results. It is very seldom that the laryngologist can cure laryngitis of a tubercular nature. I have seen two cases apparently cured, but the patients ultimately succumbed to tuberculosis. But here with early constitutional treatment there is still hope for these patients, and as Pottenger says, the condition is as curable as if in the lungs and the condition in the lungs is the lesion which we must strive to cure.

Dr. C. F. Welty, San Francisco: I hardly know how to get at the subject, having such a few minutes at my disposal. It is so important, and I believe in some of these things very thoroughly, for I have practiced and I have seen practical results from them. You must not too severely criticize my classification of these cases, but I divide them into two

divisions, the active and the passive. By the active I mean where they are running a temperature, losing weight and suffering from malnutrition. Then the passive are those cases not running a temperature, not losing weight and are rather quiescent. These I divide into two classes, the quiet, where they have tubercular lesions of the larynx but they are not running a temperature. They are apparently in good condition. These are the cases I single out for operation, and I operate these cases in the hope of curing them of laryngeal tuberculosis, and I have seen it cured, and I have done it myself. I will follow that up by the statement that I have seen these things cured without operation as well. Then we have the active forms of this passive group. I mean edema of the glottis, ulceration of the true and false vocal cords. They demand operation because of the fact that they can not swallow, can not eat, because of the pain it brings, and can not sleep becuse they cough so much. Yet you take that tissue away and they will eat and sleep comfortably, and I have seen them gain five pounds a week in weight after such an operation. They are not the cases we hope to cure, but you are going to make that patient better for some time to come and make his remaining days comfortable, at least.

In regard to tuberculin, of course I have had only a few of these cases. In one case treated that way by Mr. Smith the reaction was so intense after a very small dose that the patient went on from bad to worse and finally died, and she attributed her bad condition to the tuberculin, which was a mistake, as she was far advanced. I never intended to cure her, simply to make her better. But in that case it was bad for that patient. The previous week she had gained five pounds and seriously thought she was going to get well. I must insist that the pain will keep them from eating and if you can get rid of that they will eat plenty and gain four or five pounds a week.

Dr. K. Pischel, San Francisco: Dr. Pottenger no doubt in his full paper mentions the local treatment, and I just want to point out that while I thoroughly believe with Dr. Pottenger that the general treatment is of the greatest importance, I would not like to miss the local treatment, because I think we can do something for these patients, and that tuberculous laryngitis can be cured while the tuberculous lung is still there, as has been pointed out by Morrizz Schmidt, of Frankfort, fifteen or twenty years ago. He is a reliable observer. For those poor fellows who can not be cured, who have extensive ulcers in the larynx, who can not swallow, we must try to do something. In many cases they are beyond operation, and those cases get considerable relief from injecting emulsion of anesthesin and menthol, or orthoform. Nothing, I think, acts better in my hands. It is really a pleasure to see such a poor fellow eat his meal for the first time with ease.

Dr. W. S. Fowler, Bakersfield: Orthoform, I believe, was first mentioned by some physician on the Hudson. I think it has been very generally used with success, with relief from the painful symptoms. The emulsion is made with the yolk of egg.

Dr. K. Pischel: It is made in different ways. Freudenthal makes an egg emulsion. But I have noticed it gets stale. It must be made very carefully with gum tragacanth and gum arabic, and if it is done very carefully it remains good for weeks and weeks. The druggist has to take extreme care in making the preparation properly.

Dr. Hill Hastings, Los Angeles: It seems to me the question of the cure of tuberculous laryngitis and the results depend on our diagnosis of the trouble. That is to say, a man will diagnose one thing as a catarrhal laryngitis occurring in a tubercular patient, which we all must admit is quite frequent. Another man will say that a laryngitis with more or less infiltration is a tuberculous process. The man that says it is a tubercular process will get a good rate of cure. Those who say it is a simple laryngitis and only class as tuberculous cases of infiltration and ulceration will have a high mortality. The mortality that Dr. Pottenger gives is certainly wonderfully small, and it simply means that laryngologists all over the country are failing to diagnose tuberculous laryngitis if Dr. Pottenger is right. There is not in the statistics I have been able to find anything like as wonderful figures in the cure of tuberculous laryngitis as shown here by Dr. Pottenger. Personally, I have brought case records of fifty-seven cases. I do not mean that I have treated them. I have neither treated them locally nor generally over a sufficient length of time. I have operated on none of them, and I have not given tuberculin, so that therapeutically they have no value. I have simply observed the cases for the last four or five years to note their progress. In these fifty-seven cases that I have been able to follow over a considerable period, with distinct infiltration seen on examination, with the symptoms and signs of tenderness on pressure over the cricoid, only one recovered. This patient was cured without tuberculin. I had nothing to do with the cure. There was left an ill-shaped larynx. The arytenoids and folds were thickened and healed, the white showing scar tissue. The cord, as you will see, was markedly thickened, and the right cord is somewhat thickened, the white showing also. It healed itself. The man went up to a weight of 225 pounds and was cured simply by good food and fresh air. I saw him over two years. This is a typical case that did heal, and I know it is possible for a great many of them to heal, but I do not see how we can expect so wonderful a rate of cure as Dr. Pottenger gives until we are able to diagnose them as accurately as he has.

Here is another case with closing after it, which I meet quite a good deal in my practice, a case with both vocal cords somewhat thickened and reddish, and healing after five months. This case, I believe, is not tubercular laryngitis. If you put that kind of cases down as tubercular you are going to get a big rate of cure, but the average laryngologist does not consider every kind of case where you simply find a catarrhal thickening and irritation of the cords a tubercular laryngitis. If Dr. Pottenger does, on what does he base his diagnosis? You take these cases with tubercular lungs which cough up a great deal of sputum. It is an irritant not only to the larynx but the trachea and bronchi as well, and you will find them in the same condition as the larynx. It is natural to suppose that this irritating substance will cause these catarrhal conditions. Whether we are right in saying it is tubercular or not, I have doubts, and am of the opinion that it is a catarrhal condition produced by the irritation of the sputum. I should like to know by what means we are able to diagnose such cases as tubercular laryngitis, otherwise I am rather inclined to doubt whether they are tubercular laryngitis.

(Dr. Hastings used photographs or cuts to illustrate the cases he referred to.)

Dr. E. W. Fleming, Los Angeles: I did not hear Dr. Pottenger's paper, but I presume he took in tuberculosis of the ear.

Dr. W. H. Roberts: He took in just the larynx.

Dr. Fleming: I desire very much to report a case of tuberculosis of the mastoid, and as I wish it to appear in the transactions of the Society, would it be proper for me to read a report of the case?

Chairman W. H. Roberts: I think it would be, inasmuch as the original subject included the ear.

Dr. Fleming: This case is reported because some of its characteristics are sufficiently unusual to be of noteworthy interest.

Mr. A. T. B., aged 30, consulted me December

10th, 1907, on account of a sensitive and rather large swelling behind the right auricle over the mastoid region. On inquiry he stated that the left submental gland softened and discharged spontaneously three years ago. Operated upon for enlarged cervical gland in 1906 and for tuberculous abscess of liver, June, 1907. No history of previous ear trouble. Family history negative. Patient nervous, thin but not emaciated. Pulse, 120. Temperature, 99° to 100°. No cough or expectoration. The mediastinal glands which were reported to be enlarged in 1907 were found to be enlarged by Dr. Pottenger at this time, who also furnished me with the salient points in the patient's history and present general condition. No ear discharge, drum-heads intact and hearing good. December 14th, under infiltration anesthesia, Dr. Hastings and Dr. Bullard assisting, the mastoid region was freely exposed. The cortex was found to be perforated, through which issued pus. Further investigation revealed extensive carious destruction of the greater part of the mastoid process, without involving the antrum. Most of the mastoid cells external to the antrum were replaced by a mass of tuberculous tissue, while the greater portion of the outer wall of the vertical part of the sigmoid groove was about to separate as a sequestrum. Upon exposing the lateral sinus wall, it was found greatly thickened, very firm and to all appearances in a state of fibrous hyperplasia. As apparently healthy bone was reached without going as deep as the antrum, it was thought best not to expose it, there being no physical evidence or history of an involvement of the middle ear. The antrum not being exposed, the operation fell short of being a typical mastoid operation, although the object sought to be accomplished was the removal of all available foci of disease. Twenty days after the operation the mastoid cavity was completely healed and covered with healthy skin. He then went to the Pottenger Sanatorium at Monrovia, and concerning his treatment there Dr. Pottenger can best tell you. Suffice for me to say that he returned to Tucson about January 25th, 1908, his general condition improved in all respects—apparently well of his tuberculous mastoid. March 5th he returned for further treatment. Examination of the mastoid region at this time revealed beginning softening and breaking down of the scar tissue, associated with a sinus extending from lower end of former vertical incision two inches down the neck. March 9th, the mastoid cavity was again opened, infiltration anesthesia being used as before, and cleared of a mass of tuberculous looking tissue, only to reveal a still further advance of the disease by the involvement of the bone posterior to the sigmoid groove over the posterior fossa, and superiorly carious bone in the form of a large sequestrum resting over the middle fossa. The patient complained at no time of severe pain during the operation, which necessitated the laying bare of the posterior and middle dura adjacent to the mastoid region in order to get well beyond the apparent limit of the softened diseased bone. The mastoid wound up to April 1st, was dressed with balsam of Peru and appeared to be acting favorably, when it was noted that the tubercular process was again active, this time involving the under surface of the bony meatus. A large section of the wound was again opened, the carious bone removed by a Rongeur forceps, and also a mass of unhealthy granulations by curettement. Since the case first came under observation, which was last December, he has, I believe, with the exception of about six weeks, been treated by tuberculin injections by Dr. Pottenger. It should be stated that the involvement of the lungs is not clearly defined. Since April 9th, X-ray exposures in charge of Dr. Soiland has been added to the possible helpful measures to combat the ravages of the disease. At the present time the local condition has the outward appearance of healthy healing. His general condition has also materially improved, having gained four pounds in the last two weeks, yet I am, having in view his previous history, inclined to think the prognosis for ultimate recovery is gloomy.

Dr. F. M. Pottenger: I think I have covered some of the points made by Dr. Hastings. In the first place we know that about 80 or 90 per cent of the human family, perhaps, have tuberculosis lesions. Post mortems show tuberculous laryngitis in the neighborhood of 75 per cent of cases—according to different observers from 35 to 75 per cent. I believe that where tuberculin is used over 50 per cent will show laryngeal involvement. In regard to the cases that I have reported here, not a single one of them has not shown the tuberculin reaction in the larynx. It is as simple as can be to make the diagnosis. If you have thickening give them a dose of tuberculin and the reaction is readily seen and you cannot be mistaken about it. There is no place where a man can learn so much about the use of tuberculin and about the cure of tuberculosis as by observing the local reaction in the larynx.

I was asked to say a few words about the treatment. My method has always been to first find the proper dosage of tuberculin, beginning with a very small dose that will cause a slight reaction. I observe the larynx daily and do not give another injection until the reaction disappears, and do not increase the dose until it ceases to give a reaction. You have it under your control and you can watch the result. The diagnosis in the cases reported here to-day have all been made in that way. I will say we do have cases of catarrhal thickening due to coughing, but where you do have a chronic thickening in the larynx the diagnosis must be made positive. It is demanded that you know positively. I do not doubt that many cases of tubercular inflammation get well. We know they do. We find them, post mortem. We find cases of ulceration that get well without treatment at all. The cure is difficult, and yet it is simple. It is simply the production in the blood and the application of the antibodies to the cure of the disease. If you have a slight involvement, and the nutrition improves the general condition improves, why shouldn't it heal? It does in the lungs, it does in the glands, and why not in the larynx? We find it does. We have been too conservative, I am sure, in the treatment of tuberculous laryngitis. Over three years ago I read a paper before the National Association on the subject, and when I said the prognosis was the same as for tuberculosis in the lung I saw a great many heads shaken in opposition. Last year I made the same statement, and the men shook their heads the other way. When I made the rounds of the sanitaria of Europe I found that the prognosis was good or bad according to whether or not they were using tuberculin. Those using it cured them. Those not using it said they did not take them. It is along scientific lines as understood at present, and when you are using tuberculin in the treatment of tuberculosis you are increasing the antibodies, when using it right. Regarding the case of Dr. Welty, I do not doubt that much harm has been done by the use of tuberculin and will continue to be done; but that is nothing against the remedy if used correctly. You have the whole picture immediately under your view. There is no reason for making a mistake. you can not do harm if you watch carefully and give doses accordingly, because you increase it so gently. If I give a dose to-day and produce a slight reaction I do not increase it until it ceases to produce a reaction. You can not do harm. In regard to operation, it depends on what you are going to do. If you are going to cure the larynx I do not believe we should operate. If you are going to palliate, make the patient more comfortable, I believe it will sometimes do it. I have never yet had to operate. By constant care and watchfulness it has not been necessary.