

CHAPPELL (W. F.)

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The Treatment of Laryngeal
Tuberculosis by the Appli-
cation and Submucous
Injection of Creosote.

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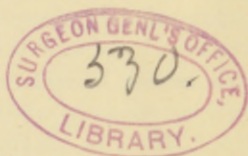
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LARYNGEAL TUBERCULOSIS

BY THE APPLICATION AND SUBMUCOUS
INJECTION OF CREOSOTE

DESCRIPTION OF AN AUTOMATIC LARYNGEAL SYRINGE
FOR MAKING SUBMUCOUS INJECTIONS

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THE
TREATMENT OF LARYNGEAL TUBERCULOSIS
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APPLICATION AND SUBMUCOUS INJECTION OF CREOSOTE.
DESCRIPTION OF AN AUTOMATIC LARYNGEAL SYRINGE
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THE success attained in the treatment of tubercular deposits of joints, glands, and other tissues stimulates the belief that were it possible to subject tubercular disease of the larynx to the same effective methods, equally favorable results might be obtained. The history of the treatment of laryngeal tuberculosis has, however, been of a most discouraging character. Morell Mackenzie, speaking on this disease, said he considered it practically incurable. At present the general feeling is that a more favorable prognosis may be given, and by a judicious selection of treatment the distressing symptoms may be considerably relieved and in some cases a cure effected. The most satisfactory results in this direction have recently been claimed from the use of strong solutions of lactic acid and curetting the laryngeal mucous membrane. It has not been my good fortune to obtain the marked improvement

* Read before the Section in Laryngology of the New York Academy of Medicine, February 27, 1895.

from this line of treatment which has been reported by a few observers. I think it is not unlikely that further experience may prove that, in view of the possibility of a general reinfection following the use of the curette, it should be reserved for the ulcerative stages of tubercular laryngitis.

Creosote administered internally has probably proved more satisfactory than any other single drug for the treatment of pulmonary tuberculosis, its beneficial action being largely due to the presence of the creosote in the respiratory channels through which it is for the most part eliminated. The astringent, sedative, and antiseptic action of the creosote lessens cough and expectoration, and, according to some authorities, diminishes the number of tubercle bacilli. Although the improvement from creosote is conceded to be chiefly the result of its local action, treatment of tubercular disease of the larynx by the application of creosote has not received much attention, only a few observers having suggested it as an adjunct to internal administration. I have been unable to find any reports of creosote being given by submucous injection for its local action in laryngeal tuberculosis. I wish to bring before the Section this evening some patients who have received the creosote treatment by internal administration, topical application, and submucous injection. There is no pretense that the results from its use excel other methods of treatment, but I think an examination of the patients will lead us to agree that the combined uses of creosote give greater benefit than its internal administration alone, and, furthermore, that it compares favorably with any of the present methods of treatment.

Alcoholic and aqueous solutions of creosote are unsatisfactory, as they do not combine readily, nor do they diminish the irritating and pungent qualities of the creosote. Oily solutions are much to be preferred, as they greatly

modify the unpleasant character of the creosote and, owing to their tenacious properties, cling to surfaces and spread a thin film over them which is not readily dislodged. By this means creosote may be kept in contact with mucous membranes for a considerable period and given ample opportunity to permeate the subjacent tissues to a variable extent. Castor oil is especially serviceable on account of its thick, viscid, and tenacious properties. It is also the most satisfactory solvent of creosote. The preparation of this solution requires considerable care, and a combination which may be generally employed consists of—

℞ Creosot. (beechwood),	}āā	℥ ij;
Olei. gaultheriæ,	}		
Olei. hydrocarbon.....			℥ j;
Olei. ricini.....			℥ iij. M.

The wintergreen and castor oil should first be mixed together, then the hydrocarbon oil added, and lastly the creosote. Sterilizing the solution by dry heat gives it a much clearer appearance. Mr. Hutchinson, of the drug department of the Manhattan Eye and Ear Hospital, has also made me a solution containing one drachm of creosote to the ounce; but he informs me that it does not combine in any other than these two proportions with these oils. This oily solution of creosote is clear, very fluid and non-irritating, of pleasant odor and taste, and may be used as a spray, or applied by the laryngeal applicator or as a submucous injection. Topical application alone may be relied on for the successful relief of the symptoms of primary tubercular deposits with infiltration and hypertrophy of the mucous membrane, provided the temperature is not high and the general condition is good. If, on the other hand, the evening temperature is high and the case seemingly progressing to active ulceration, a few submucous injections should be used as adjuncts to local treatment. The cough,

laryngeal soreness, and moderate dysphagia of primary cases are quickly relieved by sprays of creosote, but resolution of their infiltrations and hypertrophies is not so rapid. In several of my patients the laryngeal distress was relieved after a few applications, but the infiltration continued for months.

Methods of applying Creosote Solutions Locally.—The interior of the larynx should be thoroughly cleansed before any treatment is undertaken. Applications may be made by means of down sprays, the laryngeal syringe, or by absorbent cotton on an applicator. The latter is not a favorite method with the writer, as it occasionally produces an undesirable amount of coughing. An eight- or a ten-per-cent. solution of cocaine saccharinate is carefully applied to the larynx, this preparation being preferable, in my opinion, to the muriate, as it does not produce so much gagging. After the cocaine has had time to produce moderate anæsthesia, a spray of creosote (two drachms to the ounce) is used. After the spray the pyriform sinuses may be filled with creosote solution, and also some of it allowed to drop into the trachea through the opening of a gum-elastic tip which is drawn over the cannula of the automatic syringe described later. This keeps the laryngeal surfaces bathed in creosote for a considerable period, and the patient should, if possible, be kept perfectly quiet and not allowed to talk or swallow for half an hour afterward. The stronger solution of creosote may be used every third or fourth day and the weaker ones every day or so, depending entirely on the amount of stimulation it produces. I have seen the laryngeal membrane become very red and considerably swollen from too frequent applications. In the ulcerative stages of laryngeal tuberculosis, sprays of a drachm of creosote to the ounce can be used daily with advantage; but if there is no ulcerative process a personal experience

of each case must decide the frequency of the applications. A slight burning sensation follows the applications of creosote solutions, but it only lasts a few minutes. The disagreeable taste is pretty effectually covered by the winter-green oil.

In tubercular laryngitis with ulcerations, both topical applications and submucous injection should be employed. They hasten the separation of sloughing tissue, stimulate healthy granulation, and at the same time arrest progressive ulceration. The injection should be as superficial as possible, as the primary tubercular deposit is immediately beneath the epithelial layer. Weak solutions of cocaine may be sufficient in some cases, but complete anæsthesia is usually necessary, and I have found twenty-per-cent. solutions to be the most satisfactory. They should be administered on an applicator, although it might be safe to employ the spray if the physician was well acquainted with his patient.

Method of making the Submucous Injection.—A long needle with a laryngeal curve can be used with any hypodermic syringe; but there are some drawbacks to this, as the movement of the hand in pushing down the piston is apt to make the patient gag, and conceals from view the point we wish to inject.

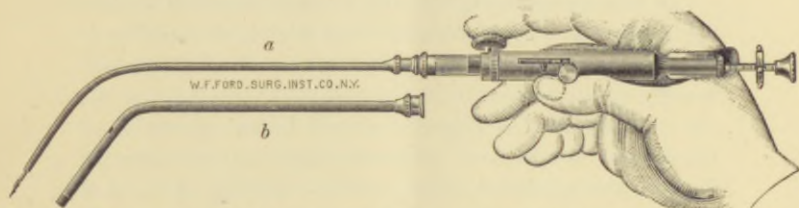
To obviate this I have had an automatic syringe made, as shown in the cut, which allows the operator to disengage the piston with his thumb and still keep the point of the syringe in view in the mirror.

The shank of the needle is a hollow tube about six inches long, which may be given suitable curves for laryngeal work. The needle is about half an inch in length, and corresponds to the large-sized hypodermic needle, with the opening close to the point.

The depth to which we desire to introduce the needle

is regulated by a small piece of solid rubber ligature which is drawn over the needle and may be shortened or lengthened accordingly.

The rubber casing on the needle makes it easy and safe to employ pressure, and, owing to its suction, the rubber



a, Laryngeal needle for submucous injection. *b*, Laryngeal cannula, with gum-elastic tip and cover, for injections into the larynx and trachea.

clings to the mucous membrane and prevents the creosote solution from welling up around the needle after the injection. The barrel of the syringe is partly glass and partly metal; the latter contains a spiral spring which is attached to the piston, and a longitudinal opening on the side of the barrel is notched to receive the catch of the spring. The piston goes the entire length of the syringe, and is graduated and furnished with a set screw to regulate the number of drops injected. The solution for injection may be warmed or not. The glass barrel should be filled and the piston catch pushed into the top notch of the metal barrel. The laryngeal needle, being already sterilized, is screwed on to the syringe and the piston dropped to the second notch of the barrel, thus filling the needle. After regulating the set screw for one drop (which is the amount usually employed), the syringe is ready for use. It should be passed into the larynx with the right hand, under the guidance of the laryngeal mirror held in the left. The point selected for the injection will of course depend

on the situation of the tubercular deposit, and with a little experience any part of the larynx can be reached without much difficulty. When the point of the needle has punctured the mucous membrane, the catch of the spring is dislodged with the thumb, without changing the position of the hand, and the piston springs down as far as the set screw and makes the injection. If possible, the needle should be held in position for a few moments. Little pain or reaction follows the injection of oily solutions, but pure creosote causes a burning sensation and considerable soreness, which lasts a variable time. Much depends on the locality of the injection; the posterior surface of the arytenoids seems to be specially sensitive. There is little or no hæmorrhage after the needle is removed, and the following day the mucous membrane is more tense and possibly somewhat redder. This condition subsides in the course of a few days, leaving the tissues in a wrinkled condition, as though the mucous membrane was too large for the subjacent parts. This is most noticeable around the arytenoids. Careful judgment is required to determine how often the injections should be made, but as a rule it can be done once in five or six days. If ulceration is proceeding rapidly, one injection may be given daily until three or four have been administered. This number would usually include the amount of tissue involved and promote its more rapid resolution and stimulate granulation. After several injections, it is well to wait for a time and see if the circle of resolution will not spread from the point of injection to the neighboring tissues.

The experience obtained from the comparatively few cases I have seen is, of course, not sufficient to allow of definite rules being made for the position of injections. It would seem, however, that some remarks about injections in different locations might be made.

The ventricular bands usually require superficial and deep injections, the former to reach the deposits in the bands, and the latter the ventricles of the larynx. The interarytænoid space should be treated from below upward, otherwise it would be impossible to obtain a good view after the first injection. Very superficial puncture should be made in the mucous membrane covering the arytaenoids, as it is an easy matter to start a perichondritis in this situation. A row of injections should first be placed around the base of the arytaenoid cartilages and gradually approach their tips. Tubercular infiltration of the epiglottis renders it so thick and firm that it is capable of bearing considerable pressure and is readily subjected to this treatment. A single row of injections may be made around the free border of the epiglottis about half an inch apart. The lingual surface of the epiglottis is very accessible for injection, but the laryngeal surface is not so easily reached. If the anæsthesia is complete the epiglottis may in some cases be pulled forward sufficiently by the shank of the needle for the injections to be made. If this can not be effected, the needle may be pushed through the cartilage from its lingual surface.

A little experience will enable the operator to judge the thickness of the epiglottis, and the length of the needle we desire to use can be regulated by the rubber tubing, as already described. After the injections the larynx should be kept as clean as possible, and sprayed every day or so with the weaker solution of creosote.

In primary cases of laryngeal tuberculosis it is not necessary to keep the patient in bed; but in the ulcerative stage, with high temperature and general muscular weakness, it is better to have him remain in bed and under observation for twenty-four hours. In Case III an injection into the vocal cord produced considerable cough, and em-

barrassed the respiration to a slight degree for a few hours. Just why this happened I am unable to state, as many other injections in the cords of the same patient did not produce any similar results; neither has it happened in any other case.

The histories of the following patients demonstrate some of the benefits which may be expected from the combined creosote treatment, and I am pleased to be able to show five of the patients to the section this evening:

CASE I.—F. H., aged twenty-three years, came to the hospital, July 23, 1894, complaining of difficult articulation owing to a stiff, painful sensation in the larynx and also considerable dysphagia. His family history was an unsatisfactory one, as his father died, aged forty-nine years, from pulmonary tuberculosis, and also three brothers, aged sixteen, twenty-eight, and thirty-one, respectively. The cause of their death was some throat affection the nature of which is uncertain, but from the histories was probably tuberculosis. His general condition was much impaired, and his appearance very anæmic. Afternoon temperature, 100.8° F.; pulse, 120. Considerable distress was experienced from severe night sweats and coughing. On examination, the upper parts of both lungs gave abundant evidence of tubercular infection in various stages of progress. The soft palate was very anæmic, and the laryngeal surface and tip of the epiglottis much thickened and rounded and very red in appearance. The coverings of the arytaenoid cartilages were red, puffy, and of an œdematous, club-shaped appearance. Examination of sputa showed numerous tubercle bacilli.

Beechwood creosote was prescribed, and the larynx sprayed with an oily solution containing two drachms of creosote to the ounce. He visited the hospital three times a week, the internal dose of creosote being gradually increased and the spray continued. The laryngeal distress moderated considerably after the sixth application of creosote. Marked improvement was not apparent until the latter part of September, when the red and thickened appearance in the larynx diminished greatly and the

dysphonia and dysphagia had about disappeared. The chest symptoms had not improved, and on the 21st of September the temperature was 103.2° F., and on the 25th it had fallen to 101.2° . Thirty-six drops of creosote had been taken daily for a period of two weeks past. On his next visit, October 2d, his appearance and general condition had much improved. Temperature, 100.2° F. This satisfactory improvement continued, and on October 19th he reported a gain in weight of four pounds in three weeks. Temperature was 99° F., and the cough, night sweats, and laryngeal symptoms had practically disappeared. The dose of creosote had reached sixty drops a day at this time, and the patient felt so well that he went to work.

He next visited the hospital November 2d, and reported a return of the night sweats and cough, accompanied by extreme prostration. He presented an ashy appearance and every evidence of being very ill. The mucous membrane of the left arytenoid cartilage was swollen and red, and he complained of some pain on the left side of the larynx. Temperature, 103.4° F. An injection of half a minim of pure creosote was made into the left arytenoid, which was followed by a burning sensation which lasted several hours. On the 7th of November the point of injection was still visible, but the infiltration present before the injection was made had about disappeared. The notes of November 12th shows the temperature to have been 100° F. General condition, appearance, and appetite much improved. Voice good. No dysphagia or dysphonia, and, with the exception of a little redness over the arytenoids, the larynx presented a satisfactory appearance. A few weeks later his wife called to say that her husband was very weak, and that their circumstances did not permit his having sufficient nourishment. He was admitted to the Presbyterian Hospital under the care of Dr. A. H. Smith, and during his stay of seven weeks gained ten pounds in weight. He has now been home some five weeks, and has visited me at the hospital every week, but receives no treatment for his throat. His pulmonary symptoms and general condition are, however, far from satisfactory.

CASE II.—Mr. E. N. S., aged twenty-nine years, first came under my care in 1887 complaining of lumbar aching, and he

subsequently developed two small lumbar abscesses, one in 1889 and a second in 1891. After the latter there was a slight curvature of the spine, which Dr. Gibney, who was called in consultation, said was due to tubercular disease of the vertebræ. In the summer of 1894 Mr. S. had a troublesome cough and night sweats. An examination revealed numerous fine, moist râles, with dullness over the left pulmonary apex. Temperature, 101° F. The sputa contained quantities of tubercle bacilli and some elastic tissue. Under creosote and general tonics the chest symptoms greatly improved. He again consulted me on the 17th of December, 1894, in consequence of hoarseness and a feeling of soreness in the larynx, with considerable pain in swallowing. Temperature was 99.4° F.; pulse, 100. His appearance was one of general depression and lassitude; cough constant and irritative in character, and moderate night sweats.

The soft palate and pharynx were anæmic. Epiglottis red and somewhat enlarged; the arytænoids large and their mucous membrane red and puffy. The interarytænoid space presented several hypertrophies. Considerable mucus adhered to the surfaces of the arytænoids, epiglottis, and around the base of the tongue and in the pyriform sinuses. A microscopic examination of the mucus showed plenty of tubercle bacilli. Creosote was prescribed for internal administration and the two-drachms-to-the-ounce solution of creosote sprayed into the larynx. A week later, after the third laryngeal application, the soreness and pain in swallowing were greatly diminished and the cough lessened. I did not see him again for two weeks, when he returned complaining of slight pain in swallowing.

An examination of the larynx showed an almost entire subsidence of the redness, infiltrations, and hypertrophies already described, with no apparent cause for the pain in swallowing. The creosote solution was again applied, and a spray given for home use of one drachm of creosote to the ounce with ten grains of menthol added. He is still under this treatment and, with the exception of the vocal cords being slightly pink, the larynx presents a nearly normal appearance and he does not complain of any laryngeal symptoms.

CASE III.—E. D., a woman, aged thirty-seven years, came to the hospital April 23, 1894, complaining of hoarseness. Several members of her family had died of phthisis, but little could be obtained of their history. About a month before her visit to the hospital she had noticed her voice becoming slightly hoarse. It gradually progressed until she spoke in a low whisper. There was considerable soreness in the larynx, which was more or less continuous and accompanied by slight dysphagia. Temperature, 99.4° F. Moderate dullness in left pulmonary apex and some fine moist crepitations. Soft palate anæmic, epiglottis and arytenoid cartilages normal in appearance. Mucous membrane of interarytenoid space red and somewhat tumefied. Ventricular bands red and much thickened and partially overlapping the vocal cords. The latter were much thickened and presented a grayish granular appearance. An examination of the sputa showed a few tubercle bacilli.

The administration and application of creosote was commenced at once and continued until May 25th, when she reported no laryngeal pains or soreness and voice quite clear. The infiltrations of the ventricular bands and vocal cords had diminished considerably. During the summer months she visited the hospital four times and gave every evidence of gradual improvement. On the 3d of November she complained of a return of the laryngeal pain and hoarseness.

A laryngoscopic examination showed the right band and cord much thickened and about in the same condition as when I first saw her. Left cord and ventricular band much improved.

Submucous injections of the oily solution of creosote were commenced and have been continued once a week to the present time. One of the injections into the right cord produced considerable difficulty in respiration, which lasted several hours. At present she has no cough or laryngeal soreness. The hoarseness continues, but is much improved. The infiltration of the ventricular bands is much less, and the gray thickened appearance of the posterior half of the vocal cords has nearly disappeared, especially on the left. The anterior parts of the cords are still considerably tumefied. The difference in condition of

the anterior and posterior part of the cords is probably due to the difficulty experienced in making injections in the anterior part of the larynx.

CASE IV.—M. J., aged thirty-two years, came under my care in September, 1894. He had had phthisis for two years, and the upper parts of both lungs were well infiltrated with tubercular deposit. Eight weeks prior to my visit he began to have pain in his throat and hoarseness. This condition gradually increased until the dysphonia and dysphagia became so great that he had taken to his bed, and had not swallowed anything for three days.

The epiglottis, arytenoids, ventricular bands, and, in fact, every part of the mucous lining of the larynx seemed to be infiltrated, and were in such an advanced stage of ulceration and necrosis that they were hardly recognizable.

Temperature, 103° F. Cough very troublesome and expectoration abundant. He was much emaciated, and his general condition so poor that any treatment seemed hopeless.

The larynx was cleared of secretions as much as possible and two injections of half a minim each of pure creosote made into the epiglottis. The oily solution was also thoroughly applied to the remaining portions of the larynx. The following day the necrosed portion of the epiglottis had separated, and the tension of the mucous membrane had considerably relaxed. This moderated the dysphagia and respiration became easier. Injections and applications of creosote and oil were continued daily for a week. A great deal of sloughing tissue was thrown off during the week, and the surfaces were covered for the most part with healthy granulations.

The following week the solution containing one drachm of creosote to the ounce was employed daily as a spray, and stimulated the granulating tissue so much that more soothing applications had to be substituted. Up to this time the dysphagia, although much better, was still considerable.

During the third week he swallowed with little pain, and was able to take plenty of nourishment. All the laryngeal symptoms had greatly abated, and an examination showed the remaining portion of the epiglottis to be much less thickened

and the ulcerations healing. The general laryngeal thickening was greatly diminished, and the ulcerations over the arytaenoids and ventricular bands were in various stages of cicatrization.

Some of the ulcers had entirely healed and gave the parts a wrinkled appearance.

This condition of comparative comfort continued for about two weeks, but the rapidly progressing pulmonary affection put a sudden end to the necessity for further laryngeal treatment.

CASE V.—John B., aged twenty-seven, first visited the hospital December 3, 1894. He complained of having rapidly lost weight for three months past. About the 18th of November his throat began to be sore, and he had some slight dysphagia, which rapidly increased; it was almost impossible for him to swallow anything, owing to the severity of the pain. His articulation was also painful and his voice slightly hoarse. Cough constant and irritative in character, accompanied by a copious expectoration of thick, tenacious, and stringy mucus. Temperature, 102.4° F. Sputa loaded with tubercle bacilli. A pulmonary examination showed well-disseminated tubercular disease.

The tongue was red, epiglottis thick, and presented a cockscomb appearance, with small ulcerations covering its surface. The ventricular bands were thickened and the cords a light pink in color. The arytaenoid cartilages were much enlarged and œdematous in appearance, and covered with small punctate ulcerations. A twenty-per-cent. solution of cocaine was applied to the larynx, and one drop of the two-drachms-to-the-ounce solution of creosote was injected into the margin of the epiglottis, also one drop into the right arytaenoid. On the 5th a second injection was made into the epiglottis, and on the 7th one in the left arytaenoid. On the latter date the epiglottis was found to be less thickened and paler in color. The dysphagia had slightly abated. After the last injection he was able to swallow all non-irritating liquids for an entire week with very slight pain; solids gave him a moderate amount of pain. The arytaenoids had diminished in size, and many of the small ulcerations had disappeared. Cough and expectoration much less. This favorable condition of affairs continued for eight days,

when the slight dysphagia reappeared. Temperature, 103° F. On the 21st of December the epiglottis, which had diminished in size and had had a very healthy appearance, began to look puffy, especially around the cushion; small grayish-looking spots appeared over its surface.

The following day, the upper part of the epiglottis seeming to be undergoing rapid necrosis, pure creosote was injected and partially relieved the dysphagia. From the 17th to the 24th of December the patient remained in the hospital, but his general condition became so poor that he was sent to his home in Brooklyn. Owing to the distance, he was unable to receive much further treatment. The upper two thirds of the epiglottis separated and the stump granulated over. The rest of the larynx was covered with granulative tissue in various stages of development. His cough was not very troublesome. The dysphagia was intermittent, sometimes causing great distress, and again he swallowed with comparative comfort. The loss of so much of the epiglottis allowed food to approach the glottis, and considerable care had to be exercised during eating or drinking. He died three weeks after his return home. The treatment while he was able to visit the hospital had been application of creosote in oily solution, and also its submucous injection and internal administration.

During the last two weeks cocaine was used at times to relieve the pain, and also several applications of iodoform, which afforded him great relief from pain for twenty-four hours. I regret to say that owing to the distance I only visited him once, and did not have an opportunity to continue the creosote treatment.

CASE VI.—John D., aged twenty-seven years. Father died of phthisis. Has been hoarse off and on for over a year and has had several hæmorrhages. During the past month he has had considerable dysphonia, dysphagia, and an incessant cough at night, with profuse expectorations. Temperature, 99·4° F.; pulse, 88. A few tubercle bacilli present in the sputa examined. Slight dullness with some fine crepitation and râles were present at the apex of the right lung. Epiglottis normal, arytenoid cartilages very much enlarged and œdematous. Interarytenoid

space filled with hypertrophied tissue covered with a grayish mucus and a few spots of ulceration. Ventricular bands much thickened and completely overlapped the cords. The latter were seen after applying cocaine, and presented a granular appearance. One drop of fifty-per-cent. solution of lactic acid was injected into the anterior surface of the arytaenoid. A slight laryngeal spasm followed the injection, and the patient reported considerable burning on the right side of the throat for two days. Laryngoscopic examination showed considerable œdema around the point of injection. Three later injections of lactic acid were made, but, as there was little improvement, creosote was given internally, applied locally and by submucous injection from the latter part of December, and had been continued until the present time. After the fourth application the cough diminished considerably and the patient spoke with less effort and swallowed with little pain. At times the creosote seemed to be too stimulating and had to be stopped for a few days. At present his condition is as follows: Cough almost absent. No expectoration. Dysphonia and dysphagia disappeared. No special discomfort in the larynx; the thickness of the ventricular bands and arytaenoid cartilages has diminished so that the cords are partially visible. Ulcerations in the interarytaenoid space have healed, but the hypertrophies have not diminished. Arytaenoid cartilages still much thickened.

CASE VII.—J. S., aged forty-three years, came to the hospital January 21, 1895, complaining of hoarseness, cough, laryngeal soreness, and slight dysphonia, all of about two months' duration. Temperature, 99.4° F. The upper part of left lung was found partially infiltrated with tubercular deposit, and numerous bacilli were found in the sputa by Dr. Reyling, pathologist of the hospital. Laryngoscopic examination showed the epiglottis to be normal. Both arytaenoids thickened, especially the left. The ventricular bands were much infiltrated, red, and completely covered the vocal cords. Interarytaenoid space contained several papillary masses, and was covered with grayish-looking mucus. When the latter was removed two or three small superficial ulcerations were apparent. The patient has been constantly under treatment since his first visit and

has received creosote internally and by application and submucous injection. As you will see, he has made marked improvement under this treatment. The cough and laryngeal soreness are arrested, the voice is better, and the thickening of the ventricular bands and arytaenoids has diminished, so that the cords are visible. The papillary condition of the interarytaenoid space is much lessened and the ulcerations have healed.

Several other histories might be furnished from my case book, but those just related seem sufficient to draw attention to the combined creosote treatment.

A correct diagnosis is extremely important in considering the results of any treatment of laryngeal tuberculosis. When a patient with pulmonary tuberculosis develops laryngeal symptoms it is not always an easy matter to determine their nature. Some authorities have held that the initial infiltrations and local hypertrophies so frequently present are entirely of an inflammatory character; but the subsequent history of these cases if neglected, or if they remain untreated, is alone pretty conclusive evidence that the deposits are tubercular in character. Much more might be said on the subject of diagnosis, but it is not within the scope of this paper, and I have only mentioned the question as several of my patients presented infiltrations and hypertrophies which entirely disappeared under treatment without ulceration. Considerable difference of opinion may also arise on the decision as to when a case of tubercular laryngitis is cured. Much will depend on whether we claim that the result is a permanent one or simply that as a result of treatment there is no further evidence of laryngeal disease. The future of a larynx which has been the seat of tubercular deposit must depend greatly upon the progress of the pulmonary affection. If the latter is arrested, as is not unusual, no further laryngeal trouble may be experienced; but if the pulmonary disease

remains stationary or progresses, there is always danger of reinfection, and it is not unusual for the laryngeal symptoms to fluctuate with the pulmonary condition. From a laryngologist's standpoint, I think it is usually conceded that we may call it a cure when all symptoms and appearances of laryngeal disease subside, although they may return at some subsequent period.

The history of Case I is interesting and instructive, as, in spite of the fact that the pulmonary condition was rapidly becoming worse, the laryngeal symptoms continuously improved. The present condition of his larynx is also very encouraging, as there are no symptoms or appearance of tubercular infiltrations, although the pulmonary symptoms are still active and his temperature is 102° F.

The other cases of laryngeal tuberculosis without ulceration did well, the cough, laryngeal soreness, and dysphagia being quickly relieved, and have not returned.

In Case II the red and infiltrated condition of the mucous membrane of the larynx has completely subsided, and the infiltrations in the other cases are in various stages of resolution.

One of the two cases seen after the ulcerative process had begun was gradually relieved of his laryngeal distress, and at the time of his death the seat of ulceration was covered with granulating tissue; and had not the pulmonary affection carried him off so rapidly, considerable further laryngeal improvement might fairly have been expected.

The second case with ulceration was a most distressing one from the first, but the creosote injections promptly relieved the severe dysphagia, and for a week the patient swallowed with comfort. Our inability to carry on the creosote treatment at his home in Brooklyn resulted in partial relapse of the laryngeal affection, but one can not

help feeling that much more relief would have been obtained had constant treatment been possible.

The benefits we may expect from the combined uses of creosote may be summed up as follows :

1. It relieves dysphagia, dysphonia, laryngeal soreness, and the cough in the primary stages of laryngeal tuberculosis.

2. Infiltrations and hypertrophies disappear in some cases after persistent treatment ; the earlier the treatment is commenced, the more rapid are the results.

3. If the pulmonary disease is very active, early treatment may arrest the laryngeal affection or postpone and limit subsequent ulcerations.

4. Single tubercular ulcers may be healed if not too deep or too great in circumference.

5. In the ulcerative stages the cough and expectorations and laryngeal distress are greatly diminished, the separation of sloughing tissue is hastened, granulations stimulated, and the odor of the secretions much diminished.

The similarity of these results and benefits compared with those obtained from creosote administered to cases of pulmonary tuberculosis in the early stages is quite remarkable. I think it is not at all unlikely that further experience will prove that cases of laryngeal tuberculosis treated by the combined uses of creosote with suitable climatic and hygienic surroundings will give quite as good results as any other method of treatment. Creosote may be considered as occupying the same position to laryngeal tuberculosis as it already does to the pulmonary affection. Our present experience will not justify a positive statement regarding the curability of tubercular laryngitis in its advanced ulcerative stage. The opinion of the writer is that the pulmonary implication is so extensive and progressing

so rapidly at this stage that an arrest and cure of the laryngeal disease by any measure must be very rare. Much, however, may be done for the dysphagia, dysphonia, cough, and excessive secretions, and it is chiefly for the relief of these symptoms that our efforts should be directed.

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