Case 4.—Gastrectomy in a woman aged 60. The anaesthetic sequence was as in the first case. Convulsions developed after thirty-five minutes, and there was pronounced cyanosis. 2 c.cm. of evipan was given intravenously, and convulsions ceased. The rectal temperature was 100.2° and the theatre temperature 74°. The patient died from a pulmonary embolism ten days after the operation. At the post-mortem examination special attention was paid to possible abnormalities due to the vinesthene, but nothing was found. Sections of the liver examined microscopically showed no degeneration.

It will be noted that anaesthesia was deep in each case, that sepsis was present in two cases, and that the carbon dioxide absorption technique was used. No cases of convulsions occurred in the in-patient series where carbon dioxide absorption was not employed; but, on the other hand, the cases which received closed-circuit anaesthesia were those which required deep anaesthesia, and for motives of economy the closed circuit was chosen. Taking all things into consideration the convulsions occurring in this group appear to be similar to those met with under ether anaesthesia.

The Dental Out-patient Group

The second group consisted of 2,210 dental extractions in children between the ages of 3 and 9. Anaesthesia was produced by means of a Goldman inhaler, using 3 c.cm. of vinesthene for each case. The nature of the convulsions was quite different from that of the first group. There were five cases of convulsions, and each one came on after the anaesthetic was concluded. Anaesthesia was normal in each case, and the child was then removed to the recovery room, where it recovered consciousness sufficiently to start spitting out. Twitching of the facial muscles then began, and soon all the muscles of the body were involved. The child would then become unconscious and cyanosed, and would cease breathing. At this stage death appeared imminent. Artificial respiration was employed and preparations were made to give evipan; but in each case respiration restarted before evipan was given, and the convulsions gradually ceased. The colour returned to normal and the child would then sleep for about an hour. If awakened before this it would get up and run about the room, banging its head on the walls and appearing completely incoordinated. On the employment of restraint the child would go to sleep once more and waken some time later apparently quite normal. Those who were allowed to sleep following the cessation of convulsions awoke normally in about an hour.

This "syndrome" has now been accepted by the nursing staff as a normal complication of vinesthene anaesthesia and no undue alarm is felt. A return to the use of ethyl chloride as a dental anaesthetic was contemplated, but the nursing staff was emphatic in its preference for vinesthene, despite convulsions, to the far greater dangers of ethyl chloride. Careful inquiry into the history of the children revealed no abnormality; each child was seen a week after the anaesthetic and appeared to have suffered no ill effects. Rectal temperatures taken at the time were normal and no patient was incontinent. Fresh vinesthene was used direct from a sealed ampoule. Fortunately for the sake of comparison, one epileptic child developed convulsions; but these were quite typical, and came on during the anaesthetic, not afterwards. Recovery was uneventful, and the mother admitted that she had forgotten to give him his bromide during the previous week. This case was not included in the above series.

Commentary

The cause of these convulsions which come on after anaesthesia appears quite obscure. It is well known that vinesthene deteriorates rapidly at any temperature, with the formation of aldehydes in considerable quantity. These aldehydes, on the addition of an acid or any hydrogen ion, will polarize and form resins which are definitely toxic to laboratory animals, causing convulsions. On the other hand, the mental symptoms would appear to indicate some form of cerebral damage, fortunately not of a permanent nature. So far as I am aware no death under vinesthene anaesthesia has yet been recorded, although in experimental animals an overdose has resulted in death from a condition resembling acute yellow atrophy. It is therefore recommended that anaesthesia with vinesthene should not exceed an hour in duration. I have, however, given it for three and a half hours without the occurrence of any untoward symptoms. Until a fatality occurs, which I hope may never take place, it is unlikely that the pathology of vinesthene convulsions will be determined.

I am indebted to Professor Macintosh of the Department of Anaesthesia, Oxford University, for his kindly help in the compilation of this paper.

TUBERCULOUS LARYNGITIS

AN ANALYSIS OF 428 CASES

BY

R. SCOTT STEVENSON, M.D., F.R.C.S.Ed.

Consulting Laryngologist, London County Council Tuberculosis Hospitals and Sanatoria

AND

F. R. G. HEAF, B.A., M.D.

Principal Assistant Medical Officer, London County Council; late Medical Superintendent, Colindale Hospital

Opinion generally in the medical profession regarding tuberculous laryngitis may be said in recent years to have veered round from a pronounced pessimism to an unjustified optimism. It is now a far cry from Morell Mackenzie's (1880) oft-quoted "The prognosis of laryngeal tuberculosis is always extremely unfavourable and it is not certain that any cases ever recover," and Blumenfeld's (1908) "The cure of tuberculosis of the larynx is still to-day an exception," to the too prevalent opinion, voiced in several recent textbooks of oto-laryngology and of medicine, that tuberculous laryngitis—the most common, and with the exception of tuberculous meningitis the most serious, complication of pulmonary tuberculosis—is a comparatively benign condition requiring no attention beyond the treatment of the pulmonary disease. One reason for this prevalent misconception is that, as the care of tuberculosis is a statutory obligation of the local authority, tuberculous laryngitis is nowadays rarely seen in the clinics of the ear, nose, and throat departments of the large teaching hospitals or even in the special ear, nose, and throat hospitals: a surprising number of the postgraduates who have visited our throat clinic at Colindale Hospital have said that they had never seen or been shown a case of tuberculous laryngitis before. Another reason is that even to-day extraordinarily few patients with suspected or actual pulmonary tuberculosis have the larynx examined before they have been admitted to a special chest hospital or sanatorium: on questioning 400 consecutive tuberculous patients we found that only thirty-two (8 per cent.) had had a

laryngeal examination before admission. In its early stages tuberculous laryngitis may be symptomless, but, like all tuberculous conditions, it is then curable. Moreover, its onset is a sure indication of a decreasing resistance to the infection, and the discovery of an early laryngeal lesion sometimes enables the necessary precautions to be taken to prevent the impending relapse that it heralds.

In view of these facts it seemed to us that a useful purpose would be fulfilled if a detailed examination and analysis were made of the case notes over five recent years of the patients admitted to Colindale Hospital (men, 350 beds) and St. George's Home, Chelsea (women, 50 beds), which is in the charge of the medical superintendent of Colindale; at both hospitals patients at every stage of pulmonary disease are admitted—early, moderately advanced, and advanced. The larynx of every patient at these hospitals is examined at the time of admission and again at regular intervals while under treatment. From the case notes statistical tables have been prepared, and the evidence of these tables is presented as giving an unbiased picture of tuberculous laryngitis to-day, especially regarding prognosis and treatment. In all, 2,831 patients suffering from pulmonary tuberculosis were examined, comprising 2,130 males and 701 females; the cases of tuberculous laryngitis found among these patients were 288 in males and 140 in females, a total of 428.

Incidence of Tuberculous Laryngitis

TABLE I

	Males	Females	Total
Number of cases of pulmonary tuberculosis examined	2,130	701	2,831
Number of cases of laryngitis found	288	140	428
Percentage	13.5	20	15.08

Sir StClair Thomson's figures in 1911 were 25 per cent. cases of laryngitis, and in 1924 18.77 per cent. Our figure of 15.08 per cent. shows a further decrease. Although the number of cases among women is notably high we feel that the decrease of tuberculous laryngitis has been greater in women than in men, for it must be remembered that the incidence of pulmonary tuberculosis has not fallen so rapidly in young females as it has in males.

With regard to the number of those dying of pulmonary tuberculosis and found to show tuberculous infiltration of the larynx the literature gives a wide variation: Percy Kidd (1909) found 50 per cent., Fetterolf (1914) 83 per cent. In the series of 133 cases of one of us (Heaf, 1924) eighty-one cases (60.8 per cent.) were found; of those eighty-one, fifty-six showed tracheitis in various stages, from oedema of the mucous membrane to definite ulceration.

In the following tables the Turban-Gerhardt classification has been used for the pulmonary lesion.

Relation of Laryngitis to the Stage of the Pulmonary Lesion

TABLE II

Stage	Cases Examined			Cases with Laryngitis		
	Males	Females	Total	Males	Females	Total
A ..	112	10	122	3 (2.7%)	—	3 (2.4%)
Bi ..	54	14	68	2 (3.7%)	—	2 (2.9%)
Bii ..	1,225	471	1,696	103 (8.4%)	50 (10.3%)	153 (9.0%)
Biii ..	739	206	945	180 (24.3%)	90 (44.7%)	270 (28.2%)
Total	2,130	701	2,831	288 (13.5%)	140 (20%)	428 (15.08%)

As would be expected the percentage rises rapidly as the more advanced stages of pulmonary disease are reached, particularly in women.

Relation of the Laryngeal Lesion to Age and the Pulmonary Condition

TABLE III

Pulmonary Stage	15-20		21-30		31-40		41-50		51-60		60+		Total	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
A ..	—	—	—	—	3	—	—	—	—	—	—	—	3	—
Bi ..	—	—	1	—	1	—	—	—	—	—	—	—	2	—
Bii ..	9	4	32	28	30	13	22	4	6	—	4	1	103	50
Biii ..	16	14	44	38	48	26	46	8	24	4	2	0	180	90

These figures show the greater frequency of laryngitis in men than women past middle age, and also the high percentage of cases occurring in young adult females. This latter feature helps to confirm the opinion that the young adult female tends to have little resistance to the disease and is generally seriously affected when found to be suffering from pulmonary tuberculosis.

Length of Time Pulmonary Symptoms were Present before the Larynx became Involved

TABLE IV (311 Cases. Percentages are expressed in relation to the total number of males and females)

	- 1 yr.	1 yr.	2 yrs.	3 yrs.	4 yrs.	5 yrs.	6 yrs.	Total
Males ..	15 (5.9%)	42 (16.5%)	80 (31.4%)	58 (23.8%)	15 (5.9%)	12 (4.7%)	32 (12.2%)	254
Females ..	5 (8.6%)	5 (8.6%)	23 (40.3%)	14 (24.5%)	5 (8.6%)	2 (3.5%)	3 (4.9%)	57

This shows that the majority of cases of laryngitis occur in the second and third years after the pulmonary symptoms have begun. There is also a group of cases occurring in the sixth and over sixth years, presumably a relapse of an old arrested lesion.

The number of cases in which the laryngeal symptoms occurred before the pulmonary symptoms is notable. These cases were analysed according to age as follows, showing that nearly all occurred during middle age.

Cases in which Laryngeal Symptoms were the First Manifestation of Tuberculosis

TABLE V

Age :	15-20	21-30	31-40	41-50	51-60	60+	Total
	2	—	11	4	—	1	18

Classification of Types of Lesion

The various lesions were divided into groups according to the area of the larynx involved and then subdivided according to the presence or absence of ulceration. The intrinsic group consisted of cases in which the vocal cords and interarytenoid fold were involved. The extrinsic group consisted of cases in which the epiglottis, arytenoid, and ventricular fold were affected. Two further groups were made of the solitary lesions and the lupoid infiltrations, and another small group of those cases in which the soft palate was involved.

The intrinsic and extrinsic groups were subdivided into a non-ulcerative and an ulcerative class, and those cases in which there was thickening only of the interarytenoid fold were also separated. The cases falling into each subgroup were again divided into age groups and the following table drawn up.

Relation of Type of Lesion to Age of Patients

TABLE VI (428 Cases)

Type of Lesion	Sex	15-20	21-30	31-40	41-50	51-60	60+	Total
Intrinsic	Thickening of interarytenoid fold	M.	3	5	4	1	1	14
		F.	1	13	10	3	-	27
	Infiltration of cords and interarytenoid fold. Non-ulcerative	M.	12	41	23	21	13	112
		F.	8	39	14	7	1	69
	Infiltration of cords and interarytenoid fold. Ulcerative	M.	7	12	11	12	2	44
		F.	1	7	7	-	-	15
Extrinsic	Infiltration of arytenoid, ventricular fold, and epiglottis. Non-ulcerative	M.	-	6	7	6	3	22
		F.	-	5	3	1	-	9
	Infiltration of arytenoid, ventricular fold, and epiglottis. Ulcerative	M.	4	15	23	20	7	72
		F.	1	11	4	-	1	17
	Infiltration of arytenoid, ventricular fold, and epiglottis. Plus soft palate	M.	-	-	1	3	2	6
		F.	-	-	-	-	-	0
	Lupoid	M.	-	-	2	2	-	4
		F.	-	1	-	-	-	1
	Solitary	M.	-	1*	1*	3*	1†	7
		F.	1*	-	-	-	-	1
Epiglottis only	M.	-	1	4	2	-	-	7
	F.	1	-	-	-	-	-	1
Total Intrinsic	M.	22	58	38	34	16	2	170
	F.	10	59	31	10	1	-	111
Total Extrinsic	M.	4	21	31	29	12	3	100
	F.	1	16	7	1	-	1	26

* Cord. † Ventricular fold. ‡ Epiglottis.

Table VI shows the greater prevalence of the more severe extrinsic type in males and the tendency with which this type appears to develop in middle age. The high figures for young adults under 30 are important, as they reflect the advanced stage of the pulmonary disease frequently found at that age and the poor resistance that so many of those patients have towards the infection.

It was thought that the "productive" or fibrotic type of pulmonary lesion would not be associated with laryngitis so often as the exudative type. Although this was found to be true, the difference was not so great as expected.

Type of Pulmonary Lesion associated with Laryngitis

TABLE VII (387 Cases)

Laryngeal Lesion	Pulmonary Lesion	
	Exudative	Productive
Intrinsic	92 (23.8%)	69 (17.6%)
Extrinsic	136 (35.6%)	78 (20.0%)
Lupoid	0	4 (1.0%)
Solitary	2 (0.5%)	6 (1.5%)
Total	230 (59.9%)	157 (40.0%)

Prognosis

The prognosis of any case depends on the extent and nature of the pulmonary condition and also on the patient's age. A patient with advanced lung disease will not have such a good chance of recovery as one whose

pulmonary lesion was slight. One would also expect laryngitis in the chronic fibroid type, which has developed because of the patient's general resistance to the disease, to have a better prognosis than in the caseous or miliary type, in which resistance is poor. It is interesting to note, as shown in Table VIII, that 12.8 per cent. of the stage Biii cases showed much improvement and 1.2 per cent. actually recovered completely. Tables IX and X show that there is less chance of recovery for the patient over the age of 40 than for the patient between 20 and 30, though the reason for this is difficult to explain.

TABLE VIII.—Result of Treatment in Relation to Pulmonary Condition (Males, 288 Cases)

	A		Bi		Bii		Biii	
	No. 2	% 66.6	No. -	% -	No. 12	% 8.2	No. 2	% 1.2
Healed	1	33.3	1	50.0	23	22.9	23	12.8
Much improved	-	-	1	50.0	45	44.8	48	26.6
Improved	-	-	-	-	14	13.8	40	22.6
Stationary	-	-	-	-	11	10.3	65	36.7
Worse	-	-	-	-	-	-	-	-

TABLE IX.—Result of Treatment in Relation to Age (Males, 288 Cases)

	15-20	21-30	31-40	41-50	51-60	60+	Total
Healed	3	8	3	2	-	-	16
Much improved	2	18	14	6	7	1	48
Improved	13	15	31	24	10	1	94
Stationary	5	19	12	13	4	1	54
Worse	2	17	22	23	9	3	76
Total	25	77	82	68	30	6	288

TABLE X (Males).—Results expressed as Percentages of All Cases in Each Age Group

	15-20	21-30	31-40	41-50	51-60	60+	Total
Healed	12%	10.4%	3.6%	2.9%	-	-	5.5%
Much improved	8%	23.4%	17.2%	8.8%	23.3%	16.6%	16.7%
Improved	52%	19.5%	37.8%	35.3%	33.3%	16.6%	32.8%
Stationary	20%	24.7%	14.6%	19.2%	13.6%	16.6%	18.8%
Worse	8%	22.0%	26.8%	33.8%	29.8%	50%	26.8%

Occupation and Tuberculous Laryngitis

We are not able to make any definite observation on the frequency with which laryngitis occurs in any particular trade or profession, as it is not easy to obtain sufficient controls, but in the 288 male cases under observation there were thirty-seven labourers, nineteen clerks, nineteen factory workers, seventeen engineers, fourteen salesmen, twelve waiters, eleven carpenters, eleven metal workers, eleven carmen, and ten taxi-drivers. Among the 140 female cases there were eighty-five housewives, twenty-five factory workers, sixteen clerks, sixteen dressmakers, and ten domestic servants.

Symptoms

The symptoms of tuberculous laryngitis have been described so many times elsewhere that it is not proposed to enumerate them again here, but we should like to draw attention to certain phenomena which were found in our series and which may be of importance.

Aphonia.—Complete or almost complete aphonia occurred as the initial symptom in twenty-three men (5.36 per cent. of total cases) and ten women (2.33 per cent.), making a total of thirty-three cases (7.7 per cent. of all cases). It would therefore appear from this that all patients with pulmonary tuberculosis who complain of loss of voice, whether transient or persistent, should be seen by a laryngologist.

Dryness of the Throat.—Dryness of the throat in the morning was the most common early symptom and often continued throughout the course of the disease. It seemed to be mainly due to sputum adhering to the larynx.

Lesion found by Routine Examination.—In ten cases (2.33 per cent.) there were no initial symptoms, and the lesion was discovered by routine examination. In such cases the lesion was in an early stage and responded well to treatment.

Dysphagia.—This symptom was carefully observed. It was found to be more common in males than in females, and was present in nearly all cases where there was either ulceration or infiltration of the arytenoid joint. The intrinsic cases were fairly free from the symptom, but the majority of the cases of the extrinsic type complained of it. This is brought out very clearly in Table XI.

Relation of Dysphagia to the Site of the Lesion

TABLE XI (428 Cases)

Area Involved		Males (288)				Females (140)			
		Dysphagia		No Dysphagia		Dysphagia		No Dysphagia	
		No.	%	No.	%	No.	%	No.	%
Intrinsic	Thickening of inter-arytenoid fold	—	—	14	100	1	3.7	26	96.3
	Infiltration of cords and interarytenoid fold. Non-ulcerative	13	10.8	99	89.2	5	7.25	64	92.75
	Infiltration of cords and interarytenoid fold. Ulcerative	18	35.5	26	64.5	6	40	9	60
	Infiltration of arytenoid, ventricular fold, and epiglottis. Non-ulcerative	13	64.5	9	35.5	2	22.3	7	77.7
Extrinsic	Infiltration of arytenoid, ventricular fold, and epiglottis. Ulcerative	57	81.5	15	18.5	15	88.5	2	11.5
	Infiltration of arytenoid, ventricular fold, and epiglottis. Plus soft palate	6	100	—	0	—	0	—	0
	Lupoid	—	—	4	—	1	—	—	—
	Solitary	—	—	7	—	1	—	—	—
	Epiglottis only	2	—	5	—	1	—	—	—
	Total Intrinsic	31	18.2	139	81.8	12	9.2	99	91.8
	Total Extrinsic	76	76.0	24	24.0	17	65.5	9	34.5
	Grand Totals	109	38.0	179	62.0	32	22.8	108	77.2

Treatment

The opinion that treatment in cases of tuberculous laryngitis is merely palliative and on the whole rather useless is still very prevalent. We agree that there are many cases which do not improve with any known treatment, but, on the other hand, the distressing symptom of dysphagia rarely occurs in tuberculous patients when adequate attention to the larynx is given. We have used the following local treatments either singly or in conjunction with each other:

Silence
Painting the larynx with lactic acid, 50 per cent. and 100 per cent.; argyrol, 12.5 per cent. and 25 per cent.; guaiacol, 12.5 per cent.; chaulmoogra oil, 50 per cent. in olive oil; tannic acid and anaesthesin; trichloroacetic acid
Galvanocautery
Diathermy
Injection of superior laryngeal nerve
Local application of ultra-violet light

In addition all cases had routine sanatorium treatment and some had special treatment (for example, artificial pneumothorax, sanocrysin, thoracoplasty) for the pulmonary condition. In the following tables we have included only cases in which the result appeared to be due definitely to the particular form of treatment prescribed. Many cases have been excluded because the result was indefinite and could not be assigned to any one cause. In some cases the temperament of the patient made classification impossible; in others the improvement could not be attributed to the local treatment of the larynx, and therefore all these cases were omitted.

TABLE XII.—Results of Treatment: Results shown could be Attributed Definitely to the Method Indicated

Treatment	Healed	Much Improved	Improved	Stationary	Worse
Silence alone ..	12	8	24	8	6
Applications:					
Lactic acid ..	—	6	9	3	4
Argyrol	—	6	12	3	2
Chaulmoogra oil	2	11	15	6	6
Guaiacol	—	1	1	1	—
Trichloroacetic acid	—	1	—	—	1
Galvanocautery ..	2	7	23	10	2
Diathermy	—	—	—	—	2
Ultra-violet light ..	—	4	14	12	10
General:					
Artificial pneumothorax ..	2	5	12	4	2
Sanocrysin	—	4	7	1	—
Cadmium salts ..	—	—	3	—	—
Thoracoplasty ..	—	—	2	—	—

No patient who developed laryngitis while under routine sanatorium treatment responded to any form of treatment. In our series there were fifteen patients who developed tuberculous laryngitis after admission, and all became worse in spite of careful attention.

Relief of Dysphagia.—The relief of dysphagia is usually effected by insufflations of anaesthesin and orthoform, but where this has failed the galvanocautery is used. In cases where the arytenoids chiefly are involved and the pain tends to be localized to a particular area, usually at the level of the crico-thyroid membrane, the superior laryngeal nerve is injected with a solution of 2 grains of novocain in 80 per cent. alcohol. We have done this in seventeen cases, and obtained complete relief for one month or longer on twelve occasions. It is dangerous to perform this little operation on both sides, as it tends to interfere with deglutition. With the galvanocautery we have obtained complete relief in twenty-nine cases out of forty-two and partial relief in six cases. Two important details should be remembered when cauterizing: (a) It is dangerous to do this in patients who are going downhill rapidly—that is, patients rapidly losing weight—or when the blood picture shows a high sedimentation rate or a high polymorph count and a low lymphocyte count.

(b) To obtain the best relief of dysphagia it is advantageous to find the painful spot by touching various parts of the larynx with a pointed probe. There are usually one or two tender spots, and the cautery should be applied directly on these areas. For relief of dysphagia the area is punctured with a red-hot cautery, but when the cautery is used to promote healing we prefer a dull red heat, and use the cautery by gently stroking it over the surface of the lesion.

Chaulmoogra Oil.—Of all the various applications to the larynx chaulmoogra oil has, in our hands, given the best results. It promotes healing and relieves dryness of the throat. But it is essential to use the Burmese chaulmoogra oil, which contains a higher percentage of chaulmoogric acid than the ordinary commercial Indian oil. No beneficial result can be obtained from the substitute products from various species of *hydnocarpus*. The oil, used half-and-half with olive oil, is applied by a swab or dropped from a laryngeal syringe on to the larynx twice weekly, and may require to be done twenty or thirty times before a permanent result is obtained.

Ultra-violet Light.—With regard to ultra-violet light treatment, we have employed a Kromayer lamp, with a Beaumont's curved quartz laryngeal adapter. This is passed over the epiglottis (anaesthetized at first with a spray of 5 per cent. cocaine) so that the end of the quartz rod which emits the rays is well in the larynx. Exposures start with one minute and are gradually increased to a maximum of (usually) three or (sometimes) four minutes. It is most important that the end of the quartz rod is passed *over* the epiglottis, otherwise a serious burn, which develops into an ulcer, may result. The main effects of this treatment are that it (1) reduces oedema, (2) clears secondary infections, and (3) sometimes heals ulcers. Some cases require as many as forty exposures, at three-day intervals, before the desired result is obtained. Of forty patients who had a full course of treatment, four were greatly improved and fourteen definitely improved;

twelve, however, were no better and ten were definitely worse. In spite of the good results obtained in some cases our opinion is that it is hardly worth while to persevere with this method of treatment, as other methods are available giving as good results with less trouble to all concerned.

The following are drawings of some representative cases.

FIG. 1.—Case 604 M. I (19/1/35): Silence; 20 treatments with chaulmoogra oil. II: Showing result at 5/10/36.

FIG. 2.—Case 319 M. I (30/8/35): Silence; 42 treatments with ultra-violet light locally. II: Result at 11/4/36

FIG. 3.—Case 204 M. I (21/9/34): Silence; one galvanocautery puncture in interarytenoid area. II: Result at 29/3/35.

FIG. 4.—Case 706 F. I (14/5/35): Silence only. II: Result at 4/10/35.

TABLE XIII.—Result of Treatment in Relation to Site of Lesion (Males, 288 Cases)

Site of Lesion		Result					Totals
		Healed	Much Imp.	Imp.	Static	Worse	
Intrinsic	Arytenoid fold ..	2	3	6	2	1	14
	Arytenoid fold and cords. Non-ulcerative ..	9	26	49	18	10	112
	Arytenoid fold and cords. Ulcerative ..	1	6	15	14	8	44
Extrinsic	Arytenoids, epiglottis, ventricular fold. Non-ulcerative ..	—	4	7	6	5	22
	Arytenoids, epiglottis, ventricular fold. Ulcerative ..	—	5	13	8	46	72
	Arytenoids, epiglottis, ventricular fold. Plus soft palate ..	—	—	—	—	6	6
	Lupoid ..	—	1	2	1	—	4
Solitary ..		4	3	—	—	—	7
Epiglottis only ..		—	—	2	5	—	7
Total Intrinsic ..		12 (7.05%)	35 (20.5%)	70 (41%)	34 (20%)	19 (11.5%)	170
Total Extrinsic ..		—	9 (9%)	20 (20%)	14 (14%)	57 (57%)	100
Grand Total ..		16	48	94	54	76	288

Conclusions

The incidence of tuberculous laryngitis is undoubtedly diminishing, although it is still a common complication of pulmonary tuberculosis, occurring more frequently in the later stages of the pulmonary disease. In young adult females the percentage of incidence is particularly high, but in patients past middle age it is more common in men than in women. The majority of cases occur in the second and third years after the beginning of the pulmonary disease. The prognosis of a case of tuberculous laryngitis depends on the extent and nature of the pulmonary condition, as well as on the patient's age; cases in which the pulmonary lesion is slight have the best hope of recovery. Dysphagia is more common in extrinsic than intrinsic laryngeal lesions and is present in over 80 per cent. of ulcerative extrinsic lesions. Cauterization with the galvanocautery relieves the pain caused by an ulcer and also aids healing in a considerable proportion of cases. Sanatorium regime and vocal rest are still mainstays of treatment; the most effective local application is chaulmoogra oil, but the Burmese oil must be employed. Local ultra-violet light is helpful in some cases, but on the whole those cases which improve under this treatment would probably improve quite as quickly and with much less trouble by other methods. The site of the lesion is important with reference to treatment; intrinsic cases show very much better results than extrinsic cases, and

particularly when they are not ulcerative. All cases of suspected pulmonary tuberculosis should have the larynx examined as part of the diagnostic procedure, and patients under treatment for pulmonary tuberculosis should have regular periodic laryngeal examinations.

We have to thank Dr. Allen Daley, Medical Officer of Health, London County Council, for permission to quote work done at London County Council hospitals; the Council accepts no responsibility for the authors' opinions or conclusions.

BIBLIOGRAPHY

- Blumenfeld (1908). *Ann. mal. Oreille*, **34**, 733.
Fetterolf, G. (1914). *Trans. Amer. laryng. Ass.*, **36**, 258.
Heaf, F. R. G. (1924). *Lancet*, **2**, 698.
— (1933). *British Medical Journal*, **2**, 966.
Kidd, P. (1909). *Allbutt and Rolleston's System of Medicine*, **5**, 286, London.
Mackenzie, Morell (1880). *Diseases of the Throat and Nose*, **1**, 383, London.
Stevenson, R. Scott (1931). *Practitioner*, **127**, 264.
— (1933). *British Medical Journal*, **2**, 960.
— (1935). *Recent Advances in Laryngology and Otology*, p. 90, London.
— (1937). *Practitioner*, **139**, 565.
— (1939). *Tubercle*, **20**, 497.
Thomson, StClair (1924). *Med. Res. Cncl. Sp. Rep. Ser.*, No. 83, London.

SOME OPERATIVE FACTORS OF SEASIDE CLIMATE

BY

OTTO H. KESTNER, M.D.

Formerly Professor of Physiology, University of Hamburg
(From the Royal Sea Bathing Hospital, Margate)

Many thousands of delicate children are successfully treated each year in convalescent homes and hospitals at the seaside. General experience goes to prove that the results of treatment are as good in winter as in summer, despite the fact that the climatic conditions of the two seasons are widely different. Either the seashore, the sea air, or something else at the seaside has a specific action on the human body independent of the season, or very dissimilar physical and meteorological influences must produce an identical result upon the human body.

Investigations into Basal Metabolisms of Patients

To decide this fundamental question I have carried out determinations of the metabolism (oxygen consumption) of patients in the Royal Sea Bathing Hospital at Margate. The thirteen patients selected were boys between the ages of 7 and 15 who suffered or had suffered from extrapulmonary tuberculosis. During the period of the investigations

(September to November, 1939) they were convalescent or at least apyrexial; they had been at Margate for several months, in some cases for many months. The investigations demanded that the determinations should be made under the established conditions of hospital life. The patients lie in bed in the open air throughout the day. They are dressed in night-shirts and jerseys and are well covered with blankets. During the autumn and winter only hands and head are exposed to air, winds, and sunshine. As a rule the determinations

have been made with the patient's bed in its normal situation; only occasionally have I moved beds in order to give a greater or less exposure to wind. I have used the portable Benedict apparatus throughout.

I knew that the influence of the sun upon human metabolism was somewhat different under basal conditions from what it was after meals during the peak of specific dynamic action. Man lives under basal conditions only in the very short time between awaking and breakfast, and I needed natural conditions. I have taken the hours between 10 a.m. and 12.15 p.m. and 2 p.m. and 4 p.m.

The results are given graphically below. The height of the columns gives the oxygen consumption in c.cm. per minute, reduced to 0° C. and normal barometric pressure in the usual manner. Those who are in the habit of thinking in terms of calories may get the twenty-four-hour metabolism by multiplying the numbers by 7.15. The outlined columns are the controls, taken indoors and therefore uninfluenced by sun or wind; the hatched columns represent readings of metabolism taken in cooling winds, sometimes of considerable velocity; the black columns show the metabolism of subjects exposed to the sun's rays. The controls agree with the usual prediction tables for basal metabolism or lie a few cubic centimetres above them. The metabolic rate is increased in the open air both in sunshine and with exposure to winds of strong cooling power. In each investigation I have made a practice of determining the skin temperatures of the uncovered hands, of the arms covered by the sleeves, and of the forehead. I give here only the average of numerous determinations in degrees centigrade:

	Forehead	Arm	Hands
Indoor... ..	30.5	29.4	25.8
In wind... ..	27.6	29.0	20.6
In sunshine... ..	31.2	31.7	25.5
In sunshine and wind... ..	30.3	31.9	21.8

The skin of the hands alone shows any pronounced decrease of temperature as the result of the cooling effect of wind. Decrease in temperature of the skin of the forehead is prevented by capillary reaction. The above

figures go to prove that the increase of metabolic rate produced by cooling winds cannot be ascribed to simple chemical heat regulation, but belongs to a quite different group of phenomena. Cold and sunshine are stimuli that raise

the metabolic rate even if only a relatively small area of the body's surface is exposed to their influence.

Climatic Factors at the Seaside

The first observer to remark a rise in metabolic rate produced by the radiation of the sun was Leonard Hill. With stronger radiation, such as is met with in summer and at high altitudes, I have seen much greater increases in metabolism: I have observed in healthy adults rises of

Graph showing readings of basal metabolism taken under different conditions. Outlined columns = controls; cross-hatching = exposure to cooling winds; black columns = exposure to sun rays.