of early or early intermediate type. Two hundred tests were carried out each consisting of a mirror test with a sputum test as control when sputum was available, the sputum being taken at approximately the same period and in all cases within the same week. The material was supplied by seventy-five patients.

In sixty-one of the tests material containing pus cells and sometimes elastic fibres was found on the mirror from patients who stated that they were unable to raise sputum. In sixteen of the sixty-one tests referred to above tubercle bacilli were demonstrated. They were also demonstrated in ten mirror tests from patients who at a corresponding time had "negative" sputum. This represents an increase in accuracy of 13 per cent. as the result of using the mirror test. On the other hand no material was obtained on the mirror in eleven tests and in three cases material collected yielded a negative result although tubercle bacilli were demonstrable in the sputum—that is, in 7 per cent. the mirror failed to show tubercle bacilli in "sputum positive" cases.

Comparative Table

Mirror, T.B. positive ...	"No sputum" ...	16	} 13%
Mirror, T.B. " ...	Sputum, T.B. negative ...	10	
Mirror, no secretion ...	Sputum, T.B. positive ...	11	} 7%
Mirror, T.B. negative ...	" " " " ...	3	
Mirror, T.B. negative ...	"No sputum" ...	45	
Mirror, T.B. positive ...	Sputum, T.B. positive ...	26	
Mirror, no secretions or T.B. negative	"No sputum" or sputum T.B. negative	89	

Total 200

It should be noted that in this series a sputum test implies expectoration collected during a period of about twenty-four hours, while the mirror test only represents the matter ejected as the result of two or three coughs voluntarily made at a time when expectoration would otherwise not have occurred. The scales were thus weighted heavily in favour of the sputum test, and the results of the mirror tests are the more striking. Despite this, if we take the total number of tests, a positive result occurred forty-nine times in the mirror group while an equal number of sputum tests only gave thirty-seven. The increase in accuracy obtained by this simple means may be compared with the result of the more elaborate methods of sputum concentration. Dr. H. G. Frayer, in a recent report to the Joint Tuberculosis Council, stated that by the application of a modification of the Pottenger method he had been able to demonstrate tubercle bacilli in twenty-two out of 121 otherwise "negative" cases—an increase in accuracy of just over 18 per cent.

Conclusions

1. The examination of secretion ejected directly from the lungs and collected by a mirror held over the larynx is a quick and convenient method of demonstrating tubercle bacilli.

2. The mirror test frequently enables the confirmation of a diagnosis of pulmonary tuberculosis suggested by history, symptoms, or physical signs to be made without the delay which must occur when the patient is given a sputum outfit. Difficulties in securing the return of sputum flasks by post are obviated. This advantage will be especially appreciated by those who work in country districts or among uncivilized communities.

3. Malingering may be circumvented and the patient who consciously or unconsciously swallows his sputum may be induced to supply a sample of pulmonary expectoration by this means.

4. Compared with the ordinary sputum test the mirror test, to judge from our limited experience, is more delicate, and it may enable such accessory methods of examination as gastric lavage and bacterial investigation of the stools to be dispensed with. Though less delicate than the sputum concentration test it can be used when no sputum is available for that purpose.

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CONSERVATIVE TREATMENT OF LARYNGEAL DIPHTHERIA

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It may be of interest to record my experience of the treatment of laryngeal diphtheria from August, 1930, to April, 1936. The Scunthorpe Infectious Diseases Hospital has a cubicle block of eight beds available for the treatment of diphtheria, and serves an urban and rural population of approximately 60,000. During the past six years the incidence of diphtheria in the area has been low, but there have been a few outbreaks of a localized character occurring in different parts, with comparatively high mortality.

During this period eighteen cases of laryngeal diphtheria were admitted to the hospital. Another case in the area, owing to temporary lack of accommodation, was sent direct to a neighbouring isolation hospital. Tracheotomy was performed in this institution, but with fatal result.

A considerable proportion of the eighteen cases were admitted to hospital after the notifying practitioner had expressed the opinion that tracheotomy was required and should be carried out after admission. In two instances while I was on vacation tracheotomy was performed by my late deputy. One of the patients was admitted in a very toxic condition, well advanced in the third stage of croup. Both patients died shortly after operation.

Analysis of Cases

So far as the other sixteen cases were concerned all were successfully treated by conservative measures and all were eventually discharged cured. Upon admission each case was immediately treated by steam kettles, an adequate dose of antitoxin was administered, and a mixture of tinct. belladonnae and tinct. camph. co., 5 minims of each to one teaspoonful of water, was administered four-hourly. In a few cases hypodermic injection of camphor and/or brandy orally were also given.

Of the two children who died after tracheotomy in the institution one was a female aged 6 and the other a male aged 4. The former had had an injection of 10,000 units of antitoxin prior to admission. Of the sixteen patients who recovered, all were admitted in the second stage of croup with moderate or severe recession of the soft parts of the thorax. More or less frequent paroxysms were general, some of the patients being very distressed at times, with poor colour, occasional cyanosis, and weak, rapid pulse.

The age incidence of the sixteen cases was as follows:

Age	...	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	11-12
Cases	...	1	2	2	2	1	3	3	1	1

Nine were males and seven were females. Eight had diphtheria antitoxin administered prior to admission to hospital, ranging from 8,000 to 24,000 units. In all cases antitoxin ranging from 16,000 to 64,000 units was administered after admission to hospital. Nine had on admission small patches of membrane on one or both tonsils. In one case the uvula was also affected. Swabs were taken in only three of the cases, but in each instance was positive.

There is no resident medical officer in this institution, but the patients were visited by me as often as was thought necessary. Steam was discontinued in fourteen of the sixteen cases in from two to three days. In one case it was discontinued after one day and in the other after five days. The administration of the mixture of tinct. belladonnae and tinct. camph. co. was discontinued in from two to three days after admission. The period of stay in hospital ranged from twenty-two to fifty-two days; exceptionally in two cases sixty-two and seventy-one days. These two patients were detained on account of septic conditions of the skin, which developed toward the end of convalescence. Three developed a serum rash.

Lemarié and Hamon¹ have classified the various forms of croup into the following groups: (1) benign, (2) severe, (3) septic, (4) tracheo-bronchial diphtheria, (5) infantile croup. With regard to operative treatment of laryngeal diphtheria, cases may be treated by aspiration, by intubation, or by tracheotomy. The authors above mentioned consider that aspiration in the five groups gives the best results in cases of tracheo-bronchial diphtheria.

Intubation is an operation which requires some manipulative skill. After the tube has been inserted re-intubation may be required. Complications such as heart failure may occur during intubation, and stenosis of the larynx after extubation. On the other hand, intubation may have to be followed by secondary tracheotomy. As compared with tracheotomy, intubation is no doubt to be preferred, there being no surgical preparation of the patient required and less risk of the occurrence of pulmonary sequelae.

Porter² states that the indications for operative intervention depend largely on whether the patient is treated at home or in hospital. In the former case if there is definite dyspnoea, or one severe paroxysm of coughing, tracheotomy or intubation should be carried out. In private practice, it is stated, tracheotomy is preferable "unless skilled aid will be forthcoming to replace the tube in the event of its being coughed up."

The mortality of cases of tracheotomy is undoubtedly very high, on an average probably 50 per cent. or over. Moreover, the complications or after-effects which may occur as a result of the operation are serious. Results such as pulmonary sequelae, retained tube, granulations, or ugly scars render it an operation to be avoided if at all possible.

Factors in Conservative Treatment

So far as the conservative treatment of laryngeal diphtheria is concerned immediate administration of tinct. belladonnae and tinct. camph. co. when the patient is admitted to hospital appears to have a definitely soothing effect. The medicine helps to prevent spasms or modifies their effects. On occasions the medicine was pushed by shortening the interval between the doses. In my experience total occlusion of the respiratory passages did not occur, and in most instances it was possible for the patient to overcome a very considerable degree of partial obstruction. It is necessary, however, for adequate dosages of antitoxin to be given, and that the patient should be placed under favourable conditions. Skilled nursing is an important factor in assisting the child to overcome restlessness, bouts of spasm, and dyspnoea.

A child suffering from laryngeal diphtheria is generally in a state of nervous apprehension upon admission to hospital. Admitted into unaccustomed surroundings, with strange nurses in attendance, it may become panicky after an injection of antitoxin. The child is usually afraid also of the administration of steam and of its paraphernalia. At first it may not take steam well, and even attempt to push away the apparatus. During this period the patient may easily become worked up into a state of spasm of the glottis in which tracheotomy may appear to be urgently necessary.

On the other hand, the immediate administration of tinct. belladonnae and tinct. camph. co. has a soothing effect. It is agreeable to take. The patient's anxiety is soon allayed, and thus the medicine prepares the patient for the administration of steam. In fact, with this medicine children often fall into a restful sleep, with the mouth open. In any event, whether awake or asleep, the amount of steam can, if required, be increased without distressing the patient. During bouts of spasm, occurring in the severe cases up to two days after admission to hospital, no restriction was placed upon the patient's movements. The child was sometimes temporarily nursed in a sitting position, and occasionally lifted out of bed, with no harmful after-effects apparent.

Conclusion

The prognosis of laryngeal diphtheria generally is grave, the death rate ranging from 18 to 40 per cent. in different series of cases reported. It may be that the series of sixteen cases I have quoted may not be sufficiently large in number or representative enough to enable one to express an unqualified opinion on the value of conservative measures in the treatment of laryngeal diphtheria. I feel, however, that this series indicates that unnecessary operative intervention can and ought to be avoided. There may be nothing novel in the remedies mentioned, but the systematic application of these has in this series of sixteen cases produced a result which could not be improved. Resort to operative procedures in some of these cases might have produced 100 per cent. cures, but would not have borne comparison in the disturbance to the patients and the cosmetic results obtained in the case of tracheotomy.

REFERENCES

- ¹ Lemarié and Hamon: *British Medical Journal*, 1934, i, 1129.
- ² Porter: *Diseases of Throat, Nose, and Ear*.

The new issue of the quarterly *Bulletin of the Imperial Institute* (vol. xxxiv, No. 2, April-June, 1936) includes a report on samples of chaulmoogra oil obtained from the seeds of species of *Hydnocarpus* received from Nigeria, Malaya, and Ceylon. Attention is called to the efforts being made in many of the tropical colonies to produce their own supplies of this oil, which is used in the treatment of leprosy. Hitherto the oil has come from India, but the results published show that the oil contained in the seeds of *Hydnocarpus wightiana* from the colonies mentioned conforms with the requirements as set out in the *British Pharmacopoeia*. It has become increasingly evident in recent years that something more than the three major fertilizing constituents, nitrogen, potassium, and phosphorus, must be added to the soil if a satisfactory standard of fertility and crop growth is to be maintained. A brief article summarizes the available information on minor fertilizer materials, some of which have a direct or stimulating effect on the plant itself, while others known as soil amendments indirectly produce an effect on the crop by modifying conditions in the soil. Reference is also made to deficiency diseases caused by the lack of sufficient available elements in the soil, such as magnesium, sulphur, iron, manganese, copper, and zinc.