creased and the hours of work are extended depends upon the progress of the lesion, and the patient's disposition, weight, and appetite. The utmost care must be taken in controlling graded exercises and work. If the patient's temperature rises to 99° F. or over he should be kept in bed on "absolute rest" until his temperature is persistently normal. For a limited period the patient may rest in the sanatorium ward, but whenever his temperature remains febrile for more than a few days he must no longer be regarded as a sanatorium patient. He needs transference to the hospital or nursing block of the sanatorium to undergo treatment by "absolute rest," after which, under favourable circumstances, he may re-enter the sanatorium. This alternation between hospital and sanatorium treatment is in great part the secret of successful institutional treatment of pulmonary tuberculosis. It is best done in the combined hospital-sanatorium.

As to the duration of sanatorium treatment, this depends upon the response of the individual. Some patients require longer, others shorter periods. If possible the patient should be retained in the sanatorium until his disease is quiescent and he is in a fit condition to resume an occupation. In patients falling short of this standard their sanatorium residence should have educated them in a way of life which may enable them in the future to obtain quiescence or to prolong their days.

Conclusion

An attempt has been made in this paper to indicate the principles of modern sanatorium treatment, including the selection of patients for such treatment. In brief these principles comprise:

1. The diagnosis of pulmonary tuberculosis at the early stage.
2. A proper selection of patients for sanatorium treatment.
3. Full co-ordination between the tuberculosis officer and the medical superintendent of the sanatorium.
4. Observation and hospital treatment, including collapse therapy.
5. Correct co-ordination of hospital and sanatorium treatment.
6. Study and treatment of the individual patient by the medical superintendent of the sanatorium.
7. A proper sanatorium regime.
8. Prolonged duration of stay in the sanatorium.

To these principles should be added the maintenance of the ex-sanatorium patient in whom the disease has become quiescent under medical supervision for at least five years, the injunction to seek medical advice at the first symptom of renewed ill-health, residence in a village settlement, or, if this is impracticable, suitable after-care provision by the local authority.

The sanatoria of the more progressive authorities in this country obtain favourable results by the practice of these principles. If they were generally practised throughout the country we should hear less about the failure of sanatorium treatment.

REFERENCE

- ¹ Heaf, F.: The Misapplication of Artificial Pneumothorax in the Treatment of Pulmonary Tuberculosis, *Tubercle*, 1933, xv, 13.

An international post-graduate course on diseases of infants and children, with special reference to their treatment, will be held in Vienna from February 11th to 24th. A prominent feature of this course will be the clinical demonstrations and the exhibition of radiological, electro-cardiographical, and other apparatus used in diagnosis and special therapy. The fee is 50 Austrian schillings, and further information is obtainable from the secretary of these international classes, Dr. A. Kronfeld, Porzellangasse 22, Vienna IX.

SEPTICAEMIA FOLLOWING TONSILLECTOMY

A RECORD OF CASES

BY

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In recent years there have been at least two interesting papers^{1, 2} showing the result of investigation into the post-operative complications following the removal of tonsils and adenoids. Clinical notes of a series of cases may therefore not be out of place.

This article makes no attempt to deal with the statistical aspect, but merely records a number of cases that resulted in certain serious sequelae. They occurred at a time when children undergoing this operation were kept in hospital for twenty-four hours. The patients were admitted on the morning of operation and discharged the following day. The total mortality during these years was 0.7 per cent. All the cases reported were operated upon by, or under the direct supervision of, the surgeons in charge of the ear, nose, and throat departments, and no patient was discharged under twenty-four hours after removal of the tonsils. All were examined immediately prior to operation by the house-surgeon.

Eleven cases of severe illness, with seven deaths, are herein recorded, all of which can be directly attributed to the operation. Streptococcal blood infection would appear to be the principal cause of the illness. In seven of the cases a streptococcal blood infection was proved by the presence of the organism either in the blood or in the pus from pyaemic abscesses, while in Cases 8, 9, 10, and 11, the probability of a streptococcal septicaemia is strong.

Although among a large number of operations the incidence of serious complications may be considered small, yet the occurrence of such accidents in connexion with what is looked upon as a minor operation is disquieting, and calls for a critical survey of method and management. Following on this unfortunate experience it is impossible to resist the obvious implications and deductions. It is significant that patients operated upon in private practice, either in their own homes or in nursing homes, seldom develop severe complications. Many of the hospital patients come from poor, overcrowded, and unhealthy environments. Their physical condition cannot therefore be considered satisfactory to undergo an operation, and their homes are certainly not suitable for their after-care. Whenever possible such cases should be taken into hospital or sent to a convalescent home for a few days prior to the operation.

As there can be little doubt that the chief source of danger is the presence of a virulent strain of streptococci in the upper respiratory passages or tonsils, it is a self-evident precaution to avoid operating upon those who have recently had, or been in contact with, infections of this nature. In this connexion it is as well to remember that the surgeon or the staff assisting him may be the source of infection, and that anyone in the throes of "a cold" should be excluded from taking part in the operation.

Since these cases occurred the period of detention in hospital has been increased to three days during the summer months and five during the winter months; complications have been greatly reduced and the mortality practically wiped out. Considerations of hospital finance and the length of the waiting list should not be entertained at the expense of the safety of the operation.

It is difficult, when one realizes the vast number of patients referred for operation, to resist a sense of doubt

as to its necessity or even advisability in all cases. The beneficial results following the removal of tonsils and adenoids in selected cases are undoubtedly most striking, but operation is to be advised with deliberation after careful and, if necessary, repeated examination.

Case Records

Case 1.—A male, aged 8 years, had tonsils and adenoids removed, guillotine method, on March 4th, 1932. The temperature, which on March 5th was 99.8° , rose gradually to a maximum of 104.4° on March 13th. The throat was fairly clean; there were a few enlarged and tender cervical glands. On March 11th painful (Osler's) node was noted on right wrist, and on the same day a blood culture grew streptococci. Painful nodes were noted on the right foot and left upper arm on March 12th, similar nodes developing subsequently during the next day on the left hand and right knee. On March 14th there was fluid effusion into the left knee-joint, which cleared up without surgical measures. Three days later a fluctuating swelling appeared on the fourth finger of the left hand, and pus aspirated from this contained streptococci. The temperature then gradually settled, although it was never normal, until a sharp rise occurred on March 24th, which continued until March 27th, when a large abscess in the deep tissues below the left scapula was aspirated; this also contained streptococci. Gradual improvement followed, until the patient was discharged to a convalescent home. Anti-streptococcal (anti-scarlet) serum was administered daily throughout the illness, and blood transfusion was performed when it was at its height.

A case of streptococcal septicaemia with pyaemic abscesses, and recovery.

Case 2.—A female, aged 4 years, had tonsils and adenoids removed, guillotine method, on March 9th, 1932. The temperature was 100.4° on March 10th, reaching 102.4° on the third day, and remaining up until death took place, one week after operation. There was consolidation at the base of the right lung with generalized bronchitis. Blood culture grew streptococci.

A case of streptococcal septicaemia with bronchopneumonia and rapidly fatal termination.

Case 3.—A female, aged $7\frac{1}{2}$ years, whose tonsils and adenoids were removed, guillotine method, on July 1st, 1931, was detained in hospital for six days owing to slight pyrexia. She remained well for one week after discharge, but was put to bed at home on account of lassitude and feverishness. A slight swelling of the left knee was noticed on July 22nd, which gradually increased, the child becoming extremely ill. On August 8th she was readmitted, looking very pale, with tonsillar fossae clean, and temperature 105.2° . The left knee was swollen, tender, and flexed at 90° , and on exploration contained turbid fluid, from which streptococci were isolated in pure culture. On August 12th the right hip-joint was extremely painful, and on aspiration turbid fluid was obtained which contained streptococci. The temperature continued to range from 100° to 103° until death, on August 14th. Blood culture was not carried out.

A case of streptococcal septicaemia with pyaemic abscesses, and death.

Case 4.—In this case, that of a female aged 26 years, the tonsils and adenoids were removed by dissection method on October 16th, 1931. She was discharged on October 19th and remained well until October 23rd, when she complained of severe pain in the left ear, accompanied by fever of 105° . Owing to persistence of pain in the ear and pyrexia, the left mastoid was opened; no pus was found, and the lateral sinus was healthy. On October 27th right pleural effusion developed, blood-stained fluid being withdrawn on exploration, which on culture grew streptococci. Blood culture was sterile (one only). The pyrexia continued, and on November 26th thrombophlebitis of right femoral vein occurred. By the end of December the fever had subsided, and the signs of fluid in the right chest had disappeared. The patient was discharged well, except for slight oedema of the right foot.

A case of streptococcal septicaemia, streptococcal pleural effusion, with recovery.

Case 5.—A male, aged 5 years, whose tonsils and adenoids were removed, guillotine method, on September 16th, 1931, was discharged from hospital the following day apparently well. He was readmitted six days afterwards with a history of severe abdominal pain, vomiting, and diarrhoea for three days. On admission he was very ill, with sunken eyes and alae nasi working. The temperature was 102° , pulse rate 152, and respirations 32. The throat was clean, except for a slough still present on the right tonsil. There was generalized tenderness and rigidity over the abdomen, the signs being especially marked in the left iliac fossa. There was pneumonic consolidation over the lower lobes of both right and left lungs. It was decided that the abdominal signs were probably due to the pneumonia, but on the following day, the abdominal tenderness and rigidity persisting, laparotomy was performed under gas and oxygen anaesthesia, serous fluid with flaky pus escaping. This fluid contained streptococci on culture; blood culture was sterile. The child died two days after operation.

A case of streptococcal septicaemia, with bronchopneumonia, streptococcal peritonitis, and death.

Case 6.—A male, aged 9 years, had tonsils and adenoids removed, guillotine method, on August 8th, 1931. On the following day the child had a temperature of 100° , and was therefore detained in hospital. On the second day after operation the temperature was 102° , pulse rate 140, and respirations 22. The throat was satisfactory, and a few rhonchi were present in the lungs. The child was acutely ill and drowsy. The temperature ranged from 100° to 104° until the fourth day after operation, when it gradually subsided. A blood culture grew a few feeble colonies of streptococci.

A case of streptococcal septicaemia, with recovery.

Case 7.—A female, aged 3 years, was admitted to hospital for an indefinite febrile condition, supposed to be due to a recent tonsillitis. Ten days after admission, on June 8th, 1932, tonsils and adenoids were removed, guillotine method. Twelve hours after operation the temperature rose to 100.4° , and so continued. On June 12th there was pain with redness and swelling just below the left knee, maximum tenderness being over the head of the fibula. When the left fibula was explored on June 14th about 5 c.cm. of pus was evacuated; this contained streptococci. Blood culture was negative. The child made an uneventful recovery.

A case of streptococcal septicaemia, with streptococcal osteomyelitis of fibula.

Case 8.—The tonsils and adenoids of a female, aged 2 years and 9 months, were removed, guillotine method, on February 15th, 1932, on account of persistent nasal discharge. On February 19th the child was discharged from hospital apparently well. She was readmitted on February 24th with a temperature of 104° , pulse rate 148, and looking extremely ill and pale. No abnormal physical signs, except some post-nasal discharge and enlarged cervical glands, could be found. In spite of a blood transfusion the child died on the day following admission. Unfortunately, a blood culture was not attempted, but the clinical picture and progress of the case is highly suggestive of a septicaemia, probably streptococcal.

Case 9.—The tonsils and adenoids of a male, aged 2 years, were removed for unilateral nasal discharge, guillotine method, on May 15th, 1931. The child was discharged from hospital after twenty-four hours apparently well. Two days after operation he developed cough and dyspnoea, and became increasingly ill. He was readmitted to hospital the next day, with a temperature of 99.4° , pulse rate 160, and respirations 56; there was extreme cyanosis, and coarse rales could be heard all over both lungs. Death took place five hours after admission.

The signs in this child were suggestive of an acute streptococcal bronchopneumonia. However, the possibility of inhalation pneumonia cannot be denied, although I have not met with such in my experience of a very large number of tonsillectomies in children. Unfortunately, no post-mortem was obtained.

Case 10.—A male, aged 5 years, had tonsils and adenoids removed, guillotine method, on January 23rd, 1931. He was discharged from hospital after twenty-four hours apparently

well. Three days after operation there was a sudden onset of severe vomiting and diarrhoea. The child's condition rapidly became worse, and unconsciousness supervened the following day. On readmission (five days after operation) the temperature was 103°, pulse rate 160, and respirations 32. The patient was very drowsy, but could be roused; his colour was good. There were scattered rhonchi throughout both lungs, a patch of tubular breathing, and crepitations at left base. The temperature remained at 103° to 104°; delirium and unconsciousness supervened, death taking place two days after admission—that is, one week after tonsillectomy. No blood culture or post-mortem was performed, but the clinical picture was one of septicaemia.

Case 11.—A female, aged 9 years, had tonsils and adenoids removed, guillotine method, on October 7th, 1931. She was discharged from hospital after twenty-four hours apparently well. On arrival home she was seen by the family doctor, who found her not at all well, with a temperature of 101°. The child continued very ill; the throat was dirty, and the temperature ranged from 101° to 103°. On October 10th there was severe epistaxis. The following day the patient was still very ill; her expression was anxious, and her breath very offensive. There was sordes on the lips and teeth, and the throat was very dirty and sloughy. The cervical glands were enlarged and tender, and blood oozed from the nasopharynx. She was admitted to a nursing home, when the temperature was 102°, pulse rate 144, and respirations 28. A throat swab showed the presence of streptococci and staphylococci. In the morning of October 12th the patient's condition slightly improved, but in the evening there was another severe epistaxis, and she became semi-conscious. A post-nasal plug was introduced to control haemorrhage, and anti-streptococcal serum was given. The child died that evening. No blood culture was obtained.

Although the post-nasal haemorrhage was probably contributory, the fatal result in this case, in view of the high pyrexia and general picture, was considered to be due to septicaemia.

I desire to express my thanks to my colleagues in charge of the ear, nose, and throat departments for allowing me to see and record these cases.

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- ¹ Keen, J. A.: *Journ. Laryngol. and Otol.*, January, 1932.
- ² Nesbitt, Elizabeth: *British Medical Journal*, 1934, ii, 509.

M. Gundel and F. Müller-Voigt (*Deut. med. Woch.*, November 2nd, 1934, p. 1664) give an account of a hurricane campaign of diphtheria immunization in the town of Duisburg-Hamborn. With a population of 440,000 it has suffered more and more from diphtheria since 1928. In that year there were 1,438 cases and 112 deaths. In 1933 the cases rose to 2,090 and the deaths to 126. In 1934, up to September, there were as many as 2,214 cases and 160 deaths. Artificial immunization of the children seemed, therefore, urgently indicated, and within the space of six days first injections were given to 23,000 of the 38,562 children between the ages of 1 and 5, and to 57,034 of the 64,450 school children between the ages of 6 and 14. The material used was formol-toxoid and toxin-antitoxin, and the immunization was effected by three injections. In the absence of legislative measures wherewith to enforce this undertaking, the authors achieved rapid, wholesale immunization of the town's juvenile population by means of systematic educational propaganda and a well-organized campaign, which required the co-operation of more than a hundred doctors and over 3,000 other workers, about 1,700 of whom were school teachers. The propaganda included articles in the Press, and addresses. It was found much easier to deal with the school child than with the pre-school child, as the former could be shepherded by their teachers, whereas the latter required extraction from their homes, a process which could not be achieved by simply inserting notices in the Press. The rate at which the school children were inoculated, after some practice had been acquired, was 140 to 150 per hour; the rate was considerably slower for the pre-school children.

ACUTE IODISM FOLLOWING LIPIODOL BRONCHOGRAPHY

BY

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The use of lipiodol for bronchography has now become so much a part of the routine investigation of non-tuberculous chest diseases that the occurrence of any severe complication appears worthy of record.

Lipiodol consists of poppy-seed oil in which 40 per cent. of iodine is held in chemical combination with the unsaturated fats. The possibility of the production of toxic symptoms in patients with an idiosyncrasy for iodine is obvious. However, severe symptoms from this cause appear to be rare, owing to the close chemical combination in which the iodine is held. Sicard and Forestier¹ state that they have encountered only transient iodism of benign type. A report² of the Council of the American Medical Association on the dangers of the injection of iodized oils makes no mention of the possibility of dangerous toxic symptoms. Firth³ describes a personal experience of troublesome but not serious symptoms from iodine sensitivity following endotracheal introduction of chloriodized peanut oil; in addition to coryza, lachrymation, and an urticarial rash, he had a transient parotitis and severe frontal headache, all passing off within a week. Carmichael⁴ records two considerably more severe cases after lipiodol, characterized by vomiting, diarrhoea, conjunctivitis, and a haemorrhagic, urticarial, and bullous rash. Both cases improved rapidly within a week. O'Donovan⁵ reports a case in which death occurred six weeks after lipiodol injection, accelerated by the aggravation of a previously existing papulo-pustular rash.

The two cases described in this communication, one of which proved fatal, occurred recently at the Brompton Hospital. Over 2,900 lipiodol examinations have been performed at this hospital without a previous serious accident from iodine sensitivity. A transient coryza with lachrymation and possibly a mild urticarial or erythematous rash, all passing off within a few days, have been observed not infrequently. In a few cases more severe rashes—appearing rather later, up to a week or ten days after the injection—have occurred. These tend to be of an acute and irritant urticarial type. Headaches have followed the injection in rare instances, and in one case frontal headache was severe enough to cause suspicion of acute glaucoma. I have been unable to find any previous record in the literature of a fatality directly due to acute iodism consequent on the diagnostic use of lipiodol.

Case I

A man, aged 46, was admitted to the Brompton Hospital in August, 1933. He was referred from a sanatorium, where doubt about the original diagnosis of pulmonary tuberculosis had arisen on account of atypical x-ray appearances and persistently negative sputum examinations. The differential diagnosis appeared to rest between chronic lung abscess and neoplasm. His general condition was poor, and he had lost 3 st. in weight.

On August 22nd I introduced 20 c.cm. of lipiodol by the subcuticoid route. The film taken after this showed a good outline of the bronchi, with a probable chronic bronchiectatic abscess of the right upper lobe; there was no lipiodol in the stomach. Six hours later he had developed marked coryza, with nose-bleeding, salivation, and injection of the conjunctivae. The following day he was obviously weaker; the pulse was rapid and of poor volume, and the temperature was rising; the nose-bleeding continued. Scattered petechiae had appeared, especially on the dorsum of the hands and