occurred it was sometimes from profound anaemia, sometimes from embolism, but mostly from uraemia.

The microbe causing the endocarditis, isolated in 73 out of 75 cases, was almost always a streptococcus of a peculiar type, intermediate between the pneumococcus and the ordinary streptococci, to which Dr. Libman gave the name *Streptococcus mitis*. It was not the same as the rheumatic diplococcus of Poynton and Paine.

The streptococcal infection which I have tried to describe, and which I consider possesses definite features, does not, of course, resemble that of Dr. Libman and Dr. Baelr. But it is suggestive that in New York there should have been cases of subacute streptococcal endocarditis, and that in Cheltenham we should have many cases of streptococcal throat, a certain number of which developed endocarditis and myocarditis.

Within the last few months some observers who have had cases of sore throat followed by cardiac disease in children, have isolated a streptococcus which they call the *Streptococcus rheumaticus*. I have a shrewd suspicion that a goodly proportion of these cases come under our category. Our epidemic was certainly not acute rheumatism, for although in children it is possible to have cardiac trouble without muscular pains or joint manifestations, in adults this is rare.

The heart conditions in our cases were unlike malignant endocarditis. The heart became affected about the end of the first week, the signs being those of myocarditis or endocarditis. The latter was of a slow, smouldering type, followed sometimes by permanent damage to the valves; but in other cases, as far as we know at present, by recovery. We never saw embolic phenomena. In fact, what astonished me was to see patients developing cardiac disease under one's very eyes, placidly lying, not feeling at all ill, not anaemic, with a quiet pulse, and usually normal temperature. The pulse, however, shot up on the patient changing from the recumbent to the sitting posture. I feel sure that if the heart had not been examined no one would have suspected heart mischief.

The streptococcus responsible for this malady is certainly not the *Streptococcus mitis* of Dr. Libman. In a report of the Clinical Research Association on one of Dr. Pruen's cases the *Streptococcus salivarius* and *Streptococcus pyogenes* were found. The latter, of course, were met with in the cases where suppuration occurred in the neck gland.

Some of my colleagues suspected the milk supply as being the probable source of the outbreak. I cannot be sure of this, because my patients had milk from different supplies, and my first definite case of the illness had his own cows on his own estate, carefully tended and looked after, and the only other person to contract the disease was his agent, who had paid him a flying visit to discuss business matters with him when ill. Other patients had it, too, who drank only milk that had been boiled. Two patients also developed the illness immediately on their arrival here from Woolwich and Sheffield. Unquestionably milk is an excellent medium for the multiplication and growth of streptococci which might gain access to it from mastitis in cows, or from those handling the milk, suffering from the disease, as in some cases of scarlet fever epidemics.

THE tenth Congress of the German Roentgen Society will be held in Berlin in April (19th to 21st), under the presidency of Dr. Max Levy-Dorn. The secretary is Dr. Immelmann, Berlin W. 35, Lützowstrasse, 72. There will be an exhibition in connexion with the congress.

THE Board of Trade has addressed a letter to the Secretary of the Liverpool School of Tropical Medicine thanking it for arranging an exhibit illustrating the prevention and cure of tropical diseases at the International Exhibition at Ghent last year. The Board expresses its thanks to Professor J. W. W. Stephens, who represented the school on the committee of organization, and Professor R. Newstead, who collaborated with him in the preparation of the exhibits relating to malaria, sleeping sickness, yellow fever, and ankylostomiasis. The collections illustrating these diseases, the first of their kind to be contributed by this country to an international exhibition abroad, were among the most important features of the tropical diseases section of the exhibition. The Board hopes that it may be found possible to demonstrate even more fully on a future occasion the activities of British medical institutions in the field of tropical medicine.

CHRONICALLY ENLARGED TONSILS AND THEIR TREATMENT.

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Is the question whether these tonsils should be completely or partially removed, or treated by one of the many methods which are advocated, certain points require consideration.

Anatomy and Situation.

The tonsillar crypts, with rare exceptions, extend to the capsule, and when they become infected it is impossible to say to what depth the invasion extends. On removing tonsils apparently only enlarged, it is a common thing to squeeze out septic matter or to find one or more septic foci lying beneath the capsule. This occurs not only in definitely septic tonsils, but also in those which only appear enlarged. Partial removal is of little value in such a condition. The plicae semilunaris and triangularis play an important part in the retention of foreign substances and prevention of drainage of the crypts which they cover. They do not embrace a small tonsil very closely, but as it enlarges they become more closely applied to its surface and offer increasing obstruction to drainage. The crypts which are most frequently and severely diseased are those covered by the semilunar fold, and these are generally left when the tonsil is partially removed.

The situation of the tonsil renders it very liable to infection, being constantly bathed in septic fluid and exposed to injury, especially when enlarged, by hard particles of food. When enlarged it pushes the palatoglossus and palato-pharyngeus muscles apart and impedes their action. The movement of the soft palate being interfered with, the character and tone of the voice suffer. The posterior pillar of the fauces being pushed backwards narrows the sides of the oro-pharynx, and in some cases causes obstruction to the Eustachian orifice. Partial removal of the tonsil does little to relieve these conditions.

Function.

As far as is known, the principal function of the tonsil is to act as a barrier to the entrance of bacteria into the system. The healthy tonsil easily disposes of bacteria, and the viscid secretion which it manufactures retains bacteria which come in contact with it and destroys them by its bacteriolytic action. When, however, its resistance is lost, the tonsil becomes an ideal culture bed for bacteria.

The secretion (the first line of defence) is often dried up in mouth-breathers, and they are the class most frequently affected by tonsillar troubles. Another factor is their lowered vitality, in which the tonsil shares, due to imperfect preparation and assimilation of air for respiration and the lack of nasal stimulus to deep breathing.

As in other parts of the body, the lymphoid tissue of the tonsil produces lymphocytes, but if it is diseased or weakened it is doubtful if it can perform this function to any appreciable extent.

Masini advanced the theory that the tonsil has an internal secretion after the nature of the suprarenal gland, but this has not been confirmed.

Chronic Enlargement of the Tonsil.

Many theories have been advanced to account for this, and while in some enlargements other causes may be at work, the most reasonable explanation in most cases appears to be some local irritation. As mentioned above, the form and situation of the tonsil favour the entrance of bacteria, and it is not surprising to find enlargement in a gland so constantly exposed to infection, when one considers that enlargement in other glands is most commonly brought about by chronic irritation.

The course of events is briefly as follows: The tonsil becomes infected, and three things may happen: (1) It recovers completely; (2) it recovers, but with weakened resistance, which allows it to be from time to time reinfected; (3) some chronic irritation remains. In the two last named conditions the resulting hyperaemia brings about hypertrophy of the tonsil and later the formation of fibrous tissue. Examination of a number of

tonsils supports this view. Those removed from young children are generally softer and more friable than those found in older children or adults, but if the history of tonsillar trouble is definitely of short duration in older patients, the tonsils are generally like those removed from young children.

If the infection occurs early in life, or at first is not sufficiently severe to cause inconvenience, the enlargement may be overlooked until it has reached a large size or until fibrous tissue has developed. Certain enlarged tonsils recover their protective function and if causing no symptoms may be left intact.

Septic tonsils are generally enlarged, and tonsils which are removed owing to their size are often found to be septic, which affords further evidence that (a) chronic irritation is generally the cause of enlargement, and that (b) enlarged tonsils are commonly of low resisting power.

A small tonsil the subject of repeated attacks of inflammation may result when thrombosis of one or more of the small vessels supplying it occurs, either during an attack of inflammation or by the subsequent formation of fibrous tissue.*

Malignant endocarditis, recurrent attacks of iritis, septic thrombo-phlebitis, labyrinthitis, meningitis—the latter two following suppurative otitis media—are some of the many complications which have been traced to diseased tonsils.

The deformities of the chest, retarded growth, and the mental condition of children with obstruction to nasal respiration brought about by tonsils and adenoids, are constantly in evidence, and if left without operation, under the plea that they will outgrow the condition, children grow up handicapped, both bodily and mentally. About 80 to 90 per cent. of tuberculous glands of the neck have their origin in tonsillar infection. By extension the glands of the thorax may be involved, or the parietal pleura at the apex of the lung with extension to the visceral layer and the underlying lung may be directly infected.

Out of 1,986 tonsils removed for various causes, and examined for tubercle, 5.9 per cent. were found to be tuberculous, and the appearance of the tonsil does not give any indication of the presence of tubercle except in extremely rare cases. An objection put forward against the removal of tonsils has been that dissemination of tubercle may occur. This may happen if partial removal is practised, but if the disease is localized in the tonsil complete removal extirpates it. Even when the glands in the neck are affected, they often subside when the primary focus in the tonsil is removed.

During diphtheria epidemics, it is constantly noticed that the great majority of the patients have chronically enlarged tonsils, although these may not in many cases have caused inconvenience. Professor Beattie of Liverpool has informed me that he considers the tonsil to be one of the main channels of infection in rheumatism. In a recently published paper he and Yates give the results of a series of investigations, in which 20 tonsillar cases are included. In 15 there was a history of tonsillitis and rheumatism, and on inoculating rabbits with cultures prepared from these tonsils, 7 developed arthritis, and the streptococci were recovered from the joints. They point out that this streptococcus, which causes the arthritis, can only be identified by inoculation, and that many varieties are found in the tonsillar region. The inoculations were performed from isolated colonies, and so in the 8 unsuccessful cases the wrong colony may have been selected. The degree of virulence of the bacteria, the dose employed, and the resisting power of the rabbit are also factors which may affect the experiment. In the remaining 5 cases (swabs from sore throats in which the history was unknown), 1 rabbit developed arthritis, the other 4 septicæmia. The constantly recurring history of tonsillitis in patients with chorea is an interesting point in this connexion.

Until the bacteriology of scarlet fever is known, nothing can be definitely stated; but those who see most of this disease are of the opinion that the tonsil is one of the most frequent, if not the main, channels of infection.

The following points strongly suggest this:

1. Tonsillitis is the earliest symptom of the disease.
2. The severity of the throat symptoms and of the attack are closely connected.

* The size of the tonsil is best judged by making the patient gag, by palpation, or by using an instrument such as that devised by Tilley.

3. The discharges from the throat and nose are highly infectious, and are capable of spreading the disease long after desquamation is complete.

4. Epidemics of scarlet fever and diphtheria often appear about the same time, or run concurrently, and although it is more common for scarlatina cases to develop diphtheria, the reverse sequence is by no means unknown. A mixed infection is often seen.

5. Children suffering from septic tonsils or prone to tonsillar inflammation supply a very large number of cases.

Through the kindness of Drs. Armstrong, Kerr, and Clegg, I was lately enabled to examine the throats in 273 cases of scarlet fever. In 4 there was a definite history of the partial removal of the tonsils, and it may have been practised more often. In one other case the tonsils had been removed, but a large pad of adenoids was present. In another case (a mild one) there was a small piece of tonsil tissue on one side.

In 131 school children of the same class, examined by the courtesy of Dr. Foggin, the partial operation had been done in 4 at least, and the complete operation in 4. No complete operation was included in the fever group, yet it had been done four times in rather less than half the number of healthy children.

In 239 of Group 1 the tonsils were large, and, although enlargement is expected in this disease, very many gave one the impression that the enlargement had existed previously.

Amongst the convalescents very large tonsils were the rule rather than the exception when all other glandular swelling had subsided. In Group 2 between 30 and 40 had large tonsils. If one allows so large a margin as 33 per cent. for tonsils which had been normal in size before the attack of scarlet fever, there is still a large difference between the proportions of enlarged tonsils in the two groups.

A more systematic examination into a large number of cases will be required to clear up the point definitely, but I think it will be found that scarlet fever occurs more frequently in those who suffer from chronically enlarged tonsils, and, if this is the case, it will be a further argument in favour of complete removal, when operation is required.

Treatment.

If a child otherwise healthy has enlarged tonsils of moderate size which have not caused any symptoms for some time past, it need not be operated on, or if at the time of operation for adenoids no septic matter can be squeezed out of such tonsils they may be left, provided the matter is explained to the parents and the child can subsequently be examined from time to time. Such enlargement may be of a temporary nature or due to one of the other causes of chronic enlargement, or the tonsil may have recovered its protective function.

Splitting up and cauterizing the crypts has a very limited application, at times causes severe inflammation, and by no means invariably cures. X-ray applications and lymphatic gland extract have both been recently tried, and successes reported in reducing the size of the tonsil; even if they reduce the size of the tonsil it may still contain septic or caseous foci, or remain weakened. While these methods are *sub judice* tonsillotomy and tonsillectomy remain where there is apparently simple enlargement. All septic tonsils should be completely removed.

For tonsillotomy it is claimed that (a) it is less severe, (b) often satisfactory, (c) causes less hæmorrhage, (d) portion left will carry on the tonsil function. If a large number of cases are compared it will be found that the immediate shock is about equal in both operations, but the endeavours which are often made to remove a little more tissue in the partial removal often leads to considerable trauma. In consequence there is more post-operation pain in such cases.

Partial removal leaves remains of crypts which easily become infected, and attacks of tonsillitis may still occur or become more frequent. In complete removal the raw surface is larger, but the tonsil is loosely attached to its bed and shells out easily with less trauma, leaving no crypts to infect. The partial operation often is satisfactory, but often is not, and subsequent operation is required, either on account of tonsillitis or recurrence of

the enlargement. In a condition such as tonsillar enlargement, a patient is justified in expecting a cure after operation.

In adults either complete or partial removal is a much more severe operation than in children, and the risk of haemorrhage is greater in both cases, though possibly greater when the tonsil is enucleated. As the operation is generally required owing to the tonsil being septic, the risk must be taken, unless the diathermic apparatus is available.

It is very doubtful if the haemorrhage after tonsillotomy is less than after tonsillectomy in children. The tonsillar vessels are very small when they enter the organ. After enucleation they retract in healthy muscle tissue, and so easily close. In tonsillotomy they are slightly smaller when cut, but have not the firm tissue to help contraction, or may be held open by fibrous tissue. In enucleation the bleeding is sharp, but rapidly ceases; in partial removal there is more oozing after operation. Secondary haemorrhage may possibly occur oftener after complete removal, but this is very doubtful and it is extremely rare. In over 1,000 cases in the past few years I have had no trouble with secondary haemorrhage. Improvement so rapidly and permanently follows complete removal that it is very doubtful if the severity of the operation is greater or convalescence prolonged.

If the tonsillar function were of importance, one would expect that the ill effects of complete removal would have already been shown, but improvement of health has been the universal rule, and, as mentioned above, a tonsil enlarged from chronic irritation is generally one of lowered resistance, and it is also doubtful whether it produces many lymphocytes.

If it were possible to say that a tonsil is healthy but enlarged owing to its endeavour to overcome a shortage of these cells and that it produced an appreciable number, then one would be justified in doing a partial operation.

The disadvantages of tonsillotomy are:

1. Subsequent operation or operations may be required owing to recurrence of enlargement, or to attacks of tonsillitis. I have removed tonsils from a boy who had had three previous operations.
2. The portion of the tonsil most liable to disease—namely, that covered by the semilunar fold—is that most often left; in other cases deep septic or caseous foci are left and brought nearer to infection.
3. Partial removal may be the starting point of tonsillitis, or the attacks may be more frequent after the operation.
4. Partial removal of a tuberculous tonsil may result in the dissemination of the disease.
5. When the pillars of the fauces are widely separated, partial removal does little or nothing to relieve the effects of this condition.

None of these objections apply to tonsillectomy, and only in public speakers and singers, where the voice may be altered by the operation, need one hesitate. In older people, or if haemorrhage is feared, the tonsils can be removed by diathermy.

Considerable attention has been paid to the minimizing of haemorrhage. Crushing through the tissues with a blunt-bladed guillotine appears to have the disadvantage that bruising will occur, and if so, infection of the raw surface will be more severe than if the blade had a dulled edge. Theoretically the risk of secondary haemorrhage appears to be increased.

Messrs. Whillis and Pybus's operation is a most satisfactory method, and the whole operation can be completed in less than a minute. If two sizes of guillotine (their pattern or Heath's) are used, according to the size of the tonsil, one rarely requires two incisions for any tonsil. The edge of the blade should be somewhat dulled, as by this means haemorrhage is lessened.

If after operation the gag is relaxed, firm but gentle pressure is applied to the raw surfaces with mops on handles and the face and head are bathed with cold water, the haemorrhage is considerably lessened.

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EARACHE OF OBSCURE ORIGIN.

BY

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PAIN in the ear and mastoid region may be due to irritation of any branch of the second and third division of the fifth, the seventh, ninth, or tenth nerves, of the cutaneous nerves of the neck, and the carotid sympathetic plexus. Certain toxæmias may also cause it.¹

I have described previously cases due to sphenoidal sinus disease and to stimulation of the posterior end of the inferior turbinal.²

The cases described below are interesting in that aural pain was the complaint for which the patients consulted me. In both cases the tympanum was apparently normal. The first gives an almost perfect mimicry of sphenoidal sinus empyema.

CASE I.—Meningeal Exudation.

A middle-aged woman, well nourished, and apparently healthy, complained of pain in the right ear of a few days' duration. The pain was constant and suggested furunculosis of the external meatus. Examination and testing with tuning-forks gave negative results.

I did not consider the matter serious, but the patient returned in a few days, and then complained of severe occipital pain, pain at the back of the eyes; the original pain in the ear was decreasing in severity. This suggested to me the possibility of acute suppuration in the ethmo-sphenoidal group of sinuses. This was rendered more probable by the nasal examination, which showed that the left nostril was rather narrow, but otherwise not abnormal. The septum was not markedly deflected. The right nostril was wide, the inferior turbinal was somewhat atrophied, and there was crusting on the posterior pharyngeal wall, which reappeared despite frequent nasal lavage. The fronto-ethmoidal and antral sinuses on both sides were quite satisfactory on transillumination.

I was surprised to find marked oedema of both optic discs, and a minute haemorrhage into the right disc. Examination of the urine was entirely negative. By snipping away (under cocaine) a small portion of the middle turbinal, and next day catheterizing the sphenoidal sinus, I was able to prove that that sinus was not at fault. I therefore obtained the opinion of Dr. T. M. Bride, of the Eye Hospital, who was almost certain that the case was one of specific papilloedema. She was immediately placed upon potassium iodide 20 grains thrice a day, with hydrarg. cum creta 1 grain. In three days vision had risen from $\frac{3}{8}$ to $\frac{5}{8}$ in the left eye; the right eye was not so fully recovered. The pains had entirely disappeared, and she "felt fine." Recovery was complete and rapid.

I can only conclude that this was a case of specific meningeal exudation limited to the sphenoidal region, thus simulating the reflex pains of a sphenoidal empyema. The pain in the ear and auricle resembling furunculosis was most probably reflected along the auriculo-temporal division of the inferior maxillary.

CASE II.—Chronic Osteo-periostitis.

A well-nourished woman came to me complaining of severe tympano-mastoid pain on the left side. The opposite mastoid had been operated upon some time previously. All medical methods of treatment had proved futile, and she demanded more radical treatment. The middle ear was apparently normal, but there was some doughy oedematous swelling over and just above the mastoid. I opened the mastoid in the usual way, and found the periosteum thickened and hyperæmic. Haemorrhage was profuse. After considerable trouble a small antrum was found deeply situated. The bone was so hard that it broke a piece out of each of two new gouges. The electric burr was practically useless, so hard and ivory-like was the bone. The middle fossa and lateral sinus were exposed as a matter of routine, but nothing with the exception of this sclerosed bone was found sufficient to cause the symptoms. Owing to the trauma and consequent possibility of necrosis, the wound was not entirely closed. After healing the mastoid region became free from pain, but still there was slight oedema above the mastoid. She was ordered massage over this area for half an hour twice daily, and in six weeks the oedema had entirely subsided.

I considered the pathology of this case to be a chronic osteo-periostitis, probably of "rheumatic" nature, and corresponding to the nodes met with in other parts of the bony skeleton.

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