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ACUTE TONSILLITIS

AN ACCOUNT OF SOME RECENT STREPTOCOCCAL INFECTIONS*

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At the end of 1933 it became obvious that there was prevalent in the Chelmsford area a definite epidemic of tonsillitis, which was carrying with it a toll of loss of work and complications in excess of the normal. On investigating the bacteriology of the throats of some of the cases the constant feature was the presence of the haemolytic streptococcus. This led to a more thorough search for other conditions which might be due to the same organism, and it then became evident that streptococcal infections were far more prevalent than had been the case in the previous year. The majority of these cases could be traced directly or indirectly to a throat infection. At the commencement of 1934 this epidemic increased in magnitude and in virulence, and it is still (November, 1934) active, though less marked.

As is mentioned later in this paper, the question arose as to whether there was more than one type of haemolytic streptococcus occurring among the cases, and the evidence has shown that this was so. (Typing of the organism recovered from four cases showed four different types.)

It is not suggested that streptococcal infection is not always occurring, but that the condition has been more prevalent locally during the last fourteen months. This has drawn attention to the menace which it presents, not only to individuals but also to institutions. It is proposed, therefore, to discuss the epidemic of streptococcal infections together with their complications, to give examples of cases, and to put forward suggestions as to treatment and prophylaxis. For brevity, scarlet fever has not been included in the discussion, although it appears that it is merely a particular form of streptococcal infection.

Aetiology

There is no doubt that the causative organism is the beta-haemolytic streptococcus—*S. pyogenes*. Various workers have demonstrated that there are several types of this organism, and Griffith has succeeded in defining about thirty serological types.

The manifestations can be said to be local, bacteraemic, and toxic, and the effect upon the individual is definitely dependent, first, upon the virulence of the infecting organism, and secondly, upon the resistance of the individual himself. There is at least a temporary acquired immunity following an attack, but it is reasonable to assume that, although immunity to one type may be obtained by an infection with that type, yet no immunity has been produced against infection with another type. This may well account for the frequency of recurrent attacks in the same person which have occurred during the recent epidemic, and also for the fact

that the second attack often shows characteristics unlike that of the first. On the other hand, repeated swabbings of the throat during treatment have demonstrated that the organism is extremely persistent, and although it is possible that reinfection with another type may occur, a second attack may be merely a relapse or recrudescence of the first attack in another form.

The mode of infection would appear to be by the droplet route, and this is made more probable by the fact that a large number of apparently healthy people are found to be carrying this organism in their throats. It should be observed here that it is recognized that, normally, haemolytic streptococci may be obtained from the throats of healthy people, but it is not usual in such a high percentage of persons as in the present instance. Other modes of infection may be suggested, such as milk, water, bathing pools, linen, and hands, but in such cases as have been observed it was difficult to correlate these routes, except in the last case, which is, of course, a form of droplet infection.

The method of isolating the organism employed in the laboratory has been that recommended by Griffith, using horse blood agar plates made by pouring a thin 5 per cent. blood agar layer over a layer of ordinary agar. By this method there is no doubt that it is more easy to recognize colonies. All swabs were cultured as soon as possible after taking them.

Onset of Infection

The onset was usually sudden, and accompanied by considerable constitutional disturbance. In the later cases diarrhoea was often the first symptom. Most frequently, however, a sore or dry throat was the first thing complained of; pain on swallowing was a feature, as were generalized aches and pains, and, less commonly, rigors. The tonsillar glands were always palpable and tender. These symptoms were closely followed by a nasal discharge (described as "catarrh") and a harsh, dry, unproductive cough. In the more severe cases delirium occurred, particularly at night. The duration of the acute stage of the disease ranged from three days up to three weeks. Very rarely was any patient able to return to full work, feeling well, under three weeks. Loss of weight occurred always, and was severe in some cases.

The Throat Condition

The appearance of the throat varied, and can be classified into approximately three types.

1. "*Red and Glazed*" Type.—The tonsils were red and injected, and not usually swollen. This appearance was spread about half an inch laterally from the anterior pillars of the fauces. The uvula was also affected, and was red and slightly swollen. The posterior pharyngeal wall appeared to share in the inflammation.

* A paper read before the Mid-Essex Division of the British Medical Association.

2. *Oedematous Type*.—This type was perhaps the next most common. The tonsils were grossly swollen, bulging out the fauces, and if (as in some cases) unilateral in distribution gave the appearance of a quinsy. The posterior pharyngeal wall was often completely obscured and the uvula greatly swollen. The patients usually complained of pain on swallowing and difficulty in breathing. If, under the impression that pus was present, attempts were made to evacuate the swollen area, then the resultant exudate would be blood. Incision did not appear to give any relief or expedite recovery; in one case aggravation was produced and oedema of the glottis occurred, with fatal results.

3. *Ulcerative and Follicular Type*.—In the ulcerative type shallow whitish sloughs were present together with oedema, which gave an appearance not unlike diphtheria. Repeated swabs were negative for the Klebs-Loeffler bacillus. In the follicular type oedema was more marked but coexistent with small white pinhead follicles, which later coalesced to form ulcers. Pain was a very prominent feature of this type of case.

General Symptomatology

The temperature was always raised in the initial stages, and this was accompanied by a raised pulse rate, the pulse tension being of poor quality. In some cases the pulse was relatively slow at rest. After a period varying from twenty-four hours to six days the temperature would become normal in the absence of complications, and the pulse rate would slow down. The slightest exertion would, however, produce tachycardia and dyspnoea. The respiration rate was not normally increased.

The symptom picture varied to a marked degree. In the mild and abortive types of case it was not infrequent that the patient continued to work, only consulting his doctor later on account of general weakness with palpitations and dyspnoea on exertion. Examination of the throat would inevitably show the tell-tale redness and injection, and throat swabs invariably grew haemolytic streptococci in large numbers. In the fulminating cases death occurred as soon as the fourth day, usually from a complication such as oedema of the glottis.

Following rapidly upon the sore throat there would be a dry, harsh, painful cough—all the more painful on account of the concomitant muscular pains occurring, most noticeably in the intercostal muscles. This cough appeared to be entirely due to irritation of the upper air passage. Finally, a nasal discharge would occur, and the patient would always describe himself as having caught a cold. Unfortunately in the early stages of the epidemic the nasal discharge was not examined bacteriologically, but in the later cases it nearly always grew a haemolytic streptococcus. General weakness and tachycardia on exertion were inevitable sequelae.

Local treatment to the throat took the form of painting at frequent intervals with Mandl's paint, which, although it appears to have no effect on the soreness, definitely improves the throat, and apparently has some lethal or inhibitory effect on the streptococcus. Frequent gargles with hot hypertonic saline gave relief, and the addition of aspirin helped to dull the pain. In some cases local application to the neck of ung. methyl sal. gave relief, but better results were obtained by heat, either in the form of radiant heat or antiphlogistine.

In many instances an *erythematous rash* occurred like that associated with scarlet fever: this varied from a blush to a bright redness. The Schultz-Charlton test was negative. *Peeling* occurred in some cases, but only on the palms of the hands and the soles of the feet. In some instances a *sore tongue* was a feature, and fissures could be observed, whilst in others a definite stomatitis occurred, which was so painful as to prevent even the taking of fluids. Chronic streptococcal glossitis was observed on two occasions and was very resistant to treatment, the best results being obtained by ionization. The tongue was never like that described as associated with scarlet

fever. *Otitis media* was not an uncommon complication, the patient only consulting the doctor after a purulent discharge had occurred. Examination of the pus was always positive for haemolytic streptococci. Before perforation of the tympanic membrane it appeared red and injected and bulging. One case of lateral sinus thrombosis occurred which was associated with a pulmonary abscess and broncho-pleural fistula. Sinusitis occurred in several cases, but cleared up without special treatment other than ephedrine or adrenaline sprays.

There were two cases of iridocyclitis. Throughout the epidemic only one case of pneumonia was encountered. This was first seen in the process of resolution.

Possibly the most consistent feature of the disease was the tachycardia and dyspnoea on exertion experienced afterwards. In some cases the heart was dilated and definite systolic bruit could be heard at the apex. The apex beat moved in and the bruit disappeared upon adequate rest. In practice it was found that adequate rest during the initial stages of the disease almost invariably decreased the length of convalescence and saved the occurrence of the symptoms described above. In a number of the cases bradycardia (on rest) was a feature, and in one particular case this was accompanied by a remarkable diffuse and heavy apex beat, which was outside the nipple line.

Special Complications

ACUTE MASTOIDITIS

This condition was found on several occasions, varying from moderately severe cases to complete mastoid necrosis. Two cases of the latter were observed, both occurring in connexion with the cellular type of mastoid.

Case 1.—B. M., aged 11 years, commenced with an acute tonsillitis of the oedematous type. Within twenty-four hours earache occurred, and within forty-eight hours he had symptoms of mastoiditis. At operation complete mastoid necrosis was demonstrated. An extremely complete operation was performed, but in spite of this the temperature remained raised to 101° F., with a correspondingly raised pulse rate. Examination of the pus revealed the presence of haemolytic streptococci in pure culture. The temperature remained raised in spite of the administration of serum, but the patient's general condition improved. On the seventh day a paresis of the corresponding eye (right) appeared, which was diagnosed as Gradenigo's syndrome. In view of the persistent pyrexia it was deemed advisable to re-explore the mastoid. This was done, but no further bone disease was demonstrated, and large quantities of granulation tissue were scraped away. Antistreptococcal serum (scarlatinal) was given, and this was repeated the next day. On the eleventh day the patient developed acute nephritis. This was treated by diet, and he improved. Unfortunately, twenty-one days later, just when his urine was free from red blood cells, he had a recurrence of his acute nephritis and also suppuraction of a cervical gland occurred in the right side of the neck. This was incised, and from this moment his condition improved rapidly. After recovery an autogenous vaccine prepared from the culture from the tonsils was given, commencing with small doses. The final renal function tests showed no permanent impairment. It is proposed to remove the tonsils at a later date.

CELLULITIS OF NECK

Four cases of acute streptococcal cellulitis of the neck, in connexion with septic teeth, were observed. It is possible that in these cases the infection had spread from the tonsils, as throat swabs grew haemolytic streptococci in each case. It is of interest to note that both these cases occurred in pregnant women, and that abortion took place. Observation led to the belief that incision of the cellulitis in the absence of fluctuation is inadvisable, and also that extraction of the teeth was contraindicated in the absence of obvious pus.

Case 2.—Ada S., aged 38 years, was admitted on August 4th, 1934, complaining of a brawny swelling of the right side

of the neck and face. There was a history that one week before the neck had been swollen and tender, but this had subsided. The swelling had recommenced two days later, and had gradually become worse. She had difficulty in opening the mouth and swallowing. On examination there was found to be a brawny swelling of the right side of the neck and face; there was no fluctuation. A septic tooth was present in the right lower jaw. The patient was very toxic. A swab of the throat showed an almost pure growth of haemolytic streptococcus. She was given 10 c.cm. of polyvalent antistreptococcus serum. This was repeated on the next day and the tooth extracted. A small quantity of pus escaped, culture of which showed a haemolytic streptococcus. The urine then showed the presence of sugar and acetone. Insulin and glucose were administered intravenously, with more serum, and she improved considerably. On August 7th she aborted, and the placenta was retained. This was later removed manually. A blood count showed a leucocytosis of 15,000 white blood cells with 75 per cent. polymorphonuclear cells. The polymorphs showed no gross shift to the left. On August 9th she became rapidly worse, and died of heart failure, although her cellulitis had subsided. It appeared that the combination of the abortion superimposed upon her already toxic condition was the final cause of death.

Cellulitis of the neck also occurred in connexion with the glands, notably tonsillar and lingual glands. This in most cases took the form of a brawny oedema, and yielded to serum without the necessity for surgical intervention on account of suppuration. There were two cases of erysipelas.

Cellulitis was further seen in various parts of the body which could not in any circumstances have been due to direct spread from the throat—as for example, the hand, the foot, and the ankle. (The route of infection was not always obvious, but it was possibly through the blood stream, most probably by the droplet route, either from the patient or from an external source.) In the absence of pus formation, the treatment which gave best results was serum therapy, which resulted in either localization or resolution. Evidence seemed to indicate that early incision is contraindicated.

Case 3.—Mrs. S., aged 58 years, was admitted on account of a swelling of the hand, with pyrexia, tachycardia, and generalized malaise. The hand was swollen, tender, and painful, and it was thought that pus was present under the palmar surface. Free incision was made under anaesthesia, but no pus was found. On the next day the patient's condition was worse, and a second operation was performed, again with negative results. On the following day the hand was again explored and a tube inserted up above the wrist, again without pus being found. Amputation of the arm was considered. The whole hand was a mass of brawny oedema, and almost twice its normal size; it was tender, red, and painful. Examination of the pus showed many streptococci, and a haemolytic streptococcus was obtained on culture. Administration of polyvalent antistreptococcal serum produced immediate and most dramatic results; the temperature rapidly fell, pus discharged, and the hand cleared up completely. (Similar results were observed on cases of cellulitis of the leg.)

ACUTE NEPHRITIS

This occurred in four cases of the series. In one case it was associated with acute mastoid necrosis, and in another with the ulcerative type of tonsillitis. This was given local treatment to the throat, serum, and diet, with daily examination of the urine for red blood cells. The diet was restricted until the urine was free of red cells.

Case 4.—E. O., a grocer aged 20 years, was admitted to the Chelmsford Hospital on February 12th, 1934, with a history of sore throat commencing fourteen days before. There had been no swelling and no pain until the last twenty-four hours, when the urine had become cloudy. On admission the man was extremely ill, his temperature being 99° F. and the pulse 100. The neck was swollen and brawny, and the throat red, swollen, and oedematous, with the tonsils showing some ulcerated patches. The man looked toxic, and there

was oedema of the ankles. The urine contained much blood, and, microscopically, blood casts and red blood cells. A throat swab gave a culture of haemolytic streptococci. He was treated with local applications of Mandl's paint every two hours, and 10 c.cm. of polyvalent antistreptococcal serum was given intramuscularly on two successive days. The diet consisted of fruit juice and glucose orangeade. He commenced to improve after forty-eight hours, but the urine contained blood cells until May. Repeated swabs of the tonsils still grew a haemolytic streptococcus. The blood urea was at first raised to 85 mg. per 100 c.cm., but later fell to 40 mg. per 100 c.cm. The patient was treated by dietary and rest until the urine was free from red blood cells. An autogenous vaccine was prepared and given, and the tonsils removed six months later without any reaction.

All these cases yielded to treatment on rigid medical lines until the urine was free from red blood cells. In the cases of E. O. and B. M. an autogenous vaccine was prepared and given with a view to tonsillectomy later. The report on the microscopical inspection of sections of the tonsils showed the following characteristics: "adenitis of considerable standing, but at the time of removal in a relatively quiet stage; very great sclerosis around the periphery of the individual follicles; no high organismal content in the crypts."

ARTHRITIS, FIBROSITIS, AND HEADACHE

In the early stages of the epidemic many cases of arthritis secondary to a streptococcal throat were diagnosed as acute rheumatism. It soon became evident, however, that they did not yield to the usual treatment, inasmuch as salicylates had little or no effect; furthermore, on closer examination of the affected joints it could be seen that they did not conform to the type usually associated with acute rheumatism. The joints were painful, but not greatly so, the swelling was moderate, and there was nearly always fluid present. Under pressure, although tenderness could be elicited, it was nevertheless not very marked, and redness was not a feature. Movement was restricted as it caused pain. The joints principally affected were the ankle, knee, and wrist. The arthritis was not usually multiple. The most pronounced feature was that, although resistant to salicylates, the arthritis inevitably improved after one injection of anti-streptococcal serum (polyvalent).

It was noticed that there was another type of arthritis which was observed to occur chiefly in the small joints of the hands and feet, associated in some cases with generalized pains, worse on movement. This condition, however, occurred more in association with the soft structures around the joint. The fingers showed generalized fusiform swelling. Again, this condition failed to respond to salicylates in various forms. Local applications of antiphlogistine appeared to give relief, and in all cases salicylates obtained little or no response. It is, however, advisable to administer salicylates if only as a diagnostic measure. Serum therapy appeared specific. Absolute immobilization and rest was essential on account of pain. No cases suppurred.

Case 5.—Mary T., aged 19 years, commenced with a sore throat and diarrhoea, following which she had generalized vague pains. She improved to a certain extent upon rest and sodium salicylate, but continued to complain of stiffness. On admission she was found to have generalized stiffness, and pain and swelling of the small joints of the fingers and also of the wrists. She was also "stiff" on movement. A swab of the tonsils gave a mixed growth with a haemolytic streptococcus predominating. An autogenous vaccine was prepared and administered with great care. Some slight reaction was observed, and there was some improvement. After a suitable period the tonsils were removed; there was some slight immediate reaction, but improvement proceeded rapidly, and massage and movements were administered. She made an uneventful and speedy recovery, and is now back at work. The total duration of absence from work was eight months.

In association with arthritis may be mentioned one of the most common sequelae—namely, fibrositis. The muscular pains may be divided into two types: a generalized pain associated with the onset of the disease, which usually passed off after forty-eight hours and was particularly complained of in the early stages; and a persistent pain, worse on movement, with local tenderness on pressure, which would be present for several weeks and was very resistant to all kinds of treatment. The first type can be seen in almost any acute illness in which "aches and pains" are a feature, but the second type occurred in the most varied manner. Headache is most common, and relief could generally be obtained with pyramidon, phenacetin, or luminal, but it was also seen as an alarming symptom, and in some cases morphine had to be given to obtain relief. The headache appeared to be due to fibrositis of the scalp, and could be relieved in some cases by massage to the scalp gently applied. Intercostal fibrositis in many cases resembled pleurisy, but no rub could be heard, and local tenderness was most marked. It was the cause of intense discomfort during the coughing stage. Generalized fibrositis was not uncommon, and stiffness of the joints and limbs was most marked. Lumbago was encountered on several occasions, and eventually yielded to treatment.

OTHER COMPLICATIONS

Three cases of streptococcal peritonitis occurred, one of which terminated fatally. Two were associated with acute appendicitis, and in both cases diarrhoea was a prominent feature. The other case was apparently one of secondary infection. There was one instance of secondary infection of a compound fracture.

Puerperal sepsis has probably led to more discussion than any other condition. Several cases were noted during the last year, and in some instances a haemolytic streptococcus was isolated. It is of interest to note here that Whitley states to me that the incidence of puerperal sepsis in the area has been higher during the last twelve months, and that the number of cases in which *S. pyogenes* has been isolated has also been larger, although the source of infection was not traced. It may be remarked that a routine swabbing of the throats of six nurses has revealed haemolytic streptococci in the throats of five of them; and that a swab of a district nurse and a doctor from one area also showed the presence of the organism.

General Treatment

For general treatment complete rest in bed with fluids only was the rule. These consisted chiefly of glucose, orangeade, and lemonade, taken as hot as possible at frequent intervals. At least half a pound of glucose should be ingested daily. The local treatment to the throat has already been described. Rest was maintained until the temperature had been quiescent for at least two days and the pulse rate had settled down. "Graduated getting up" was then instituted, and, provided that this technique was followed, the patient was usually fit for work at the end of three weeks from the onset.

SERUM THERAPY

Unfortunately, facilities are not available for administration of serum in a large number of cases, due, first, to the expense, and, secondly, to the ever-present danger of a reaction. An extremely good illustration of this occurred about two years ago in a man aged 40, who, after desensitization, had recurrent and alarming attacks of urticaria, culminating in shock and unconsciousness.

Serum was used on cases in the series which showed complications such as nephritis, arthritis, and cellulitis, but later in the epidemic it was used as a routine measure upon all cases from which haemolytic streptococci had been isolated. The results undoubtedly justified the expense.

The serum used in all the cases except one was polyvalent antistreptococcus serum (B. W. and Co.). In three instances I used serum as a means of obtaining a temporary passive immunity, and I feel that this is justifiable in cases in which development of an acute infection would be fatal. The dosage in the majority of cases has been 10 c.cm., repeated, if necessary, according to the clinical picture. Insulin and glucose may be used at the same time. In the majority of cases the intramuscular route was used with success.

Careful consideration of the history of the patient and family as to allergic conditions was undertaken, and also as to whether serum had ever been administered before, and a small test dose given if necessary. In all cases a small dose of ephedrine was given about twenty minutes before the injection. In cases of sensitized patients desensitization was performed: in all cases a syringe ready loaded with adrenaline was at hand. In the eventuality of a reaction 3 minims were injected at once, followed by 1 minim every half-minute.

Differential Diagnosis

Diagnosis depended upon the physical signs and symptoms—notably, the sore throat, pyrexia, and rapid pulse, associated with general constitutional disturbance and the typical appearance of the throat confirmed by bacteriological examination.

Diphtheria.—With regard to the throat, the most important disease to be excluded is diphtheria. It should be borne in mind that it is possible to have a mixed infection, and that this is the type of case which goes to a fatal termination. Differentiation should be possible on account of the appearance of the throat, enlargement of the glands, general symptoms, and the smell. In doubtful cases antidiphtheritic serum should be given as well as antistreptococcal serum.

Scarlet Fever.—In connexion with this, diagnosis is of importance only in order to satisfy the local health authority with regard to notification. The Schultz-Charlton reaction and the result of the Dick test may be helpful in coming to a decision. There is no doubt that the two diseases may be manifestations of one and the same infection. The tongue in most cases of streptococcal tonsillitis is not a scarlet fever tongue, and the complications differ inasmuch as they are more severe than those of the scarlet fever that has occurred locally during the last few years. In my experience scarlet fever as seen at present in this neighbourhood is a much milder condition than streptococcal tonsillitis.

Acute Rheumatism.—The differential diagnosis is by means of the clinical appearance of the joints and their failure to respond to treatment with salicylates, or, better still, by their response to serum. In the majority of the cases the heart has escaped valvular damage, which appears to indicate that the lesion is primarily a toxic myocarditis.

Rheumatoid Arthritis.—There appeared to be no need to differentiate, as it is evident that the multiple arthritis associated with streptococcal infections is merely one of the infective type of "rheumatoid arthritis." The blood sedimentation rate was increased in all cases. Finally, in the differentiation of this condition from any other condition due to a pyogenic organism, too much stress cannot be laid upon the desirability of examination of all pus as a routine measure.

Other differential diagnoses would be *glandular fever*, *mumps*, *acute osteomyelitis*, and *septicaemia*.

Prophylaxis

The mode of infection, as has been discussed elsewhere, appears to be chiefly by the droplet route; hence it would appear advantageous to devise some method by which carriers, or potential carriers, may be sterilized.

The only method of sterilization of the throat which has proved satisfactory in my hands has been the local application of Mandl's paint, and it is extremely difficult to persuade large numbers of people to paint their throats daily. Furthermore, it would appear that the majority of convalescent patients still have a haemolytic streptococcus in their throats unless treated with painting during the course of the disease.

This, then, appears to indicate that the routine treatment of the infection by painting the throat will act also to some degree as a prophylactic measure. With this in view, I have endeavoured, where possible, to persuade convalescents to continue painting their throats as long after their recovery as possible. Gargling with hypertonic saline also is efficient to some degree. Isolation in a fever hospital has the disadvantage that there is a liability to contract infection with another type of the same organism there.

The chief causes of the continuation of the present epidemic would appear to be as follows.

1. The failure of patients to seek medical advice at the earliest opportunity, and hence the spread of infection before treatment has been commenced.
2. The fact that financial considerations compel the average man to return to work too soon, often with the throat still showing the presence of haemolytic streptococcus.
3. The present desire of the schools to maintain their attendance lists at the highest level, regardless of the fact that a child with a sore throat is a potential source of danger to the other children.

In hospital, the matter presents a far more serious aspect, as the introduction of an acute infection among persons whose resistance has already been lowered by other conditions is nothing short of a calamity. There is also to be considered the danger of contamination of clean wounds, with fatal results.

Several methods of prophylaxis suggest themselves.

1. A careful routine examination of the throats of all new admissions, with isolation and treatment if necessary.
2. A routine swab of all nurses periodically, with daily painting if positive.
3. A routine Dick test with immunization of all nurses on commencing hospital duty.
4. The wearing of masks for all dressings.
5. Immediate isolation of any nurse reporting with a sore throat, no return to duties being allowed until her swab is negative.
6. The daily examination of the throats of nurses and patients by the ward sisters.
7. Closure of wards during epidemic to all except acute cases, and cessation of operations for tonsillectomy or adenoidectomy.
8. The routine examination of all pus for streptococci, and in special cases administration of prophylactic doses of serum.

Summary

Although cases of scarlet fever have occurred locally during the last year, there has also occurred an epidemic, which has been more severe, of streptococcal tonsillitis, due to one or more types of haemolytic streptococci.

The majority of the cases showing complications have improved with treatment with polyvalent antistreptococcal serum and the other measures described.

Before concluding, one question appears extremely relevant: Are we any longer entitled to regard scarlet fever as a separate disease to be accepted by the public health authorities as a ground for notification and isolation?

I should like to express my appreciation for the help and suggestions given me by Dr. Frederick Griffiths and Dr. J. T. Whitley in the preparation of this paper.

TONSILLITIS AND ALBUMINURIA

BY

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The connexion between infections of the tonsils and upper respiratory passages and certain renal lesions is now universally recognized, but surprisingly little information is available as to the frequency of occurrence of renal damage in such infections, and still less as to the factors which determine its appearance.

Our first object in the present investigation was to determine the incidence of renal lesions in an unselected series of patients reporting for tonsillitis at the out-patient department of a general hospital.

The only extensive study of this subject known to us is that of Petersen and Schwab,¹ who in a series of 479 cases of tonsillitis found evidence of a renal lesion (Nierenerkrankung) in thirty-six (7.5 per cent.), such lesions occurring more frequently in patients with peritonsillar involvement. Their analysis of the type of lesion present in their cases is, unfortunately, complicated by the inclusion of ten other patients who had been admitted to hospital for a renal lesion following on a throat infection after a definite interval. Including these ten patients, they classify 28 per cent. of their forty-six cases of renal damage as suffering from acute glomerulo-nephritis, 34 per cent. as cases of focal nephritis, and 38 per cent. as instances of renal irritation; in these latter patients isolated red cells, casts, or renal epithelium made their appearance in the urine for a few days only, and no other evidence of renal damage was present. In a smaller series of 151 patients Lomnitz² saw two cases of febrile albuminuria and three instances of late post-infective albuminuria, which he classified as nephritic.

The incidence of late albuminuria and nephritis following scarlet fever in the hospitals of the L.C.C. was, at the time of our investigation, 4.1 per cent., but the upper respiratory infection of the scarlet fever patient is due to a specific organism, and the patient is hospitalized at an early stage of his disease. Such a figure is not, therefore, necessarily applicable to a group of patients suffering from varied infections and attending an out-patient clinic.

Our second object was to study certain factors which might determine the appearance of a renal lesion in the individual patient. Among such factors are an infection by a specific organism, a peculiarly severe infection by any organism, an indeterminable susceptibility on the part of the patient, some extraneous factor, or a combination of any of these.

The two possible factors to which we have directed our attention are: first, the connexion between renal lesions and the predominance of haemolytic streptococci in the infected throats; and, secondly, the influence of the external temperature on the incidence of renal damage—since exposure to cold has always been regarded as conducing to the production of nephritis. In the epidemic of trench nephritis, for instance, which affected the British Army in France, the disease showed a maximum incidence during the winter months, and was most frequently met with among the infantry, who were especially exposed to the inclemency of the weather. It does not, however, follow that cold was the determining factor, since the incidence of infection among the troops during summer and winter was not determined. There is no reason to suppose that "trench nephritis" was not primarily the result of an infection, as is the acute glomerulo-nephritis of civilian life, though, in the experience of one of us, a history of preceding tonsillitis was rare. Slight infections