THE CAUSE AND MEANS OF PREVENTION OF TONSILLITIS,
WITH SPECIAL REFERENCE TO NAVAL AND MILITARY
SERVICE.

BY TENAX PROPOSITI.

(Continued from p. 364.)

THE PERSONAL FACTOR.

Under this heading are included the following: racial characteristics,
age, carriers, susceptibility and immunity, and individual characteristics.

(1) Racial Characteristics.—Acton [38] reported on an epidemic of sore
throat among troops in Mesopotamia. He concluded that Indian troops
were less susceptible to sore throats than British. This contention is
supported: by the figures for the health of the Army in 1927 when the
incidence of tonsillitis among British troops in India was 32.2 per 1,000,
while among Indian troops it was only 3.9 per 1,000, or one-tenth of the
previous figure. From reports of the Peking Union Medical College
Hospital it seems that similar figures would be obtained in China; tonsillitis
does not appear to be a common disease amongst the Chinese. Both black
and yellow races seem to have a high resistance to tonsillitis.

(2) Age.—Tonsillitis is most common about the school age.
The medical history sheets of about a thousand soldiers show that this
entry is very frequently the first on the sheet at the beginning of service at
the age of 17 or 18 years. Bloomfield and Felty [16] found that those without
a previous history of tonsillitis showed a much lower tendency to develop it
than those with such a history, and that if the age of 20 was reached
without an attack it was unlikely that infection would occur in the future.
It has already been noted that tonsillitis in infants under the age of 5 is
unusual owing to the simplicity of the bacteriological flora.

(3) Carriers.—The carrier is present in every community in a percentage
which varies with the surroundings and the time of the year.
Simmons and Taylor [39] examined 3,000 persons and found 56 per
cent to be carriers of the haemolytic streptococcus. Leathart [40] has
shown the carrier rate is far higher in children who go to school than in
those who do not. Meleney worked on the personnel of a surgical team;
he has found that the carrier rate rises steadily in the winter months from
5 per cent in November and December, 10 per cent in January, February
and March, to 30 per cent in April and May, and then gradually declines
throughout the summer.

Ballenger [41] has stated that on a conservative estimate half the
population of the temperate zone, during the winter months, are active
carriers of the haemolytic streptococcus, and that tonsillitis and similar
diseases have assumed the proportions of a yearly pandemic.
Bloomfield and Felty [16] took cultures from each of their groups of two hundred nurses. Three cultures were taken from each member of the group before any infection occurred. Sixty-seven of the nurses had had previous tonsillectomy of whom nine per cent were carriers. One hundred and eight had had no operation and showed thirty-seven per cent of carriers. After the attack of tonsillitis was over the throat showed a gradual change in the bacteriology from that of the acute case to that of the chronic carrier.

With regard to the carrier rate and susceptibility among 41 carriers 2.5 per cent developed infection, and among 63 non-carriers 41 per cent became infected. Thus the carriers seemed less liable to infection; this must be due either to the presence of the streptococcus or to a degree of immunity acquired from previous attacks. In the latter case it was supposed that the nearer the last acute attack the greater would be the immunity. Actually the opposite was found to be the case. It was concluded that in so far as insusceptibility ran parallel to streptococcus carriage, such insusceptibility must depend directly on the presence of the streptococcus. Practically every case had a history of acute tonsillitis in the past and old scarred tonsils frequently yielded a pure growth of the hemolytic streptococcus. Of 63 non-tonsillectomized non-carriers (those with no history of tonsillitis), 17 per cent acquired tonsillitis. Of those with a previous history 62 per cent became infected.

Kirkbridge, Wheeler and West [42] have recently shown that repeated cultures are required before carriers can be regarded as free from infection. Working on convalescents from scarlet fever, five patients gave one, two, or three negative cultures, but subsequently all showed the presence of the hemolytic streptococcus.

Glover [3] has recently found the carrier-rate of the streptococcus to vary between 36 per cent in November, 1925, and 0 per cent in October, 1926. In five schools where scarlet fever was occurring, the streptococcus carrier rate was 33 per cent, 26 per cent, 26 per cent, 36 per cent, and 33 per cent respectively.

The carrier rate must assume huge proportions at times, being accentuated by winter months, overcrowding and cinemas.

(4) Susceptibility and Immunity.—The mass of literature on the subject of immunity is beyond the scope of this essay. The degree of immunity varies greatly in different individuals, and at present cannot be measured. Eastern races must be born with a high degree of immunity. Dudley has recently pointed out that the evidence for this assumption is strong. In China, the conditions for spread would be ideal if there was no natural immunity. In actual practice, tonsillitis is not commonly seen.

There seem to be three important factors in the resistance to infection:—

(a) Tonsillectomy. This is dealt with later.

(b) The existence of a streptococcus carrier state. Those who are carriers do not get the disease. The probable explanation is that the mild infection acts as a form of chronic vaccination.
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(c) "Natural" resistance. Those with a history of infection in the past show a much greater likelihood to infection than those who have not been infected. If no infection occurs below the age of 20, tonsillitis is most unusual.

(5) Individual Characteristics.—It is said that the modern soldier goes sick more readily than did his predecessor. This is almost certainly correct. There are two reasons why this is so. The first is that we are a C3 nation as shown by the national health reports, and, further, the lower classes have been educated to take an interest in treating themselves. Daily papers, magazines and hoardings are filled with a dreary reiteration of signs and symptoms of every disease. The suggestion of sickness is constantly being "plugged" into the average layman. The craving of the out-patient at our voluntary hospitals for a bottle of medicine is getting a serious problem. It is no wonder that the ordinary man in the street tends to go sick more often than his forbear.

The "happy" and "unhappy" ship, and the "good" and "bad" regiment are factors in the incidence of sickness which go a long way, although it is difficult to analyse them.

Finally, diathesis and tonsillitis show no connection. I have carefully looked for any definite diathesis in all recent cases, but have failed to find any connection between tonsillitis and Goldthwaite's types.

Prevention of Tonsillitis.

Having reviewed the various factors in the cause and spread of tonsillitis, what means are there of preventing it?

There are three lines of attack: (1) On the tonsil itself. (2) On the general resistance to infection. (3) On the line of spread.

(1) On the Tonsil.—(a) Tonsillectomy appears to be the most satisfactory way of preventing tonsillitis. The operation also has a most beneficial effect on the carrier rate. Van Dyke [44] finds the frequency of the haemolytic streptococcus to be greatly reduced afterwards. Pilot and Davis [45] have put the figure at fifty per cent. Tongs [11] has given similar figures, but Rhoads and Dick [46] have emphasized that the operation must be a complete one, as they have shown that the stumps left after an incomplete removal may be more heavily infected than the original tonsil. Bloomfield and Felty [16] have shown conclusively that the operation confers protection; thirty per cent of their cases occurred in non-operated persons and only eight per cent in those who had had tonsillectomy. Removal of the tonsils also cleared up carriers.

Though there is no doubt that tonsillectomy is the most efficient way of preventing infection, it is out of the question as a preventive measure. The only indication for it is repeated attacks of acute inflammation, and even then the modern tendency is one of conservatism.

(b) Radiation.—Nuzum [47] has attempted to sterilize carriers by X-ray of the tonsils. The results have not been very satisfactory, only
fifty per cent of carriers being improved as a result of treatment. Even with an improvement in technique, the expense of such treatment would be too great for it to be of real practical value.

(2) The General Resistance to Infection. Vaccines.—Felty and Hodges have employed a polyvalent vaccine containing twenty-one strains of hemolytic streptococci isolated from recent cases of acute tonsillitis. Three injections were given of 75, 100, and 125 millions respectively. The results were good. Ninety women students were used in the experiment. No previous operation had been performed. Thirty-three were carriers; of these, 17 were vaccinated, and 16 used as controls; 57 were non-carriers of whom 18 were vaccinated. No cases occurred among the carriers, vaccinated or not. This result was anticipated in view of the previous data. Of the non-carriers, fifteen acquired tonsillitis; all of these but one were severe cases and in the unvaccinated group. Only three cases occurred in the vaccinated group, all of which were very mild and would not have reported sick had it not been for special instructions.

Robert [48] has obtained good results, but Glover [3] has not. Both employed mixed vaccines.

The objection to vaccines is the difficulty of persuading men to submit to injection for what is a comparatively mild complaint. I do not think it likely that much can be done in this way, assuming that a really satisfactory vaccine can be prepared.

(3) The Spread of Infection.—The collective sterilization of mess-kits is in its infancy. In spite of the interest which has been aroused, it does not seem likely that very striking results will be obtained. Infection probably takes place far more frequently in the cinema, the café and the bar.

Glover has recently emphasized the importance of preventing infected boys from returning to school, and the isolation of all pyrexias. He further advises against work being carried out before breakfast during the first few weeks of term. In the Army, it is easy to isolate pyrexias, but so much of the work of the recruit is carried out before breakfast that it would be difficult to alter the training syllabus. The age of the recruit is generally higher than that of the schoolboy, and he is more resistant to infection.

Spacing of beds remains of fundamental importance and co-operation with the Royal Engineers is essential.

In conclusion, it must be remembered that the control of the soldier ceases as soon as he leaves barracks. Our barracks have been improved as far as possible. If men were confined to barracks, the problem of the spread of tonsillitis would be a comparatively simple one. As it is, most of the preventive measures taken are rendered valueless; the only one thing that keeps the average soldier in barracks at night is lack of funds. Mechanical sterilization of utensils will enjoy a popular vogue, but the results will probably be disappointing.

The points of this essay may be summarized as follows:
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(1) Tonsillitis is due to the haemolytic streptococcus.
(2) The incidence of tonsillitis is remarkably constant in all large communities.
(3) The infection is spread through carriers.
(4) The carrier rate may rise to 40 per cent, or even 50 per cent, under suitable conditions.
(5) Prolonged and intimate contact is necessary for transmission to occur.
(6) The cinema, café, and bar are the most probable centres of infection so far as the soldier is concerned.
(7) Adequate spacing of beds is of fundamental importance.
(8) Climatic conditions have little effect on the number of cases.
(9) Satisfactory housing is of considerable importance.
(10) Spread by infected table-ware is probably of the greatest importance.
(11) Finance is a big factor against the introduction of collective sterilization.
(12) The white races have a much greater susceptibility to acute tonsillar infections than the black or yellow races.
(13) A large proportion of individuals have a natural resistance to infection.
(14) Tonsillectomy is the most efficient way of preventing tonsillitis and in clearing up carriers.
(15) Vaccines have generally been disappointing.
(16) The problem can be attacked by only three measures:
   (i) Adequate spacing of beds.
   (ii) The isolation of cases.
   (iii) The sterilization of table-ware in canteens.

In this review of the problem I have drawn freely from many authors. As far as possible all references have been verified and I am grateful to the staff of the Peking Union Medical College Hospital for permission to use their library for the purposes of reference.

REFERENCES.

REFERENCES (continued).

   — Ibid., 1922.
   Bloomfield and Felty. Ibid., 1923, xxxiv.
   — Ibid., 1923, xxxiv.
   — Ibid., 1923.
   — Arch. Ind. Med., October, 1923, xxxii.
   — Ibid., September, 1923, xxxii.