outlined above affect the threshold temporarily or even permanently.

The stigma of something abnormal (and hence pathological) that has been imputed to a high or low renal threshold should be removed.

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PREVENTION OF THROAT INFECTION

BY

HELEN PIRELL GOODRICH, M.A., D.Sc.

AND

GEOFFREY L. WAY, M.R.C.S., L.R.C.P.

Lieutenant R.A.M.C.

The toll in time and fitness levied by repeated epidemics of colds, sore throats, and inflamed tonsils arising among war workers is well known. When people are crowded together "droplet" infection is of course especially liable to occur.

Thymol as a Mouth-wash

During the last war, after investigating the action of various antiseptics on the organisms occurring in the mouth and tonsils, it was suggested by one of us (Goodrich, 1917a) that a solution of thymol was an excellent mouth-wash. This opinion has since been confirmed not only by our own daily experience but by that of many others. A distinguished biologist told us recently that he had used a saturated solution of thymol as a gargle as well as a mouth-wash ever since 1917, and to this attributed the fact that he had since had no throat infection, not even a common cold. Many people prefer to dilute the solution. No doubt there is considerable individuality with regard to the taste of thymol, some people finding it rather peppery and inclined to be irritating if strong. It should be remembered, too, that the solubility rises rapidly with the temperature, so that a really cold solution (0.05 to 0.06 per cent.) is much weaker than one saturated in a warm room.

For popular use the solution is best made by keeping the thymol in a suitable bottle filled with water; if in small crystals these may be enclosed in muslin to prevent their escape when the solution is poured off. The bottle may be refilled with cold* water as the solution is used, and one can rely on having a saturated solution after a short time. When required as a mouth-wash or gargle it may be added to water (preferably warm) until the taste is right for the individual but not strong enough to "bite the tongue," as children say. The thymol is so slightly soluble that an ounce, costing a few pence, will make about nine gallons of solution; the price is therefore negligible. The saturated solution is also very useful for disinfecting rooms and articles in them, and especially for spraying windows and mosquito nets in the Tropics.

It has elsewhere been pointed out (Goodrich, 1917b) that although the addition of glycerin enables much more thymol to dissolve in water there is no corresponding increase of antiseptic power, and that therefore the use of glycerin in this way is a great waste of a substance required for munitions. This criticism does not apply to the use

of glycerin as a demulcent in throat paints, but only to mixtures intended to be diluted before being used, in which case, therefore, the glycerin has practically no action except the reduction of the antiseptic properties of the thymol.

The Case for Oral Hygiene

It may perhaps be well to repeat here that in every mouth left undisturbed for some hours—for example, during sleep—a varying amount of white substance grows on the tongue and other surfaces and accumulates round the teeth. This consists chiefly of the thread-like plant *Leptothrix*, in the meshes of which may be numerous micrococci and other organisms and cells. The leptothrix, if not removed, will grow rapidly and calcify, passing from the so-called soft tartar ("materia alba" of Leeuwenhoek) to the well-known hard tartar. Goodrich and Moseley (1916) also recorded how frequently organisms from the mouth are to be found growing in the crypts or pockets of the tonsils. These folds of epithelium, when filled with calcified colonies of leptothrix as well as numerous bacteria, show up as white spots on the surface of the tonsil (so-called ulcerated throat). This is the unhealthy condition that must be cleaned up: if neglected the whole tonsil may become much hypertrophied, whitish, and thoroughly septic, with organisms and pus oozing from the surface as in some of the excised tonsils we have examined in the laboratory.

All this points to the advisability of keeping the throat and tonsils, as well as the mouth, clean. It seems strange that some people who would never think of missing their daily bath resent giving, by way of oral hygiene, more than a perfunctory rub to their teeth with a brush (possibly teeming with bacteria); and yet with a suitable antiseptic at hand it is so easy to sterilize a soft brush and to kill and remove most of the organisms trying to establish themselves in the mouth or throat. It would seem that the mere mechanical action in gargling must be of use in helping to empty the tonsil pockets so that the antiseptic can wash away the contents. Most children will take to gargling, as to the use of a toothbrush, if they have an inkling that their parents and other grown-ups use these hygienic measures, which really take so little time. Cleanliness can, of course, be gauged by the absence of tartar from the teeth and the healthy appearance of tongue and tonsils. Usually nothing more will be required to ensure reasonable freedom from infection.

One has, however, if necessary, a further line of defence in the practice of painting the throat and tonsils: here again the mechanical action doubtless helps to remove organisms lodged in the pockets or multiplying on the mucous surface of the throat. In the standard iodine-and-glycerin mixture used as a paint one can well afford to have the powerful antiseptic properties of iodine reduced (see below), and the glycerin ensures that the organisms are submitted to the antiseptic for a longer time than in mere rinsing.

In the report published by the Ministry of Health (Straker, Hill, and Lovell, 1939) on the bacteria of the nasopharynx surprisingly high percentages of meningococci, haemolytic streptococci, and other pathogenic organisms are recorded from some groups of the population. It is very much to be hoped that these investigations will be continued and some correlation attempted with the general hygienic conditions of the mouths and throats tested. Perhaps the results would throw some light on a fact for which the authors seem unable to account at present—namely, that in groups with similar occupations consider-

* Hot water must not be added to the solid thymol, since it melts at 51.5° C.

ably smaller percentages of women than men were found to be carriers. We can find only one reference in the report to the effect of cleanliness of the throats tested: on page 55, referring to the tonsils of nine schoolboys, it is stated: "From six of these cases the Type 19 streptococcus was isolated, while the remaining three gave completely sterile swabs—probably as a result of recent gargling or throat-painting."

Antiseptics were in some disrepute at the end of the last war, in great part owing to the conflicting results obtained by those attempting to eliminate meningococcus carriers. Now that it is known that carriers are so numerous among the general population and that the form of meningococcus carried (Group II) is comparatively harmless, the Ministry of Health (1940) discourages the search for carriers and states in its Memorandum that local treatment of the nasopharynx is probably useless. We hope, however, that contacts and carriers are not discouraged from using such simple hygienic measures as advocated here in addition to the fresh air and exercise prescribed. Infection, as stated on page 10 of the Ministry's Memorandum, appears to be through the nose and mouth, and it must surely be an advantage for individuals to take any steps likely to clear away infecting bacteria while they are still only on the surface of the epithelium.

From our personal experience of "gargling fatigues" we know that the men generally appreciate being encouraged to keep their mouths and throats clean—so much so, in fact, that they sometimes make solutions of anything available, such as common salt or vinegar, to use at other than the official times.

There seems little doubt that it is sometimes beneficial to change temporarily the antiseptic used as a throat- or mouth-wash, and the usual solutions of potassium permanganate or even boric acid may thus come in useful as a change for a day or two from more powerful antiseptics such as thymol and iodine.

Conclusion

It may be of interest to add here the results* of recently testing iodine solutions to discover one with the same germicidal effect *in vitro* as thymol. The method was that devised by one of us in 1917. A thin cover-slip film of an emulsion of the bacteria to be tested (in this case *B. coli*) was dried and immediately placed in the prepared solutions for the required time, then rinsed and pressed on to the medium (MacConkey's bile-salt lactose-agar) and incubated at about 34° C. for twenty-two hours. Provided that great care is taken in making the films and using aseptic methods throughout, the results obtained are surprisingly consistent.

Dried control films of coliform bacilli submitted only to water gave large growths always, whereas in thymol solution saturated at 15° C. (0.077 per cent.) sterilization was effected in under thirty seconds. Iodine so dilute as 0.01 per cent. gave similar results. This is only 1/100 the strength of Lugol's solution as used in laboratories, yet its efficacy is undoubted, and suggests that even the small amount of iodine contained in some lozenges may have a useful action. In water alone iodine dissolves only to the extent of 0.017 per cent. at 10° C. A convenient way to keep it for gargling is to make this saturated solution and dilute it with warm water as required.

* These experiments were made in the Department of Zoology, University Museum, Oxford, and our thanks are due to Professor E. S. Goodrich for much helpful criticism.

Summary

The occurrence of harmful organisms in the mouth and throat is discussed. Since they multiply on the surface of the tissues the problem of getting rid of them is similar to that of killing them *in vitro*. For this purpose methods are described and the use of antiseptics is recommended.

The advantages of thymol as an antiseptic or disinfectant are its almost negligible cost and its convenience in use.

In overcrowding, where it is impossible to increase adequately the cubic space per person, it would seem specially important to enforce "gargling fatigues" and so help to guard against "droplet" infection.

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A CASE OF CONGENITAL COMPLETE HEART-BLOCK

THE EFFECT OF ATROPINE

BY

GEORGE M. CURRIE, M.D., D.P.H.

Visiting Physician, Kilmarnock Infirmary

That this condition is comparatively rare is evinced by the fact that in 1932 Aitken collected only thirty-nine cases. By 1934 Campbell and Suzman were able to collect fifty-three. It has been suggested that the reason for the increase is that the more frequent use of graphic registration is leading to the recognition of a greater proportion of cases.

Yater (1929) laid down the postulates for acceptance of the diagnosis as (1) recognition in early life; (2) absence of previous history of other possible cause of heart-block such as diphtheria, rheumatism, or congenital syphilis; and (3) demonstration by the electrocardiogram. The presence of congenital heart disease also lends weight to the diagnosis.

Case Report

A child aged 2 was admitted to Kilmarnock Infirmary on March 1, 1939, as a case of suspected meningitis or infantile convulsions. She had been ill for two days. On admission her temperature was 101°, pulse 42, and respirations 30. There was very slight nuchal resistance and Kernig's sign was negative, no history of ear disease, and no sign of cerebral compression. Lumbar puncture gave a clear fluid (normal on examination) under slight pressure (140 mm.—the child crying vigorously). The heart was enlarged laterally in both directions, the transverse diameter being four inches; there was also a definite bulging of the praecordium and a thrill in the fourth left intercostal space just inside the nipple line, and a harsh systolic murmur was heard over the whole cardiac area, most pronounced in the region of the thrill. No other abnormality was detected: no dyspnoea, cyanosis, or clubbing of the fingers was present. The temperature fell to normal in twenty-four hours, and the child remained well during the remainder of her stay in hospital. She was otherwise healthy and well developed; her Wassermann reaction was negative.

Previous History.—Normal full-time delivery attended by a midwife. The child was first seen by a doctor when 18 months old, suffering from symptoms similar to the present illness, and was sent to another hospital, where the bradycardia was noted and where she made an uneventful recovery. Since then till her present illness she had been perfectly well except for