

## Antibiotics in the treatment of tonsillitis

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**SUMMARY.** Tonsillitis was studied in 317 patients over two years. A short course of antibiotics was found to be highly effective in clearing streptococci from the throat, but it was questionable whether the clearance shown represented eradication. It is suggested that the duration of treatment should be on a selective basis, using a ten-day, or short antibiotic course, according to circumstances. Withholding antibiotics altogether is not considered advisable. I could not differentiate between streptococcal and presumed viral tonsillitis on clinical grounds. The resulting possible policies of treatment are discussed. I suggest giving all cases of tonsillitis antibiotics at the time of presentation.

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### Introduction

While there is general agreement that penicillin is the antibiotic of choice, the duration of treatment in tonsillitis is more controversial. Traditional teaching advocates a ten-day course to eradicate streptococci and thereby prevent rheumatic fever (Wannamaker *et al.* 1953; Catanzaro *et al.*, 1954), but the incidence of rheumatic fever is now low and it is questionable whether eradication of the streptococcus in every instance of tonsillitis is still necessary. The Dutch community studies by Valkenburg *et al.* (1971) tend to support this view, their results indicating that the attack rates of rheumatic fever were no higher among patients not treated with antibiotics.

If rheumatic fever prevention should no longer be a major concern in the treatment of tonsillitis, then a ten-day antibiotic course with its problem of compliance (Bergman and Werner, 1963; Charney *et al.*, 1967) would not usually be necessary, and a short course to alleviate immediate infection would probably be adequate. Further, some credence would also be given to the view that antibiotics are not necessary at all, particularly as over half the incidence of tonsillitis is non-streptococcal.

### Objectives

In order to clarify the use of antibiotics, one object of this study was to determine the proportion of tonsillitis patients still retaining streptococci after a measured duration of antibiotic treatment. The other object was to assess any clinical difference between streptococcal and viral tonsillitis. Bacteriological differentiation has the drawback of delay, but more pertinent is the simple fact that many practices have no quick access to laboratories. Hence there is a need for a safe policy of treatment which is independent of the laboratory.

### Method

Consecutive patients of all ages in a suburban Plymouth general practice were assessed during the two-year period from mid September 1971 to mid September 1973. The practice of 10,000 patients covers a mixed British community, half council estate and half private residential, serving the Naval dockyard and light industry. The patients either came to the surgery or requested a visit. Those recently on an antibiotic were included and the fact recorded.

### Criteria of diagnosis

The single criterion for inclusion was visible evidence of inflammation in the throat. This encompassed tonsillitis, pharyngitis, tonsillo-pharyngitis, the less common pharyn-

geal ulcer, and the occasional instance of tonsillar oedema without redness or pus. The presenting symptom was almost invariably sore throat, but a few children presented with either pyrexia of unknown origin or ill-defined malaise. In the subsequent sections of this paper the term ' tonsillitis ' is used generically to mean inflammation of the throat. Non-inflamed sore throats occurring in influenza and the common cold were excluded.

#### *Choice of antibiotic*

All patients received an oral antibiotic in standard divided dosage. Penicillin was used as a first choice and most patients received phenoxymethyl penicillin, shown by Oakes *et al.* (1973) to provide adequate serum levels for the treatment of *Streptococcus pyogenes* and *Streptococcus pneumoniae*. Ampicillin was given if associated infection demanded a wider spectrum of activity. In suspected or known penicillin allergy, erythromycin was used.

#### *Persistence of streptococci*

This applied to all patients in the two-year period. At the first visit the clinical diagnosis was recorded, a throat swab taken, and antibiotic treatment started. The patients were seen again a few days later at a date arbitrarily determined by patient convenience and appointment availability. Most were seen on the fourth or fifth day, but this varied from the third to seventh day.

At the second visit, a second throat swab was taken and confirmation of antibiotic compliance obtained. By the time of the second visit, the result of the first swab was always available, and I stopped treatment with the antibiotics in those with no pathogenic bacterial growth (presumed virus) and continued for a total of ten days if streptococci had been reported.

The records were reviewed three months after the onset of the disease to assess the incidence of late sequelae.

#### *Clinical differentiation*

This applied to all patients seen in the latter 15 months only, and using a prepared proforma, additional clinical data was recorded at both first and second visits.

#### *Bacteriology*

Bacterial information was obtained by throat swab—the technique most suited to normal general practice. The more recently mooted technique of salivary culture (Ross, 1971a) was not considered to be easily and widely applicable. The recovery rate of streptococci at the initial presentation of tonsillitis is the same by both techniques, but the yield of persistent streptococci is higher using salivary culture (Ross, 1971b). This point will be considered when evaluating results.

Serum coated swabs were used to avoid any bactericidal effect (Bartlett and Hughes, 1969) and bilateral throat swabbing was possible in most cases ensuring an adequate "pick-up" of streptococci (Ross, 1971c).

Throat swabs were placed in Stuart's transport medium immediately after exposure. They reached the Plymouth Public Health Laboratory within 24 hours, and were cultured aerobically on horse-blood agar and Hoyle's medium. Beta-haemolytic streptococci were subdivided into Lancefield's groups.

### **Results**

During the two-year period, 317 instances of disease were seen in 281 patients. Episodes occurred twice in 22 patients, three times in four, and four times in two.

Throat swabs were obtained in 254 instances, and comprised no pathogenic bacterial growth (presumed virus) in 126 (49.6 per cent), beta-haemolytic streptococcus,

Lancefield group A, in 93 (36.6 per cent) and other micro-organisms in the rest (table 1).

The 63 instances in which throat swabs could not be obtained were nearly all children comprising most of those under five and about a third of those aged five to ten years. Of necessity, therefore, subsequent results based upon bacteriological study refer to a population from which children under five are largely excluded.

TABLE 1  
BACTERIOLOGICAL FINDINGS IN THE 254 CASES SWABBED

	<i>Occurrence of organisms</i>	<i>Rate per 100 swabs</i>
No pathogenic bacterial growth (presumed virus)	126	49.6%
<i>Beta-haemolytic strep. group A.</i>	93	36.6%
<i>Beta-haemolytic strep.</i> Group C Group G Not A, C or G Not grouped <i>Streptococcus pneumoniae</i>	10 8 5 1 1	9.8%
* <i>Staphylococcus aureus</i> * <i>Vincent's</i> <i>Pseudomonas sp.</i> <i>E.coli</i> <i>Haemophilus influenzae</i> <i>Haemophilus haemolyticus</i> <i>Candida</i>	3 3 1 1 1 2 1	4.7%
Total number of swabs	254	

\*In these instances, each organism occurred once in association with a beta-haemolytic streptococcus, group A

In the whole series of 317, there was no seasonal predominance, and of the 254 swabbed both streptococcal and presumed viral cases occurred in every month. The highest age incidence (25 per cent) occurred among five to ten year-olds, with 15 per cent at 10-15, 13 per cent at 15-20, 12 per cent at 20-25, and ten per cent at both 0-5 and 25-30 years. The remainder were over 30 years of age. Females (178) predominated over males (139), and this slightly higher incidence (56 per cent) was almost entirely due to a higher proportion of streptococcal infections among females, mainly in the 10-20 year age group.

#### *Persistence of streptococci*

Second throat swabs were obtained from the third to seventh day, but mostly on the fourth or fifth days. The results of these swabs, in conjunction with antibiotic choice, sensitivities, and patients excluded are recorded in table 2. The choice of an antibiotic other than penicillin was dictated primarily by penicillin allergy and to a lesser extent by associated infection and miscellaneous factors. In-vitro sensitivity to the antibiotic used was confirmed in all instances of streptococcal infection.

As shown in table 2, persistence of group A streptococci at the time of the second swab occurred five times only (6.6 per cent), and there was nothing remarkable and no common factor among these five. Clearance of the streptococci occurred in 65 (85.5 per cent) and secondary invasion in six (7.9 per cent). In this particular group of patients 12 of

TABLE 2  
ANTIBIOTIC CHOICE, AND SENSITIVITY TO ANTIBIOTIC USED IN THE WHOLE SERIES, WITH RESULTS OF SECOND THROAT SWABS. PATIENTS WERE EXCLUDED IF THEY HAD HAD AN ANTIBIOTIC WITHIN THE LAST MONTH

		Total 317 instances of tonsillitis				
		No pathogenic bacterial growth (presumed virus) (126)	B-haem. strep. group A (93)	Strep. not group A (25)	Other bacteria (12)*	No first swab (63)
Instances sensitive to antibiotic used in treatment		—	93	25	Sens. 1 Res. 6 No test 5	—
Antibiotic used in treatment		Pen. 109 Other 17	Pen. 83 Other 10	Pen. 24 Other 1	Pen. 10 Other 2	Pen. 45 Other 18
Second throat swabs	Persistence of original organism	—	5	3	0	—
	No pathogenic bacterial growth	88	65	16	8*	—
	Secondary invader or overgrowth of pre-existing organism	10	6	2	2	—
	3rd to 7th day Swab unobtained	22	15	3	2	—
	Exclusion owing to recent antibiotic	6	2	1	0	—
TOTALS		126	93	25	12*	63

"Pen." refers to those treated with phenoxymethyl penicillin, and "other" to ampicillin and other antibiotics.

\*This includes two organisms, each of which occurred in association with a beta-haemolytic streptococcus, group A.

the second swabs had been taken on the third day, 33 on the fourth, 23 on the fifth and eight on the sixth day.

The in-vitro sensitivities to all streptococci isolated were: 100 per cent sensitivity to penicillin, erythromycin and cephaloridine, and 30 per cent resistance to tetracycline; 28 instances were also reported sensitive to cotrimoxazole, but the remainder were either resistant or could not be read owing to the presence of sulphonamide inhibitors in the medium.

#### Secondary invaders

As shown in table 2, the second swabs revealed a secondary invading organism 20 times (ten per cent). The term secondary invasion is used to mean either true secondary invasion, or the overgrowth of a pre-existing organism, and the 20 comprised *E.coli* (9), *Candida albicans* (3), and one each of *Haemophilus haemolyticus*, *Haemophilus influenzae*, *Staphylococcus aureus*, and *Klebsiella species*. The remaining four were beta-haemolytic

*streptococci*, not Group A. Clinical symptoms caused by the invasion or overgrowth occurred in two of the candida cases only. Secondary invasion locally does not constitute a drawback to antibiotic treatment in tonsillitis.

#### Complications

In the whole series of 317, scarlatina and otitis media each occurred twice, and glandular fever was suspected in 12, but proven in only four. Adequate longer-term follow-up was obtained in 309 of the 317 and neither rheumatic fever nor acute nephritis occurred at all.

#### Clinical differentiation

One hundred and ninety-two of the 317 instances occurred during the latter 15 months of the study, the period of time during which clinical differentiation was assessed. As expected these 192 instances mirrored the whole group in age and sex distribution, and occurrence throughout the year.

Throat swabs were obtained in 156 of the 192, and similarly also the 36 without throat swabs were nearly all children, comprising most of those under five and, this time, about a quarter of those aged five to ten years.

The 156 swabbed revealed beta-haemolytic streptococci in 59 (49 group A) and *Streptococcus pneumoniae* in one. Other micro-organisms occurred in eight, and no pathogenic bacterial growth (presumed virus) in 88. The subsequent comparison of clinical data refers to the 60 streptococcal and the 88 presumed viral instances.

TABLE 3

APPEARANCE OF THROAT AT TIME OF INITIAL PRESENTATION, AS A MEANS OF CLINICAL DIFFERENTIATION BETWEEN STREPTOCOCCAL AND PRESUMED VIRAL TONSILLITIS. THE THROAT WAS ASSESSED AS NORMAL, RED ONLY, PUS +, PUS ++, OEDEMA ONLY, OR QUINSY

Appearance of throat		Cases of tonsillitis	
One side	Other side	Streptococcal	Viral (presumed)
Red only	Red only	31 (52%)	56 (64%)
Pus +	Pus +	11 (18%)	10 (11%)
Red only	Pus +	7 (12%)	7 (8%)
Normal	Red only	5 (8%)	6 (7%)
Red only	Pus ++	0	3
Pus ++	Pus ++	2	1
Normal	Pus +	2	0
Pus +	Pus ++	0	1
Normal	Ulcer	0	3
Red only	Ulcer	0	1
Oedema only	Oedema only	1	0
Quinsey	Red only	1	0
TOTALS		60	88

The clinical features recorded when the patient was first seen are shown in tables 3 and 4. The initial pattern of disease in both forms of throat infection is virtually identical. Subsequent progress is recorded in the last parameter of table 4 and in table 5, where the recovery rate among streptococcal infections is shown to be just significantly faster than in the presumed viral group ( $p < 0.05$ ).

A record had also been made of associated otitis media, and inflammation of the uvula and soft palate, but these disorders occurred too rarely to allow comparison.

One other factor was considered. A record was made of the duration of disease

TABLE 4  
ASSESSMENT OF CLINICAL DATA AS A MEANS OF DIFFERENTIATION BETWEEN STREPTOCOCCAL AND PRESUMED VIRAL TONSILLITIS

		<i>Streptococcal</i>	<i>Viral (presumed)</i>
Equality of tonsillopharyngeal appearance	Equal	45 (75%)	67 (76%)
	Unequal	15	21
	No record	0	0
	Total	60	88
Toxicity (T° and unwell)	Toxic	42 (70%)	49 (56%)
	Non-toxic	18	39
	No record	0	0
	Total	60	88
Tenderness in tonsillar node region on one or other or both sides, irrespective of enlargement	Tender	32 (58%)	49 (61%)
	Non-tender	23	31
	No record	5	8
	Total	60	88
Tonsillar node enlargement on one or other or both sides. Enlarged=1 cm or larger	Enlarged	40 (67%)	51 (59%)
	Not enlarged	20	36
	No record	0	1
	Total	60	88
Of enlarged nodes, equality in size	Equal	7	10
	Unequal	32 (82%)	41 (80%)
	No record	1	0
	Total	40	51
Of enlarged nodes, those tender on one or other or both sides	Tender	23 (66%)	34 (77%)
	Non-tender	12	10
	No record	5	7
	Total	40	51
Of enlarged nodes, speed of subsidence. * Still enlarged=1 cm or larger on one or other or both sides	Still enlarged	12	15
	No longer enlarged	19 (61%)	26 (63%)
	No record	9	10
	Total	40	51

The top six parameters refer to initial presentation, and the lowest to subsequent progress. The lower three parameters refer only to those instances with enlarged nodes.

\*In both streptococcal and presumed viral infections, assessment occurred mostly on the 4th or 5th day, and in both forms of infection the number of instances on each day of assessment was roughly equal.

before the initial presentation. In the streptococcal infections, 29 had a duration of less than 24 hours, 18 of 24-48 hours, and 12 over 48 hours (one no record). The figures for presumed viral infections were 29, 32 and 26 respectively (one no record). These variations previously were included in the analysis of every parameter recorded, but found to be irrelevant. In both presumed viral and streptococcal tonsillitis, infections of both short and longer duration presented a similar clinical pattern when first seen, and also behaved in a similar way once treated.

TABLE 5  
THE SPEED OF RECOVERY IN STREPTOCOCCAL AND PRESUMED VIRAL  
TONSILLITIS AFTER INITIATION OF TREATMENT

<i>Speed of symptomatic recovery</i>	<i>Streptococcal</i>	<i>Viral (presumed)</i>
Under 24 hrs.	8 (16%)	4 (6%)
24-48 hrs.	22 (45%)	24 (35%)
Over 48 hrs.	19 (39%)	40 (59%)
No record	11	20
TOTAL	60	88

Having established an almost identical initial clinical pattern in the 60 streptococcal and 88 presumed viral infections, it should be possible to show the same pattern also in the 36 without throat swabs; of interest as this group consists, as already stated, almost entirely of children and mostly under five. In this group 16 (44 per cent) had a red throat on each side, seven (19 per cent) normal one side and red on the other, six (17 per cent) "pus +" on each side, three normal one side and "pus +" on the other, three with "pus ++" on each side, and one with oedema only on each side. Seventy-two per cent had an equal appearance in the throat (all 36 assessed) and 68 per cent had enlarged tonsillar nodes (34 assessed) of which 57 per cent were unequal. These figures are comparable to those in tables 3 and 4 and imply that tonsillitis in children under five follows a similar pattern to that in older age groups.

Finally, although the red throat is a common feature in both streptococcal and presumed viral infection it is worth emphasising the large proportion (60 per cent) of streptococcal throats which on clinical examination gave the appearance of redness only.

### Discussion

#### *Duration of antibiotic treatment*

A short antibiotic course was found to be highly effective in clearing the throat, although studies of salivary culture versus throat swab (Ross, 1971 b) suggest that the streptococcal persistence rate shown (6.6 per cent) may be artificially low. Even at 6.6 per cent however, the incidence of persistent streptococci is considerably higher than the known incidence of rheumatic fever, allowing the tentative conclusion that streptococcal eradication is not always essential for rheumatic fever prevention; tentative, because late throat swabs were not obtained and it is questionable whether the clearance shown can be equated with eradication.

It is possible, however, that this question is academic. The incidence of rheumatic fever related to tonsillitis is known to be low (Higgins *et al.*, 1965; Turnbull, 1972), and the findings of Valkenburg *et al.* (1971) suggest that antibiotic treatment of streptococcal tonsillitis is not necessary at all, unless clinically indicated, in areas with a low incidence of rheumatic fever.

The obvious and common-sense approach to treatment duration is to be selective. It would be wrong to withhold a full-dose ten-day course from a tonsillitis patient who had previously suffered from rheumatic fever, and a similar duration of antibiotic treatment would seem advisable in other areas of known rheumatic fever risk. These include a group A streptococcal epidemic (Zimmermann and Siegel, 1966), infection occurring in closed or semi-closed residential communities of young people (Bates, 1967), and in poor socio-economic areas where bad housing, crowding, and dampness are conducive to the spread of streptococcal throat infection. Again referring to tonsillitis in the closed

community, and quite apart from rheumatic fever prevention Hughes (1972) stresses the value of a ten-day course simply to prevent spread.

Where, however, the risk of rheumatic fever is low, and the community open, which in this country will embrace most cases of tonsillitis, it seems reasonable to advocate a short antibiotic course as adequate. To go further, and withhold antibiotics altogether, I consider inadvisable.

#### **A policy for treatment**

The almost identical pattern shown by both streptococcal and presumed viral tonsillitis precludes early clinical differentiation, and the faster recovery rate among streptococcal infections is also no guide; this difference in rate is far from absolute and does not become apparent until after a few days treatment. If differentiation is to be obtained, therefore, it must be by bacteriological means.

A treatment policy can now be formulated and there are two options. One is to delay antibiotic treatment until the result of a throat swab is available and then treat streptococcal cases only. This policy is scientifically correct, avoids unnecessary antibiotic use in viral tonsillitis, and the short delay does not seem detrimental to rheumatic fever prevention (Siegel *et al.*, 1961). However, in terms of human misery, the inevitable delay of two or three days is tantamount to giving no antibiotic at all, and is likely to prolong symptoms by 24 hours in streptococcal cases (Brumfitt and Slater, 1957). This is of some importance to the patient and family so afflicted. Apart from clinical considerations, many practices do not have quick access to a laboratory, and in those which do, the milieu of general practice is such that a throat swab cannot always be obtained. This policy of treatment tends to be a hospital-orientated philosophy, and has little relevance to the realities of general practice and is not likely to find wide acceptance.

The other option is to treat without bacteriological knowledge at the time of presentation. As differentiation between streptococcal and presumed viral tonsillitis cannot be made on clinical grounds, there are two rational approaches only. Antibiotics can either be given to all or withheld from all.

Any other basis for decision would be empirical. I submit that it would be wrong to withhold antibiotics as a general policy. Local symptoms would be unnecessarily prolonged in streptococcal cases, the risk of local complications would be higher, and even now, streptococcal deaths can occur (*Epidemiological Report*, 1972).

Also, the incidence of rheumatic fever is known to lack uniformity. One is left with the option of giving antibiotics to all cases of tonsillitis at the time of presentation, and I suggest that this is the policy most suited to general practice. It is a policy both safe, and independent of the laboratory, but for those who do have laboratory access, a throat swab taken when treatment starts gives the later option of extending treatment duration in selected cases. The necessary duration of treatment would otherwise depend on a judgement of circumstances as previously discussed. The only drawback to this policy is the unnecessary use of antibiotics in viral tonsillitis, but significant side-effects did not occur in this study and are unlikely with adequate antibiotic management.

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