Antibiotics, sore throats and rheumatic fever

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SUMMARY. From a retrospective study of hospital records, it is calculated that the present incidence of rheumatic fever in Scottish children is 0.6 per 100 000 per year. This is in keeping with recent research from other developed communities. An attempt is made to assess the relative risk of developing rheumatic fever after antibiotic-treated streptococcal sore throats and non-antibiotic-treated streptococcal sore throats. The risk in both cases is low (probably in the order of 1:30 000) and there is no evidence that prescribing antibiotics for prodromal sore throats confers benefit.

Introduction

THIS report assesses the present incidence of rheumatic fever in Scottish children and the influence of antibiotic prescribing on the risk of development of rheumatic fever after an acute sore throat.

Method

The hospital records of all children aged 0–13 years discharged from Scottish hospitals during the four-year period 1976–79 with a diagnosis of rheumatic fever (International Classification of Disease) [ICD] 390), rheumatic fever with heart involvement (ICD 391) and rheumatic chorea (ICD 392) were reviewed. Additional information was obtained from general practitioner records where required.

Patients were classified as follows: definite rheumatic fever (fulfilling the modified Jones criteria);[1] possible rheumatic fever (inadequate clinical/laboratory evidence for a definite diagnosis); or non-rheumatic fever (mainly juvenile rheumatoid arthritis or gross coding errors). Those with definite rheumatic fever were further classified into those with and without prodromal sore throat; where prodromal sore throat had been experienced, note was made of whether a doctor had been consulted and whether antibiotics had been prescribed.

To assess the risk of developing rheumatic fever after a prodromal sore throat either treated or not treated with antibiotics, assumptions were made about the epidemiology of general practice respiratory illness and about the prescribing habits of general practitioners. The method has been described in detail previously[2] and used in a parallel study of the effect of antibiotics on the natural history of acute post-streptococcal glomerulonephritis. The assumptions, all justifiable from published work,[2] are:

1. The average child has four respiratory illnesses each year one of which is presented to a general practitioner.
2. One respiratory illness in four has a sore/inflamed throat as the major abnormality.
3. Streptococci can be isolated from approximately 30 per cent of patients presenting to the doctor with sore throats.
4. Streptococci will be isolated from 10 per cent of sore throats not presented to the doctor.
5. Eighty per cent of patients seen by doctors with sore/inflamed throat as the major finding will receive an antibiotic.

Results

Fifty-nine patients were identified and the records of 58 were studied. Twenty-seven had clear evidence of rheumatic fever and 19 of these had had a prodromal sore throat. Of these, nine had received an antibiotic and 10 had not. Denominators were estimated as described in Table 1. The incidence of rheumatic fever was assessed as 0.6 per 100 000 children per year (27 cases per 4.4 million child years). The risks of developing rheumatic fever after antibiotic-treated streptococcal sore throats (1:30 000) and non-antibiotic-treated streptococcal sore throats (1:40 000) were found to be small and, given the difficulty of assessing denominators, similar.

Table 1. Calculation of risk of developing rheumatic fever after streptococcal sore throat (a) treated with antibiotics and (b) not treated with antibiotics.

Numerator			
Number of hospital cases classified as rheumatic fever 1976–79			59
Case records available and reviewed			58
Definite rheumatic fever			27
History of prodromal sore throat		19	
Seen during prodrome — antibiotic prescribed	9		
Seen during prodrome — no antibiotic prescribed	1		
Not seen during prodrome	9		
No history of prodromal sore throat		8	
Possible rheumatic fever			12
Non-rheumatic fever			19
Denominator			
Population of children in Scotland aged 0–13 years			1 100 000
Number of patient years 1976–79			4 400 000

Population	Seen by GPs	Not seen by GPs
All respiratory illnesses	4 400 000[a]	13 200 000[a]
Twenty-five per cent with sore/inflamed throat	1 100 000[b]	3 300 000[b]
Streptococci present (30 per cent)	330 000[c]	—
Streptococci present (10 per cent)	—	330 000[d]
Number treated with antibiotic (a)	264 000[e]	—
Number not treated (b)	66 000[e]	330 000[d]
Estimation of risk		
(a) Rheumatic fever after streptoccal sore throat treated with antibiotic	9 / 264 000 = 1:30 000 (approx.)	
(b) Rheumatic fever after streptoccal sore throat, untreated	10 / 396 000 = 1:40 000 (approx.)	

[a]See text, assumption 1. [b]See text, assumption 2. [c]See text, assumption 3. [d]See text, assumption 4. [e]See text, assumption 5.

Discussion

Acute rheumatic fever is now rare in developed western countries; the incidence of 0.6 per 100 000 children per year in Scotland is very similar to that reported in the USA.[3,4] The reasons for declining incidence are not fully understood, but could include changes in environmental and socioeconomic circumstances, the effect of antibiotic prescribing for respiratory illness, and changes in rheumatogenic potential of prevalent Group A streptococci.

Although the decline in incidence of rheumatic fever began prior to the widespread use of antibiotics,[5] the uncertainty about the relationship between these events is one reason for persistent high use of penicillin to treat sore throats in general practice.

The numerator we report may be an underestimate as cases not referred to hospital are not included. The denominator is based on assumptions which, if anything, will tend to underestimate the prevalence of non-antibiotic-treated streptococcal illness. The strengths and weaknesses of the calculation of the denominator have been fully discussed in a previous paper.[2] The method of calculating the numerator is relatively straightforward and it is unlikely that serious episodes of illness have been overlooked. It is reassuring that our estimated incidence of rheumatic fever is in line with the most recent parallel estimates from developed countries.

The method of calculation of the denominator is extremely difficult and we cannot be certain of its reliability. The best available published estimates of a probable community incidence of streptococcal pharyngitis lie between one episode per five patient years (which would give a total of 880 000 illnesses in the population we studied),[6] and 13.8 infections per 100 patient years (which would give a total of 600 000 for our population).[7] It is of some reassurance to us that the figure we have arrived at using different methods is 660 000. This does suggest that we would have to have made substantial errors in our projections to cause us to question our general arguments. We also believe that the importance of these projections for developing appropriate general practice prescribing policies for sore throats justifies their being presented in the present format for professional debate.

Conclusions

The current incidence of rheumatic fever in Scottish children is low and the figure of 0.6 per 100 000 children per year is in line with other published research and seems likely to be a reliable estimate. Estimating the denominators for antibiotic-treated and non-antibiotic-treated streptococcal throat infections is extremely difficult; in this paper (and in the parallel paper on glomerulonephritis previously published[2]) assumptions which seem more likely to overestimate than underestimate the risks of non-antibiotic treatment of sore throats have been made. On the basis of these assumptions it seems reasonable to argue that the prescribing of antibiotics for sore throats is making little contribution to the present low incidence of rheumatic fever. Using different assumptions the position could change and we would like to encourage alternative suggestions as to how the denominator should be calculated.

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