The Incidence and Aetiology of Respiratory Tract Infections in General Practice – with Emphasis on Mycoplasma pneumoniae

Summary: The incidence of respiratory tract infections in patients seeking medical advice at a community care centre (Dalby) during 1973 and 1974 was studied. About every third patient seen at this primary health station presented with signs of such infections. In the age groups <10, 10–19, 20–39, 40–59 and ≥60 years, respiratory tract infections accounted for 65, 45, 32, 18 and 9% of the total number of diagnoses made during 1974. The aetiology of acute respiratory tract infections in a series of patients seen at this health station was studied. The series included randomly selected cases, but excluded children under seven years of age and patients presenting with signs of acute otitis media and tonsillitis. Attempts to establish the aetiology were made on the basis of the history, the clinical examination, and cultures for beta-haemolytic streptococci and Mycoplasma pneumoniae, complement fixation tests for influenza A and B, para-influenza 1, 2, and 3, adeno, cytomegalovirus and respiratory syncytial virus, and Chlamydia psittaci. Paul-Bunnell test and tests for cold agglutinins were also performed. With this test battery, an aetiological diagnosis was obtained in only 35% of the 101 patients studied. The findings suggest an infection with M. pneumoniae in 16%, with beta-haemolytic streptococci in 9%, and with viruses (adeno and para-influenza) in 7% of the patients. The present communication highlights the role of M. pneumoniae in upper respiratory infections, as few data have appeared on such infections in patients seen in general practice. The difficulty of establishing the aetiology of respiratory tract infections and the consequent treatment dilemma is discussed.

Introduction

Symptoms of respiratory tract infection are one of the most common reasons for a patient to seek a consultation with his physician. The causative agents of respiratory tract infections are known to vary with the season, climate, age of the population, and with the epidemiological environment. Therefore the relative importance of the various agents involved varies widely. It is well known that viruses are the cause of the majority of these infections. More than 150 different viruses have so far been shown to cause infections of the respiratory tract (17). There are only minor differences between the clinical signs and symptoms of the infections caused by various viruses. This is also true of respiratory tract infections caused by bacteria, including those caused by beta haemolytic streptococci (4, 5). It is therefore difficult to establish the aetiology on the basis of the clinical picture in any of these infections. Mycoplasma pneumoniae is known as an important aetiological agent in pneumonia (11) but its relative importance in upper respiratory tract infection is still uncertain. In non-epidemic periods infections with this organism are known to be endemic. Epidemics seem to occur every fourth to fifth year (22). Infections are seen in all ages but are more common in older children. The incubation period is usually three weeks or more. The contagiousness is relatively low and spread of the infection seems to occur after prolonged and close contact, for example within families (12). A number of extra-respiratory tract manifestations have been described, including manifestations in the central nervous system (2, 28), the skin and the mucous membranes, and in parenchymatous organs such as the liver and the pancreas (26). It is rare for infections with M. pneumoniae to be fatal.

The present study reports the results of a survey of the incidence and aetiology of respiratory tract infections in patients who were seen at a Community Care Centre. In this survey particular attention was given to the role M. pneu-

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M. moniae may play in upper respiratory tract infections. The value of the clinical examination and of microbiological tests in the establishment of the aetiology of respiratory tract infections is considered.

Materials and Methods

Incidence studies

One of the objectives of the Community Care Sciences Centre at Dalby, Sweden, is to perform research in general practice. It is a primary health station serving an area with a mixed rural and urban population of about 15,000 inhabitants. These inhabitants visit the Centre about 10,000 times each year. About 40% of the population is engaged in agriculture, and the remainder work at manufacturing, construction, in trade, or are in the public service. The village of Dalby is situated about ten kilometers from Lund, which is a university town with about 70,000 inhabitants. Dalby lies 24 kilometers from Malmö with its 265,000 inhabitants. Many of those living in the Dalby district are employed in these two towns (Figure 1).

Incidence of respiratory tract infections

The incidence of respiratory tract infections was determined in those seeking advice at the Dalby Community Care Centre during 1973 and 1974. The diagnoses which were made at the Centre about 10,000 times each year. About 40% of the population is engaged in agriculture, and the remainder work at manufacturing, construction, in trade, or are in the public service. The village of Dalby is situated about ten kilometers from Lund, which is a university town with about 70,000 inhabitants. Dalby lies 24 kilometers from Malmö with its 265,000 inhabitants. Many of those living in the Dalby district are employed in these two towns (Figure 1).

Aetiological Studies

Clinical material

One hundred and thirteen patients with signs and symptoms of acute respiratory infection selected at random were studied. The age and sex distribution are shown in Figure 2. These patients sought medical advice at the Division of Community Care Sciences, Dalby, or at a primary health station (ÖVC) in Lund, Sweden. The study was performed during August and September, 1975. Patients under the age of seven were excluded as it was not practical to draw blood from these young patients at a busy health clinic and it was not justified in view of the diagnosis of the children's condition. Patients with acute otitis media or obvious signs of acute tonsillitis were also excluded. All patients in the study paid their first visit to a doctor for the condition under study and had not taken any antibiotics prior to the visit.

The patients were asked to describe their symptoms (Table 8) and to note the day of their onset. A clinical examination was performed and the results recorded. A blood sample was drawn and the patients were instructed to return after two weeks for a second blood specimen to be collected. One hundred and one patients out of 113 returned. A control group was formed of 101 patients who presented to the Centre with symptoms other than those related to the respiratory tract. This control group was matched by sex and age to the patients with respiratory tract infections. One serum sample was drawn from these patients for serological tests.

Figure 1: Map of Scandinavia (left). The square indicates the province of Skåne, the southern part of which is shown on the map to the right. It shows the Dalby Community Care District (thick, black border) (15,000 inhabitants), the towns of Lund (70,000 inhabitants) and Malmö (265,000 inhabitants).

Figure 2: The figure shows the age and sex distribution of the investigated patients with respiratory tract infection.
The total number of diagnoses made in 1973 was 6,689. In the five age groups studied, the corresponding figures were 1,662, 746, 1,923, 1,144, and 1,214, respectively.

The total number of diagnoses made in 1974 was 8,117. In the five age groups studied, the corresponding figures were 2,095, 1,036, 2,333, 1,314, and 1,339, respectively.

Figure 3: The ten most common diagnoses made in each of 5 age groups seeking advice at the Dalby Community Care Centre during 1973 (left) and 1974 (right).
Culture techniques

Beta-haemolytic streptococci. In all the patients with signs and symptoms of respiratory tract infection a culture was taken from the oro-pharynx. This was obtained with a cotton-tipped swab and inoculated directly onto a blood agar plate which contained 4% horse and 4% sheep blood. Isolated streptococci were grouped according to a method described by Christensen et al. (8).

Mycoplasmas. Cultures for mycoplasmas were made from the last 59 patients in the respiratory infection group. The specimens were collected with a cotton-tipped swab from the oro-pharynx and inoculated directly onto three different solid media. Medium "A" consisted of seven parts of heart infusion agar (Difco), two parts of unheated horse serum (v/v), one part of a 25% (v/v) aqueous fresh yeast extract, and 0.002% (w/v) desoxyribonucleic acid (Sigma). Penicillin G (1000 IU/ml) and thallium acetate (final concentration 1:40,000) were used as bacterial inhibitors. Medium "B" consisted of the same basic ingredients, but was supplemented with 0.5 mg 2-mercaptoethanol (Sigma) per ml. Medium "C" also had the same basic composition, but to this medium was added 0.5 mg L-cysteine hydrochloride (Merck) per ml. The agar plates were incubated at 37°C in a humid atmosphere of 90%N2 and 10% CO2. The plates were examined for the presence of colonies at regular intervals by the aid of a stereo-microscope (x120). The plates were discarded after four weeks, if no colonies had been observed. The isolated strains of mycoplasma were identified as to species by growth-inhibition tests using antiserum impregnated paper discs (32).

Serological techniques

Sera were stored at -20°C until tested. Complement fixation (CF) tests were performed by a micro-titration technique using disposable plates with the following antigens:

Mycoplasma pneumoniae. The M. pneumoniae antigen was a chloroform-methanol extract (19) of organisms detached from the glass after growth in Roux bottles (21). This antigen was kindly supplied by Dr. K. Lind, Statens Serumsinstitut, Copenhagen.

Viruses. The sera were tested against influenza A and B, para-influenza 1, 2, and 3, as well as against cytomegalovirus (CMV). The antigens were obtained from Statens Bakteriologiska Laboratorium, Solna, Sweden. The sera were also tested against an adenovirus antigen prepared in our own laboratory, and the sera of persons above the age of 60 were tested against a respiratory syncytial (RS) virus antigen (Flow Labs., Ltd.).

Chlamydia. The sera were tested against a Chlamydia psittaci antigen (Welcome) for group-specific antibodies to chlamydia.

Cold agglutinins

The sera were assayed for cold agglutinins with a 0.2% solution of group 0 erythrocytes from adults. Duplicate serum dilutions were made in saline to which was added a 10% erythrocyte suspension. The readings were made macroscopically after overnight incubation at 4°C.

Paul-Bunnell test

The Paul-Bunnell test was performed according to the method described by Davidson (9).

Results

Incidence of respiratory tract infections in patients seen at Dalby Community Care Centre during 1973 and 1974

The ten most frequent diagnoses in various age groups of the patients seeking medical attention at the Dalby Community Care Centre during 1973 and 1974 are shown in Figure 3. Respiratory tract infections accounted for about 30% of all the diagnoses made during these two years. Acute otitis media, acute tonsillitis, “respiratory tract infection”, acute naso-pharyngitis, virosis, acute bronchitis, acute pharyngitis and conjunctivitis, were represented among the ten most frequent diagnoses. In 1974, respiratory tract infections accounted for about 65% of all the diagnoses in the children under ten years of age. The corresponding percentage in the age groups 10–19, 20–39, 40–59 and ≥ 60 years was 45, 32, 18, and 9%.

Isolation of beta-haemolytic streptococci

Beta-haemolytic streptococci were recovered from the oro-pharynx of ten of the 101 patients studied. Eight of these were group A and two were group G streptococci, while no group C streptococci were found. As indicated, the series did not include patients presenting clinical signs of acute tonsillitis.

Isolation of mycoplasmas

M. pneumoniae was recovered from seven patients when the cysteine hydrochloride containing medium (medium "C") was used. The organism was only recovered in one instance when medium "A", and in two when medium "B" was used. This difference between the three media tested was not observed for other species of mycoplasma (Table 1).

Complement fixation tests

Viruses. The numbers of cases who had a significant change in the titre of CF antibodies to para-influenza 2 and 3 and to

Table 1: Isolation of mycoplasmas from the oro-pharynx of 59 patients with signs of non-pneumonic respiratory tract infection by the use of 3 different culture media

| Medium* | Organism isolated |
|---------|-------------------|
|         | M. pneumoniae | M. hominis | M. salivarum and/or M. orale |
| Basic   | 1               | 1          | 6                             |
| Basic + 2-mercapto-ethanol | 2 | 1 | 7 |
| Basic + L-cysteine hydrochloride | 7 | 1 | 8 |

*See text

Table 2: CF antibodies (titre ≥ 1:10) to some viruses in 101 randomly selected patients with respiratory tract infection* and 101 controls

| Virus | Patients | Controls |
|-------|----------|----------|
| Influenza A | 70 | 79 |
|        B | 56 | 63 |
| Para-influenza 1 | 21 | 17 |
| 2 | 61 | 67 |
| 3 | 84 | 76 |
| Adeno | 73 | 68 |
| CMV  | 49 | 51 |

*Children below the age of 7 and patients with acute otitis media and acute tonsillitis were excluded.
viruses are shown in Table 2. There was no significant difference in the incidence of these antibodies to any of the viruses between the two groups. The titres of influenza A and B in the two groups are shown in Table 3 and those of para-influenza 1, 2, and 3 in Table 4. The titres of CF antibodies to the other viruses tested, i.e. adenovirus and CMV, are shown in Table 5. There is no difference in the distribution of the titres to any of the viruses between the controls and the patients presenting with a respiratory infection (Tables 3, 4 and 5).

Chlamydia. There was no significant change in the titres of CF antibodies to the chlamydia antigen used in any of the patients, but one of the controls had a high titre, i.e. 1:80, which was stationary.

*Mycoplasma pneumoniae.* CF antibodies to *M. pneumoniae* (> 1:10) were found in 31% of the patients and in 23% of the controls. The distribution of the titres in these two groups, which did not disclose any significant difference, is shown in Table 6. In 7 of the patients, a significant change in the titre was observed (Table 7). The results of the cultures for *M. pneumoniae* are also included in Table 7.

**Cold agglutinins**

Cold agglutinins (1:16) were found in 20% of the patients but in none of the controls. In the two patients who had a significant change in the titre of cold agglutinins there was also such a change in the titre of CF antibodies to *M. pneumoniae* (Table 7).

**Paul-Bunnell test**

In none of the patients or the controls were antibodies found indicating infectious mononucleosis.

**Signs and symptoms**

The signs and symptoms of the patients are shown in Table 8. The patients are divided into the various diagnostic categories, e.g. *M. pneumoniae*, beta-haemolytic streptococci, para-influenza (2 and 3) and adenovirus. The majority of the patients (67%) did not have a definite aetiological diagnosis.

**Table 7: Results of CF tests and cultures for M. pneumoniae and cold agglutinins (CA) in 16 patients**

| CF antibody titre | Culture | CA |
|-------------------|---------|----|
| High, but stationary (> 1:80) | 2 | pos |
| Negative (1:10) | 2 | neg |
| (1:16) | ND* | 1 |

Total 7 | 4 | 5 | 6 |

*ND = not done*
Table 8: Symptoms and signs in 101 randomly selected patients with respiratory tract infection*

| Symptom or sign           | M. pneumoniae (N = 16) | β-haemolytic streptococci** (N = 10) | Para-influenza (N = 5) | Adenovirus (N = 2) | No aetiologic diagnosis (N = 68) |
|---------------------------|------------------------|--------------------------------------|------------------------|--------------------|----------------------------------|
| Temperature ≥ 38°C        | 14                     | 7                                    | 8                      | 1                  | 23                               |
| Cough                     | 11                     | 2                                    | 3                      | 2                  | 52                               |
| Expectoration             | 7                      | 2                                    | 2                      | 2                  | 30                               |
| Coryza                    | 8                      | 4                                    | 3                      | 2                  | 49                               |
| Sore throat               | 9                      | 9                                    | 4                      | 1                  | 46                               |
| Headache                 | 8                      | 6                                    | 4                      |                    | 42                               |
| Muscle pains              | 9                      | 3                                    | 4                      |                    | 27                               |
| Hoarseness               | 5                      | 2                                    | 1                      |                    | 26                               |
| Earache                  | 2                      | 1                                    | 1                      |                    | 20                               |
| Diarrhoea, vomiting       | 2                      | 2                                    | 1                      |                    | 4                                |
| Conjunctivitis           |                        |                                      |                        |                    | 2                                |
| Exanthema                |                        |                                      |                        |                    | 1                                |
| (Naso)pharyngitis        | 9                      | 8                                    | 4                      | 1                  | 34                               |
| Bronchitis               | 3                      | 8                                    |                        |                    | 9                                |
| Upper respiratory tract infection | 4             | 2                                    | 1                      |                    | 25                               |

* Children below 7 years of age and patients with acute otitis media and acute tonsillitis were excluded
** Group A streptococci were demonstrated in 8 patients, and group G streptococci in 2

Discussion

Respiratory tract infections quantitatively constitute one of the greatest problems in general practice. In the Dalby material about every third patient presented with symptoms and signs of such an infection.

The comparatively low frequency of infections associated with group A streptococci in this series must be because patients with definite signs of acute tonsillitis were excluded. It has been estimated that viruses account for 95% of all cases of acute pharyngitis. Of the remaining 5%, 95% are due to beta-haemolytic streptococci group A; group C and G streptococci are implicated in only a few cases. In the present study, group G streptococci were found in two cases. The diagnosis of acute pharyngitis had been recorded in all but two of the patients from whom, subsequently, beta-haemolytic streptococci were isolated. Sore throat, fever and headache were the three most frequent symptoms in these patients (Table 8).

It is known that viruses are the major causative agents of respiratory tract infections. The test battery used in this study was apparently not particularly suitable to establish the presence of such an infection, since a seroconversion was found in only 7% of the patients. Rhino and corona viruses which are the most common aetiological agents of respiratory tract infections cannot be routinely diagnosed by serological means as there are no commercially available antigens. Antibodies, at a titre of ≥ 1:10, to all the viruses tested occurred in almost the same proportion in the patients and controls, and the titres had the same distribution. This certainly stresses the fact that it is necessary to examine both acute and convalescent sera.

Incidence figures for antibodies to M. pneumoniae in larger populations are available from studies in central laboratories in Denmark (22), Switzerland (20), the United Kingdom (29), the United States of America (13), and the Netherlands (16). The reported incidence of CF antibodies to M. pneumoniae in persons without known respiratory tract infection has been between 5 and 20%. In our control group the corresponding figure was 21%.

The present study was performed during the late months of an exceptionally hot summer. There was no M. pneumoniae epidemic during the period of our study. This statement is based on the low number of positive serological tests for M. pneumoniae that was seen in our laboratory during this period. The laboratory serves an area with about half a million inhabitants in the south of Sweden, including Dalby and Lund.

Most studies of M. pneumoniae infections outside hospitals have been obtained from studies conducted in closed communities, such as military units, university campuses (7, 10) and in families (12). It has been suggested that M. pneumoniae more often causes upper respiratory tract infections than pneumonia, but figures supporting this assumption are few. The reported incidence of M. pneumoniae in some selected series of patients with upper respiratory tract infections are shown in Table 9.

Incidence figures of M. pneumoniae infections in randomly selected patients in general practice have not to our knowledge been reported. We found evidence of a M. pneumoniae infection in 16 patients; a significant rise in titre of CF antibodies was found in seven, while four had high, but stationary, titres. The epidemiological data and the history strongly suggested an infection with M. pneumoniae in these four patients. Cold agglutinins were found in two of them. In five patients there was no serological evidence of a M. pneumoniae infection, but the organism was recovered from the oro-pharynx.

CF, indirect haemagglutination (IHA) and immunofluorescence (IF) tests have been used to detect serum antibodies...
Table 9: Incidence of infections with Mycoplasma pneumoniae in some selected series of patients with non-pneumonic respiratory tract infections

| Senior author, literature number and year of publication | Group studied | Diagnosis          | No. of patients | Evidence of M. pneumoniae (n) (%) | Technique used* |
|---------------------------------------------------------|---------------|-------------------|-----------------|--------------------------------|----------------|
| Chanock (6) (1961)                                       | Marine recruits | Febrile resp. illness | 144            | 40 28                          | IF             |
|                                                        |                | Afebrile resp. illness | 131            | 11 8                           | IF             |
| Grayston (15) (1965)                                     | Miscellaneous groups of patients | Bronchitis         | 125            | 7 6                            | I              |
|                                                        |                | Upper resp. inf.     | 123            | 8 7                            | I              |
| Evans (19) (1967)                                        | University students | Bronchitis         | 53             | 4 8                            | CF, IF, I      |
|                                                        |                | Acute upper resp. tract inf. | 125      | 1 0.8                          | CF, IF, I      |
|                                                        |                | Pharyngitis – tonsillitis | 92             | 4 4                            | CF, IF, I      |
| Hers (16) (1967)                                         | Selected groups of civilians (studied between 1961 and 1966) | Bronchitis         | 242            | 143 59                         | CF, IFS        |
|                                                        |                | Laryngo-pharyngitis | 40             | 12 30                          | CF, IFS        |
| Glezen (14) (1967)                                       | Patients in pediatric practice | Pharyngitis         | 715            | 22 3                           | I              |
| Biberfeld (3) (1968)                                     | Hospitalized patients | Bronchitis         | 28             | 3 11                           | CF, I          |
|                                                        |                | Upper resp. tract inf. | 228            | 1 0.4                          | I              |

* I = M. pneumoniae isolation; CF = sera tested for complement fixation antibodies; IF = sera tested for immunofluorescent antibodies; IFS = M. pneumoniae demonstrated in clinical specimens by immunofluorescent technique.

In patients with upper respiratory tract infections, the CF test has been found to detect more cases of M. pneumoniae infection than the IHA and the IF tests (23).

The frequency with which M. pneumoniae has been isolated from patients with serological evidence of infection with this organism has been low in most studies. Body fluids contain mycoplasmacidal substances that might influence the recovery rate (27). The composition of the culture media in general use may not be optimal for the isolation of M. pneumoniae from clinical specimens, although they may support the growth of "laboratory strains" of M. pneumoniae. In the present study we found that the addition of a reducing substance, i.e. cysteine hydrochloride, gave a higher recovery rate, but this observation needs further evaluation. Cysteine hydrochloride has been used earlier in culture media for ureaplasmas (30). It should be noted that the isolation rate of more rapidly growing mycoplasma species, e.g. M. hominis, M. orale, and M. salivarium, was not influenced by the presence of this substance. It is notable that M. pneumoniae was isolated from five patients who did not have any serological evidence of such an infection, which indicates the role of culture studies in attempts to establish upper respiratory tract infections with this organism.

Cold agglutinins are known to occur in 50 to 75% of patients with signs of pneumonia and with a significant change in the titre of CF antibodies to M. pneumoniae. In our series of patients with non-pneumonic respiratory tract infections, cold agglutinins were found in three of those seven with such a titre change. It has been recently demonstrated that cold agglutinins may also occur in CMV infections of the respiratory tract (24), but we did not find any evidence of such an infection in our cold agglutinin positive cases.

The present study seems to indicate that M. pneumoniae infections are not uncommon in patients presenting with symptoms of upper respiratory tract infection. This type of infection was the most common diagnosis made in our series. But it must be stressed that children below the age of seven and cases of acute tonsillitis and acute otitis media were excluded.

The physician often obtains little guidance from the history, and the clinical examination of the patient does not often al-

Table 10: Antibiotic treatment given to the patients studied

| M. pneumoniae (N = 16) | β-haemolytic streptococci (N = 10) | Para-influenza (2 + 3) (N = 5) | Adenovirus (N = 2) | No aetiological diagnosis (N = 68) |
|------------------------|------------------------------------|-------------------------------|--------------------|-----------------------------------|
| Penicillin             | 4                                  | 7                             | 1                  | 16                                |
| Ampicillin             | 1                                  | 1                             | 1                  | 2                                 |
| Doxycycline            | 1                                  | 1                             | 1                  | 9                                 |
| Erythromycin           | 3                                  | 2                             | 1                  | 6                                 |
| No antibiotics         | 7                                  | 2                             | 4                  | 35                                |
low the physician to establish the aetiology of a respiratory tract infection. The signs and symptoms in the present series of patients with either a streptococcal, viral or *M. pneumoniae* infection showed certain common characteristics, but the clinical picture was not sufficiently distinct to make a definite diagnosis without the laboratory tests (Table 8). The information the physician obtains from the microbiological laboratory often arrives too late to be of help in the treatment of the individual case. The physician therefore usually has to decide whether or not to treat a respiratory tract infection without the knowledge of the aetiology of the patient's condition. A retrospective study of the treatment which had been given to our patients clearly indicates the difficulties involved (Table 10). The liberal prescription of penicillin to patients presenting with signs of pharyngitis or tonsillitis may seem justified in relation to the difficulty of basing the diagnosis of an infection with beta-haemolytic streptococci group A on clinical grounds (1, 4), and when it is known that early institution of penicillin reduces the incidence of complications, such as acute glomerulonephritis (18). Such a therapy may also be of epidemiological significance.

The duration of fever and cough in cases of pneumonia caused by *M. pneumoniae* may be reduced by the use of tetracyclines or erythromycin. Whether such treatment of upper respiratory tract infections caused by this organism is of any benefit is not known, and it could not be determined from our study. *M. pneumoniae* is susceptible to these antibiotics in vitro (25), but they have been shown to persist in vivo despite their usage (31).

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Résumé: L'incidence des infections respiratoires chez les patients fréquentant la polyclinique de Dalby en 1973 et 1974 a fait l'objet d'une étude. Environ un patient sur trois examiné présentait des signes d'infection respiratoire. Dans les groupes d'âges de moins de 10 ans, de 10–19 ans, de 20–39 ans, et de 40–59 ans et de plus de 60 ans, les pourcentages respectifs d'infection respiratoire diagnostiquée en 1974 étaient de 65, 45, 32, 18 et 9%. L'etiologie des infections respiratoires aiguës dans un groupe de malades examiné à Dalby a fait l'objet d'une étude. Ce groupe comportait des cas choisis au hasard, à l'exclusion d'enfants de moins de 7 ans et de patients présentant des signes d'otite moyenne aigüe et d'amygdalite. L'etiologie a été recherchée sur base de l'anamnèse; de l'examen clinique et des cultures visant à la mise en évidence de streptocoques bêta-hémolytiques et de *M. pneumoniae*, d'épreuves de fixation du complément pour la recherche des influenza A et B, des parainfluenzas 1, 2 et 3, des adénovirus, cytomégalovirus et du virus respiratoire syncytial, ainsi que de *Chlamydia psittaci*. Les épreuves de Paul-Bunnell et des agglutinines froides ont également été réalisées. Cette batterie de tests a permis d'obtenir un diagnostic étiologique dans 32% seulement des 101 patients de l'étude. Ces constatations permettent de croire à une infection à *M. pneumoniae* dans 16% des cas, à streptocoques bêta-hémolytiques dans 9% et à virus (adénovirus et parainfluenza) dans 7%. L'auteur souligne le rôle de *M. pneumoniae* dans les infections des voies respiratoires supérieures; rares sont les données publiées sur ce type d'infections chez les patients examinés en pratique générale. L'auteur discute encore de la difficulté d'établir l'etiologie des infections respiratoires et du dilemme thérapeutique qui en résulte.