Determinants for the course of acute sinusitis in adult general practice patients

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Abstract

Background—Although the prognosis of acute sinusitis is important, little is known about it and the factors predicting its course in a general practice population.

Objective—To determine the course of acute sinusitis and factors predicting it in adults in general practice.

Methods—The prognostic value of demographic and clinical factors and the patient's emotional state, for example anxious or depressed, were determined prospectively by means of multivariate analysis.

Main outcome measurements—Resolution of facial pain, resumption of daily activities, and the patient's reported improvement. Factors with a significant predictive value were used to classify the patients into three different groups: quick, moderate, and slow recovery.

Results—The median time from enrolment to recovery was six (range percentile 25–75: 4–10) days in a population of 177 patients. Factors predictive of a prolonged clinical course were: female sex (hazard ratio (HR) 0.60; 95% confidence interval (CI) 0.42 to 0.83), history longer than 14 days before inclusion (HR 0.62; 95% CI 0.41 to 0.94), headache, cold, or cough as a reason for the encounter (HR 0.65; 95% CI 0.44 to 0.96), and absence of cervical adenopathy (HR 0.71; 95% CI 0.51 to 0.96). Antibiotic treatment did not influence the course of disease. The median time to recovery was three days for patients with a quick, five days for those with a moderate, and seven days for those with a slow recovery.

Conclusion—In general practice acute sinusitis is mostly a self limiting disease. A limited number of characteristics are predictive of a (slightly) prolonged clinical course of acute sinusitis in general practice.

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Pathophysiologically, acute sinusitis is defined as inflammation of the mucosa, or as empyema of the sinus.¹ Although these findings are diagnostic of sinusitis, it is not possible for a general practitioner (GP) to depend on them for diagnosis, because sinus puncture is not ethical nor available in general practice.^{2–3}

Recent work indicates that a dysfunctioning osteomeatal complex plays an important part in the aetiology of sinusitis complaints.⁴ It should be borne in mind, however, that sinusitis is not necessarily synonymous with a bacterial infection; this has been confirmed by

several studies in general practice showing that antibiotic treatment is of little value in most cases.^{5–8} None the less, it is possible to predict the course of sinusitis and identify patients who may need further examination or may benefit from further treatment. Few data, clinical or attitudinal, are available on what factors influence the clinical course of acute sinusitis.^{9–11} Signs or symptoms of purulent secretion, unilateral maxillary pain, and maxillary toothache may indicate sinusitis, but their influence on the clinical course of the illness is unknown.^{12–13} The patient's age and the severity of the sinusitis at onset of treatment may predict the illness duration in adult patients.¹⁴ Stress, life events, and fear of disease may delay recovery from respiratory tract infections, but nothing is known about the influence of anxiety and depression, despite the fact that nowadays these conditions can be reliably assessed. To determine which patients are at risk of a prolonged clinical course of sinusitis and should therefore be considered for further examination or treatment, prognostic factors should be assessed.^{15–17}

This study aimed to determine (1) the course of acute sinusitis in adults seen in general practice, (2) which factors were predictive for a prolonged course of sinusitis, and (3) the construction of a prognostic index.

Patients and methods

STUDY PATIENTS

Patients aged 15–65 years presenting with acute sinusitis (as defined by the guidelines of the Dutch College of General Practitioners¹⁸) to one of the 12 collaborating general practices were included in a double blind placebo controlled trial of the effectiveness of doxycycline. This prognostic study was conducted in the main study population, from whom additional information was obtained.⁸ Inclusion criteria were (1) the presence of the following three main symptoms: purulent nasal discharge; pain in the region of the maxillary sinuses on bending forward; history of a preceding common cold or "influenza" or (2) the presence of two of the above and one of the following additional symptoms: predominantly unilateral maxillary pain; pain in teeth or on mastication. Patients with one of the following were excluded: use of intranasal xylometazoline for more than seven days, comorbidity (diabetes mellitus, heart failure, immune deficiency), pregnancy or breast feeding, antibiotic treatment in the previous four weeks, symptoms for more than three months, allergy to doxycycline, antacid or iron treatment, and referral to an ear, nose, and throat specialist. Xylometazoline 0.1% nose drops and steam inhalation for 15 minutes three times daily

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were then prescribed for as long as symptoms were present. Patients were asked to keep a diary for the next 10 days and were then seen again by their GP.

BASILINE CHARACTERISTICS

The GPs used a computerised questionnaire recording symptoms and signs.¹⁹ Besides inquiring as to sex, age, health insurance (Sick Fund/capitation fee versus private insurance/fee for service), date and inclusion criteria, this contained a number of detailed multiple choice questions about duration of symptoms, the reason for encounter, patient demand for help, ear, nose, and throat related symptoms and signs, history of previous sinusitis complaints and sinonasal operations, diurnal variation of malaise, smoking, and respiratory tract comorbidity (table 1).⁶⁻¹³ On the day of inclusion in the study each patient filled in the 12 item version of the General Health Questionnaire (GHQ-12) to assess the patient's mental condition, particularly anxiety and depression.²⁰ A cut off point between GHQ score 2 and 3 was used to determine if there was strong emotional distress or not, as recommended by Goldberg.²¹ For 10 days the patients then recorded in a diary the degree of facial pain and of limitation of daily activities as in the McGill-Melzack questionnaire.²²⁻²³

DATA ANALYSIS

In the analysis we investigated the combination of baseline characteristics that most closely predicted (1) the speed of resolution of facial pain (pain in maxillary region and/or forehead) and resumption of normal daily activities during the first 10 days after inclusion and (2) reported improvement at day 10. A univariate analysis was performed to estimate the crude hazard ratio (HR) by means of the Cox proportional hazards model with the 95% confidence interval (CI) (SPSS statistical package). A HR <1 corresponds to a prolonged course. Correlation between the outcome measures was tested (Spearman's correlation coefficient; range between -1 and 1). Next, to estimate the simultaneous influence of the factors, predictive factors with a probability less than 0.2 and the treatment allocation were included in the multivariate model. A backward stepwise method was used to select those factors with a p value <0.05. The stability of the multivariate model was assessed by means of residual analysis. By summing the coefficients derived from the Cox model a prognostic index score was calculated. Patients were classified into convenient prognostic groups²⁴: slow (score ≤2.5), moderate (score >2.5 to <6), and quick (score ≥6) recovery. A Kaplan-Meier survival curve with median survival time and confidence intervals was computed for the three groups.

Results

All GPs of the 12 collaborating general practices took part in identifying patients. Altogether 382 patients met the inclusion criteria but 118 were excluded and 72 refused participation.⁸ So, between September 1993 and August 1995, a total of 192 patients were included in this study;

Table 1 Baseline characteristics of study patients, absolute (%) (n=177)

Variable	No (%)
Sex (female)	117 (66)
Mean age in years (SD)	37 (11.8)
Sick Fund	120 (68)
Season	
Spring/summer	52 (29)
Autumn/winter	125 (71)
Inclusion criteria	
Beginning with common cold	163 (92)
Purulent nasal discharge	145 (82)
Pain at bending	161 (91)
Predominantly unilateral maxillary pain	139 (79)
Pain in teeth/mastication pain	89 (50)
Duration of complaints before inclusion in days	
5-9	100 (57)
10-14	43 (24)
>14	34 (19)
Reason for encounter	
Sinusitis complaints	44 (25)
Headache	72 (41)
Cold/cough	44 (25)
Other complaints	17 (9)
Patient demand for help	
Treatment expected	40 (23)
Too much hindrance	56 (31)
Complaints exist too long	81 (46)
History	
Blocked nose/anosmia/cacosmia	161 (91)
Facial pain	169 (96)
Relapse of sinusitis complaints	70 (40)
Sinonasal operations	24 (14)
Malaise increasing during the day	117 (66)
Pain in ear or throat	56 (32)
Cough	117 (66)
Smoking	76 (43)
Allergy/asthma/chronic obstructive pulmonary disease	37 (21)
Ear, nose, and throat examination	
Maxillofacial pressure pain	150 (85)
Nasal speech	40 (23)
Septal deviation	24 (14)
Discharge on inferior concha	20 (11)
Postnasal drip	16 (9)
Otitis media	2 (1)
Cervical adenopathy	72 (41)
GHQ-12: score ≥3	80 (43)

15 were subsequently lost to follow up. The baseline characteristics of the study patients are shown in table 1. By the 10th day 149 of the 177 (84%) patients reported resolution of facial pain, 138 (78%) that they had regained normal daily activities, and 133 (75%) both of these. At that time 150 (85%) reported an improvement of symptoms. The median duration from day one to both resolution of facial pain and resumption of normal daily activities was six days (range p25-p75: 4-10). The Spearman's correlation coefficient for the resolution of facial pain and normal daily activities was 0.63; the coefficient of resolution for facial pain and improvement was 0.34. Because of the strong correlation between the resolution of facial pain and the normalisation of daily activities, results of the latter are not presented.

The univariate analysis of resolution of facial pain is shown in table 2. The probability values of sex, insurance, duration of complaints, reason for encounter, blocked nose, cough, nasal speech, and cervical adenopathy met the criterion for inclusion (p<0.2) in the multivariate model, but the GHQ-12 score did not. In the model for improvement by day 10 the only variables eligible for inclusion were cervical adenopathy and unilateral maxillary pain (not in table). The treatment allocation (doxycycline versus placebo) did not significantly

Table 2 Results of univariate analysis of factors that predict a prolonged clinical course of facial pain in patients with acute sinusitis complaints (n=177)

Variable	Resolution of facial pain	
	HR	95% CI
Sex (female)	0.7	0.5 to 1.0****
Age (continuous)	1.0	0.9 to 1.1
Sick Fund	0.8	0.6 to 1.1*
Season (autumn/winter)	1.3	0.8 to 1.3
Inclusion criteria†		
Beginning with common cold	1.4	0.8 to 2.5
Purulent nasal discharge	1.0	0.7 to 1.4
Pain at bending	1.0	0.6 to 1.6
Predominantly unilateral maxillary pain	0.9	0.6 to 1.3
Pain in teeth/mastication pain	1.1	0.9 to 1.5
Duration of complaints before inclusion (in days)		
1–9‡	1.0	
10–14	1.0	0.7 to 1.4
>14	0.7	0.5 to 1.0***
Reason for encounter		
Sinusitis complaints‡	1.0	
Headache	0.7	0.5 to 1.0**
Cold/cough	0.7	0.5 to 1.1**
Other complaints	1.0	0.6 to 1.8
Patient demand for help		
Treatment expected‡	1.0	
Too much hindrance	0.9	0.6 to 1.3
Complaints exist too long	1.0	0.7 to 1.5
History†		
Blocked nose/anosmia/casosmia	1.8	1.1 to 3.0***
Facial pain	1.0	0.5 to 1.9
Relapse of sinusitis complaints	0.9	0.6 to 1.2
Sinonasal operations	0.9	0.6 to 1.5
Malaise increasing during the day	1.1	0.8 to 1.5
Pain in ear or throat	1.0	0.7 to 1.4
Cough	1.3	0.9 to 1.7**
Smoking	0.9	0.6 to 1.2
Allergy/asthma/chronic obstructive pulmonary disease	1.2	0.8 to 1.7
Ear, nose, and throat examination†		
Maxillofacial pressure pain	0.8	0.5 to 1.2
Nasal speech	1.3	0.9 to 1.8**
Septal deviation	1.1	0.7 to 1.8
Discharge on inferior concha	1.1	0.7 to 1.8
Postnasal drip	1.0	0.6 to 1.6
Otitis media	1.5	0.4 to 6.0
Cervical adenopathy	1.4	1.0 to 1.9***
GHQ-12 (score ≥3)	0.9	0.7 to 1.2

HR = hazard ratio; CI = confidence interval.

****p<0.01, ***p<0.05, **p<0.1, *p<0.2.

†Reference value is “No”, ‡indicates reference value.

influence the number of events (HR 1.1; 95% CI 0.8 to 1.5).

MULTIVARIATE ANALYSIS

Table 3 shows all variables that were ultimately identified as predictors of prolonged facial pain. Female sex, complaints for more than 14 days before inclusion, headache, cold, or cough as reason for encounter and absence of cervical adenopathy were found to be specific predictive factors for prolonged pain. There was no interaction between the variables analysed in the model and its stability was good. Figure 1 shows the prognostic index resulting from this

Table 3 Results of multivariate analysis of factors that predict a prolonged clinical course of facial pain in patients with acute sinusitis complaints

Variable	HR	95% CI
Sex (female)	0.60	0.42 to 0.83
Duration of complaints before inclusion (in days)		
5–9*	1	
10–14	0.99	0.69 to 1.43
>14	0.62	0.41 to 0.94
Reason for encounter		
Sinusitis complaints*	1	
Headache	0.65	0.44 to 0.96
Cold/cough	0.63	0.41 to 0.97
Other complaints	1.00	0.55 to 1.85
Cervical adenopathy absent†	0.71	0.51 to 0.96

HR = hazard ratio; CI = confidence interval.

*Indicates reference value, †reference value is “present”.

Figure 1 Kaplan-Meier curves for facial pain in patients with sinusitis complaints: patients with a quick, moderate, or slow recovery in the prognostic index.

set of predictive factors. The median time to recovery was three days for those with a quick, five days with a moderate score, and seven days with a more slow recovery.

The model for improvement by day 10 was too unstable to provide reliable results.

Discussion

In this study we identified a number of factors predicting a prolonged clinical course in adult general practice patients with acute sinusitis. While the overall median time from first consultation to recovery was six days, there was a difference of four days between the median values for patients with a quick (three days) and with a more slow recovery (seven days).

As regards the internal validity of our study: 15 patients (8%) could not be analysed because of loss to follow up, but according to Chalmers *et al* these figures are acceptable.²⁵ With 29 predictor variables, it is possible that some may be related to a prolonged clinical course by chance alone. On the other hand, it would be unusual to correct for this phenomenon when, as in our study all items relate to separate hypotheses.²⁶ The external validity of the study was enlarged by the use of a warning system linked to the computer based medical records, calling the GPs' attention to eligible patients. With regard to relevant variables—age, sex, season of onset, patient demand for help, reason for encounter and inclusion—the study population corresponds with the findings of others.²⁷ It is important to note that our criteria for the diagnosis, according to the guidelines of the Dutch College of General Practitioners,¹⁸ do not include any diagnostic test. The reasoning is that the diagnostic value of ultrasound and radiography is too limited to confirm the GPs' diagnosis in the acute stage of the illness, and computed tomography is normally not available in general practice.^{3 28 29}

The short version of the GHQ, the GHQ-12, is a first stage screening instrument for the identification of mental disorders among primary care patients, particularly emotional disorders like anxiety and depression.^{17 21} The number of patients with anxiety and depression detected by the GHQ-12 in our study corresponds with figures found in another study in general practice.³⁰ We also found that patients visiting their GP for sinusitis more often had some emotional distress than people in a random sample of the population, indicating

the importance of this emotional state in relation to consultation behaviour. However, anxiety and depression did not predict poor outcome in our study.

The duration of facial pain and restriction of activities agree with data published by Man and Jonas.¹⁰ Our results seem to agree with the finding that sex influences the prevalence and clinical course of illness.³¹ One could hypothesise that women, through socialisation, are more likely to share their problems, complaints, and poor outcome with others, including their GP, while men are more likely to keep their problems to themselves.³² The other prognostic factors—longer duration of complaints, but less than three months, before visiting the GP, and the absence of cervical adenopathy—could indicate some other, longlasting, cause (hyper-responsiveness, allergy, or dental, muscular, neurological, vascular, and psychological problems) of complaints than an acute infection.

A important result of this study is that we could not prove an influence on the clinical course of sinusitis by factors such as relapse of symptoms, previous sinonasal surgery, course of illness during the day, smoking, allergy, asthma, chronic obstructive pulmonary disease, and septal deviation. Some of these figures are small, but they are confirmed by other studies.^{13 33–35}

We conclude that acute sinusitis in general practice is usually self limiting, with a median duration varying from three to seven days. A limited number of characteristics are predictive of a (slightly) prolonged clinical course of acute sinusitis complaints in general practice. It may be argued that none of the prognostic factors that we identified are amenable to intervention. But they possibly stimulate GPs to be aware of other explanations for prolonged complaints than actual sinus inflammation and infection. We could not prove the clinical course of sinusitis complaints is influenced by other well known factors that often tempt physicians to therapeutic activity. Our results imply that no special treatment is indicated for patients with a prolonged clinical course, in spite of tradition or any urge to prescribe. However, they could help GPs to explain to their patients the course they may expect their illness to take.

How should GPs, regarding these results, manage their patients with acute sinusitis, in first instance? Careful history taking can help the GP to differentiate between acute sinusitis complaints and other illnesses. Hyper-responsiveness or allergy, dental problems, and tension headache must be kept in mind. Clarification of the demand for help is essential, particularly with regard to aspects related to behavioural and prognostic factors and the patients' actual concerns. Further examination by means of ultrasound or radiography is not indicated in the first instance. In most cases, an explanation of the self limiting nature and the prognosis of these complaints, if necessary combined with symptomatic treatment with analgesics and decongestive nosedrops for seven to 10 days, should be sufficient.³⁶ It is essential to note that acute sinusitis in patients

in general practice is not usually caused by a bacterial infection but by an obstruction, so there is no need for antibiotic treatment.

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IMAGES IN MEDICINE

Giant abdominal aortic aneurysm secondary to intimomedial mucoid degeneration

A 69 year old African women presented with a one year history of vague abdominal and lower back pains. Over recent months she had become more aware of a pulsatile mass in the left side of her abdomen. Apart from a history of poorly controlled hypertension she was otherwise fit and well and had never been to hospital before.

On examination a large pulsatile mobile mass filling the left side of her abdomen was noted.

Computed tomography (fig 1) confirmed the presence of 15 cm infrarenal abdominal aortic aneurysm extending to the bifurcation. The radiological findings of a large aneurysm with little thrombus were highly suggestive of intimomedial mucoid degeneration. The aneurysm (fig 2) was successfully repaired with a straight Dacron interposition graft and the patient made an uneventful recovery. Histological examination of the aneurysm wall confirmed the diagnosis.

Intimomedial mucoid degeneration is a well described cause of aneurysmal disease occurring almost exclusively in black African women.¹ These aneurysms often reach large sizes before rupture and characteristically are noted to have scant thrombus and clot within the aneurysm sac. Surgical repair can be challenging, as the soft arterial wall does not hold sutures well and bleeding complications occur in some patients as a result of primary fibrinolysis.

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¹ Abdool-Carrim ATO, Robbs JV, Kadwa AM, *et al*. Aneurysms due to intimomedial mucoid degeneration. *Eur J Vasc Endovasc Surg* 1996;11:324-9.

Figure 1 Computed tomography of the abdomen showing abdominal aortic aneurysm.

Figure 2 Intraoperative view of the aneurysm with the aortic bifurcation at the bottom of the photograph.