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Original article

How should nasal symptoms be investigated in asthma? A comparison of radiologic and endoscopic findings

Background: To improve asthma control, the management of rhinosinusitis often leads the physician to perform sinonasal imaging and/or nasal endoscopy, but their respective contributions are still insufficiently understood.
Objective: To evaluate the potential contribution of a symptoms questionnaire, sinus radiography (SR) and computed tomography (CT) scan to the diagnosis of nasal diseases in asthmatic patients when compared with ENT examination.
Methods: A total of 124 patients completed a questionnaire on nasal symptoms administered by the chest physician. Then, they underwent ENT examination. On the same day, SR and CT scans were performed independently.
Results: Patients (80.3%) had nasal symptoms during the month preceding the consultation. The ENT examination was normal in 8.1% ($n = 10$) and revealed rhinitis in 57.3% ($n = 71$), rhinosinusitis in 14.5% ($n = 18$) and nasal polyposis in 20.2% ($n = 25$). For rhinitis, the negative predictive value of bilateral nasal obstruction was 87.8%. Both SR and CT had low sensitivity and specificity. For rhinosinusitis, the negative predictive value of nasal symptoms varied from 85.4 to 95.2%. Sinus CT was at least as accurate as SR for the diagnosis of rhinosinusitis. In a multivariate analysis, only the CT scan (score ≥12) appeared to be significantly associated with the diagnosis of nasal polyposis.
Conclusion: In asthmatic patients, physicians need to enquire systematically about the existence of nasal symptoms by using this simple questionnaire which is sensitive for rhinitis, and has good negative predictive value for excluding rhinosinusitis and nasal polyposis.

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Key words: asthma; computed tomography; nasal endoscopy; rhinitis; rhinosinusitis; sinus radiography.

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It is now widely recognized that the upper airways are involved in asthma and there is a growing body of evidence that rhinitis may reflect the same underlying disease process (1). Recent epidemiologic studies in the general population have provided strong evidence that asthma and rhinitis are closely associated (2), and up to 80% of patients with asthma suffer from rhinitis (3). On the contrary, sinusitis, rhinosinusitis and/or rhinosinusal polyposis are also frequently associated with asthma (4), and several studies have shown that such upper airway diseases could worsen asthma and may contribute to asthma-related complications (5). In addition, various studies have confirmed that rhinitis has a significant impact on health-related quality of life and the treatment of rhinitis has been shown to some extent to be beneficial to the lower airways (6, 7). In this respect, a strategy for preventing bronchial asthma through the management of allergic rhinitis has recently been developed (8). Therefore, asthma management should include the investigation of rhinosinusitis to improve asthma control, and often leads the physician to perform sinonasal imaging and/or nasal endoscopy. Computed tomography (CT) is nowadays the most suitable technique for studying the nose and paranasal sinuses but its relevance in asthma management remains a subject of debate (9). For this purpose, plain films of the nasal or paranasal sinuses have been widely used but the benefit of such an approach has not been demonstrated so far (10). Nasal endoscopy makes it possible to directly investigate the upper airway and is considered as the reference technique for the diagnosis of sinonasal diseases (11). However, it requires specific training and is less frequently used in common practice.

The present study was designed to evaluate the potential contribution of a symptoms questionnaire,

sinus radiography (SR) and CT scan to the diagnosis of nasal disease in asthmatic patients when compared with that obtained by ENT examination including endoscopy.

Methods

Patients

Asthmatic patients were recruited from the outpatient clinic of eight university-based asthma centers. All of the patients fulfilled the international guidelines for asthma diagnosis, had typical clinical symptoms, and a documented airway reversibility (>12% and 200 ml improvement in FEV_1 after 200 μg salbutamol) or airway responsiveness to metacholine (PD20 < 8 mg with FEV_1 > 70% predicted values). Severity of asthma was graded according to GINA guidelines. Atopy was based on the presence of at least one positive skin prick test response to common aeroallergens. The University Ethics Committee approved the study and patients gave their informed consent.

Study protocol

Patients included in the study completed a questionnaire on nasal symptoms administered by their chest physician. Thereafter, they underwent ENT examination including nasal endoscopy performed by an ENT specialist. On the same day, SR and CT scans were performed independently.

Questionnaire on nasal symptoms

The questionnaire concerned the main nasal symptoms reported by patients suffering from ENT diseases (Table 1). The questions had been previously validated by a panel of ENT experts. All the nasal symptoms during the month preceding participation were characterized and scored on different scales: nasal obstruction, runny nose, sneezing, itching, loss of smell, headache. Scoring ranged from 0 to 30.

ENT examination

Each patient underwent an anterior rhinoscopy by an ENT specialist who was unaware of his/her asthma characteristics and imaging results. Architecture damage, mucosal thickening and/or secretion abnormalities were reported and scored. A diagnosis based upon this evaluation was proposed by the ENT specialist and considered as the gold standard for subsequent analysis: normal examination, rhinitis (allergic or nonallergic), rhinosinusitis, nasal polyposis. Rhinitis was defined as a mucosal inflammation of the nasal cavities and the absence of any other abnormality. Rhinosinusitis was defined as a mucosal inflammation of the nasal cavities associated with mucosal thickening within the sinuses. Nasal polyposis was defined as the presence of polyps in several sinonasal cavities.

Imaging

Every patient underwent both a standard SR (high anterior–posterior view) and sinus CT. Coronal and axial 1.5 mm slices were performed with high resolution CT. The following SR score was used for readings: each sinus (left and right) frontal, maxillary, sphenoid and ethmoidal was analyzed (0: normal, max 4: obstruction). The range of possible scores was 0–19. The CT scans were analyzed for evidence of mucosal thickening in the sinuses, ostiomeatal complexes (OMCs) and nasal cavities. A CT scan score was assigned as previously described by Crater et al. (12, Table 2). The total CT scan score was used to classify the patients as having limited (CT score: 0–11) or extensive (CT score: ≥12) involvement. The range of possible scores was 0–30. The SR and CT scan were interpreted by two independent radiologists who were blind to the patients' history and ENT examination. Interobserver variation in identifying imaging abnormalities was

Table 1. Questionnaire on nasal symptoms

Nasal symptoms during month preceding the visit ?

☐ Yes ☐ No

If yes, nasal symptoms questionnaire

Nasal blockage
☐ Absence
☐ Mild
☐ Moderate
☐ Severe

☐ Permanent
☐ Intermittent

☐ Unilateral
☐ Bilateral

Anterior runny nose
☐ Absence
☐ Mild
☐ Moderate
☐ Severe

Anterior discharge aspect
☐ Aqueous
☐ Serous
☐ Purulent

Posterior runny nose
☐ Absent
☐ Present
☐ Other

Sneeze
☐ Absent
☐ Minor
☐ Moderate
☐ Severe

If frequent
☐ Permanent
☐ Morning
☐ Other

Nasal itching
☐ Absent
☐ Minor
☐ Moderate
☐ Severe

Loss of smell
☐ Present
☐ Minor
☐ Moderate
☐ Severe
☐ *Cacosmia*

Taste
☐ Present
☐ Absent

Headache
☐ Absent
☐ Minor
☐ Moderate
☐ Severe

Localization
☐ *Supraorbital*
☐ *Suborbital*

Episode of rhinosinusitis (facial pain with fever)
☐ Absence
☐ Rare (3</year)
☐ Frequent (>3/year)

Table 2. Computed tomography (CT) scoring [adapted from Crater et al. (12)]

Site of mucosal thickening	0 pt (mm)	1 pt (mm)	2 pts (mm)	3 pts (mm)
Frontal sinus ($n = 2$)	0–1	2–5	6–9	≥10
Maxillary sinus ($n = 2$)	0–1	2–5	6–9	≥10
Sphenoid sinus ($n = 1$)	0–1	2–5	6–9	≥10
Ethmoidal sinus ($n = 2$)	0	1	2–3	≥4
Ostiomeatal complex ($n = 2$)	0	Mild	Moderate	Severe
Nasal passages ($n = 2$)	0	Mild	Moderate	Severe

tested by means of the kappa coefficient of variation (κ) that was calculated for each item of both sinus and CT scores. There was fair agreement between the two radiologists for sinus radiographs [κ mean = 0.57; 95% confidence interval (CI): 0.46–0.66] and good agreement for CT scans (κ mean = 0.91; 95% CI: 0.99–0.63).

Statistical analysis

The frequency analysis of the symptoms score and CT scan score distribution was obtained using ANOVA. Differences in proportions were tested by means of chi-square statistics. A P-value of < 0.05 was understood to indicate statistical significance.

The 'gold standard' was the ENT specialist's conclusion following endoscopy. For nasal items in the questionnaire and for SR and CT, sensitivity (Se), specificity (Sp), positive predictive value (PPV) and negative predictive value (NPV) were calculated with standard methods.

Se = true positive/false negative + true positive
Sp = true negative/true negative + false positive
PPV = true positive/true positive + false positive
NPV = true negative/true negative + false negative

The polychotomous logistic regression model was used to evaluate the different risk factors for the three groups of patients according to the diagnosis established by nasal endoscopy (taking those with normal examination as the reference group). Results are presented as odds ratios (ORs) and 95% CI.

The statistical analysis was performed using EPI-INFO version 6.04 (13) and STATA version 6.0 (14).

Results

Demographic data and nasal characteristics

Of 124 patients participated in the study, 83% ($n = 103$) of them completed all four parts. The demographic data of the study population are presented in Table 3. Asthmatic patients (80.6%, $n = 83$) reported nasal symptoms during the month preceding the study, including nasal obstruction (67%), sneezing (67%), runny nose (54.5%) and/or loss of smell (42.8%). 40% of them presented with sinus radiograph abnormalities and more than 80% had a CT score above 5. Only one subject had a normal CT scan. The majority of patients (90.3%, $n = 93$) also presented with an abnormal nasal endoscopy. However, there was a lack of correlation between endoscopic findings and nasal symptoms. Ten of 83 patients with nasal symptoms had normal anterior rhinoscopy and 18 of 20 patients without symptoms had abnormal ENT examination (17 presented with rhinitis or rhinosinusitis and one with polyposis). Symptoms and radiologic findings are detailed in Table 3. Active smoking was significantly associated with rhinitis. Nasal endoscopy revealed architecture abnormalities in 93.2% of cases, mucosal thickening in 94.2% and secretion abnormalities in 70%. The definitive ENT findings were a normal examination in 8.1% ($n = 10$) of subjects, rhinitis in 57.3% ($n = 71$), rhinosinusitis in 14.5% ($n = 18$) and nasal polyposis in 20.2% ($n = 25$). Regarding symptoms scores, there was no difference between the groups of ENT diagnoses. The description of symptoms was similar in the different groups, except for loss of smell which was more frequent in polyposis (Table 3). Architectural damage was detected even in the absence of underlying nasal disease (normal: two of 10, rhinitis: six of 71; rhinosinusitis: five of 18; polyposis: five of 25). By contrast, mucosal thickening and secretion abnormalities were significantly associated with rhinitis, rhinosinusitis and polyposis when compared with normal examination ($P = 0.03$).

Table 3. Demographic and nasal characteristics

Variables	All ($n = 124$)	Normal ($n = 10$)	Rhinitis ($n = 71$)	Rhino sinusitis ($n = 18$)	Polyposis ($n = 25$)
Age, mean (SD)	40 (15.3)	46.3 (14.4)	38.8 (15.2)	35.3 (13.6)*	47.2 (13.4)
Sex (F/M)	71/53	7/3	39/32	9/9	16/9
Active smoking, n (%)	21 (16.9)	1 (10)	16 (22.5)*	2 (11.1)	2 (8)
CSI (μg/day)	1332	1628.5	1214.13	1333.3	1510.5
Atopy (%)	54.8	90**	45	44	76
Percentage FEV_1 (minimun–maximum)	75.8 (27–18)	74.3 (38–112)	84.6 (28–138)	82.3 (30–134)	80.4 (27–123)
Score symptoms					
30 pts mean (SD)	12.5 (7.2)	15.5 (6.7)	15.4 (5.9)	17.8 (6.2)	16.5 (6.2)
Nasal obstruction, n (%)	83 (66.9)	2 (20)	12 (38)	5 (26)	7 (28)
Permanent nasal obstruction, n (%)	44 (35.5)	2 (20)	20 (28.2)	9 (50)	14 (56)
Bilateral nasal obstruction, n (%)	56 (45)	4 (40)	28 (39.4)	10 (52.6)	15 (60)
Anterior runny nose, n (%)	80 (64.5)	0	8 (11.3)	3 (16.6)	4 (16)
Posterior runny nose, n (%)	63 (50)	4 (40)	32 (45)	12 (63)	16 (64)
Loss of smell, n (%)	53 (42.7)	1 (10)	5 (7)	2 (10.5)	8 (32)**
Sinus radiograph score, mean (SD)	3.7	3 (2.6)	3.1 (3.8)	4.25 (2.9)	5.4 (3.7)
Sinus CT scan score, mean (SD)	12.8	11.4 (7.5)	10.4 (5.9)	13.5 (6.5)	20.1 (7)**
Frontal sinuses	1.04 (1.7)	0.5 (0.97)	0.54 (1.1)	0.8 (1.3)	2.8 (2.5)**
Maxillary sinuses	3.1 (2.1)	2.1 (2.2)	2.6 (2.1)	3.9 (2)	4.5 (1.8)**
Sphenoid sinus	0.8 (1.02)	0.8 (1.03)	0.54 (0.9)	0.47 (0.6)	1.6 (1.2)**
Ethmoid sinuses	4.09 (2)	4.2 (2.1)	3.4 (2)	4.8 (1.8)	5.7 (0.8)**

* $P < 0.05$, ** $P < 0.005$.

We classified asthma status according to the GINA guidelines by taking into account treatment and respiratory function: intermittent asthma 16.9% ($n = 21$), mild persistent asthma 4% ($n = 5$), moderate persistent asthma 54.8% ($n = 68$) and severe asthma 24.2% ($n = 30$).

The distribution of asthma severity did not differ according to ENT diagnosis and the doses of inhaled corticosteroids were similar in the four groups (Table 3).

The SR score did not differ significantly according to nasal symptoms (i.e. nasal obstruction, runny nose, sneezing, itching, loss of smell, other) or ENT diagnosis (i.e. normal examination, rhinitis, rhinosinusitis, polyposis). The CT score was significantly higher only in patients suffering from polyposis (Table 3).

Comparison of symptoms questionnaire and nasal imaging with ENT diagnosis and endoscopic findings

Sensitivity, specificity and predictive values of questionnaire items and imaging scores are presented in Tables 4–6 for rhinitis, rhinosinusitis and polyposis, respectively. The symptoms questionnaire had a high sensitivity and a poor specificity for rhinosinusitis and polyposis, and to a lesser extent for rhinitis. However, there was no specific item highly predictive of ENT diagnosis. The best parameters were obstruction and sneezing for rhinitis, and to a much lesser extent, loss of smell and previous sinusitis for rhinosinusitis and polyposis. It should also be noted that imaging scores were less predictive than the symptoms questionnaire, except for the CT score in patients suffering from polyposis (Table 6).

Table 4. Predictive value of nasal symptoms and imaging for rhinitis

	Rhinitis			
Items	Se	Sp	PPV	NPV
Nasal symptoms (any)	77.5	9.4	53.4	23.8
Nasal obstruction	66	26.4	58.1	34.1
Runny nose	59.2	23.8	46.7	34.1
Sneezing	64.8	30.2	55.4	39
Loss of smell	32.4	42.6	42.6	32.4
Taste	71.8	24.5	56	39.4
Headache	52.1	43.4	55.2	40.4
Previous sinusitis	38.7	50	51.1	37.7
Sinus radiography	57.7	18.9	48.8	25
CT scan	66.2	10.5	37.9	24.3

Se, sensitivity; Sp, specificity; PPV, positive predictive value; NPV, negative predictive value; CT, computed tomography.

Table 5. Predictive value of nasal symptoms and imaging for rhinosinusitis

	Rhinosinusitis			
Items	Se	Sp	PPV	NPV
Nasal symptoms (any)	94.4	18.9	16.5	95.2
Nasal obstruction	77.8	36.8	17.3	90.3
Runny nose	83.3	38.7	18.8	93.2
Sneezing	66.7	33	14.5	85.4
Loss of smell	72.2	62.3	24.5	93
Taste	88.9	29.2	17.6	93.9
Headache	66.7	48.1	17.9	89.5
Previous sinusitis	50	64.6	21.6	86.9
Sinus radiography	83.3	34.9	17.9	92.5
CT scan	83.3	28.3	16.5	91

Se, sensitivity; Sp, specificity; PPV, positive predictive value; NPV, negative predictive value; CT, computed tomography.

Table 6. Predictive value of nasal symptoms and imaging for nasal polyposis

	Polyposis			
Items	Se	Sp	PPV	NPV
Nasal symptoms (any)	92	19.2	22.3	90.5
Nasal obstruction	80	36.4	24.1	87.8
Runny nose	68	45	28.3	81.8
Sneezing	68	33	20.2	80.5
Loss of smell	56	60.6	26.4	84.5
Taste	68	25.3	18.7	75.8
Headache	56	46.5	20.9	80.7
Previous sinusitis	54.5	67.1	32.4	83.6
Sinus radiography	86	35.4	23.8	87.5
CT scan	96	32.3	26.4	97

Se, sensitivity; Sp, specificity; PPV, positive predictive value; NPV, negative predictive value; CT, computed tomography.

The symptoms questionnaire also had good sensitivity for detecting nasal abnormalities detected endoscopically. For architectural damage, the most efficient item was nasal obstruction (sensitivity 88%, specificity 92%). In patients with mucosal thickening, the sensitivity of questions about nasal obstruction, runny nose and sneezing was 89%, 73% and 76% respectively, whereas specificity only varied from 16 to 22%. However, the negative predictive value ranged from 73 to 82%. The sensitivity of nasal obstruction, runny nose and sneezing in patients with secretion abnormalities was respectively 86%, 77%, 78% and the specificity varied from 15 to 54%.

In terms of imaging, the sensitivity of SR ranged from 59.8% for mucosal thickening to 62.3% for secretion abnormalities, whereas its specificity reached at best 42.3%. The CT scan demonstrated a better predictive value, but this was lower than that of symptoms questionnaire for several abnormalities. For architectural damage, PPV was 87.3% but sensitivity was 49%, specificity 42.9%, and NPV 9.7%. For mucosal thickening, the sensitivity of CT scan was 56.1%, specificity 60.5%, PPV 73%, and NPV 41.9%. These parameters were close to those obtained for another inflammatory index, secretion abnormalities (sensitivity, 55.8%; specificity, 66.7%; PPV, 84.1%; NPV, 32.3%).

Multivariate analysis approach: polychotomous model

Taking into account nasal symptoms by questionnaire, demographic data, severity of asthma and imaging (i.e.

Table 7. Multinomial regression

Variables	Rhinitis $n = 71$ OR (95% CI)	Rhinosinusitis $n = 18$ OR (95% CI)	Polyposis $n = 25$ OR (95% CI)
Severity (severe *vs* others)	1.3 (0.55–0.06)	2.15 (0.77–6.03)	1.24 (0.5–3.1)
SR score (normal *vs* others)	2.6 (0.42–15)	0.89 (0.09–8.6)	2.42 (0.3–19)
CT score *f* 12	1.33 (0.26–6.66)	5 (0.71–7)	16 (2.5–28)**
Age	0.95 (0.9–1.1)	0.92 (0.86–0.98)	0.99 (0.93–1.04)
Sex	0.39 (0.07–2.1)	0.39 (0.05–2.7)	0.92 (0.15–5.5)
Atopy	0.08 (0.009–0.73)*	0.05 (0.004–0.6)*	0.2 (0.02–2.2)
Nasal symptoms (at least one)	1.07 (0.15–7.7)	5.8 (0.5–26)	2.2 (0.2–24)

Normal ENT examination is the control group, * $P < 0.05$; ** $P < 0.005$.
SR, sinus radiography; CT, computed tomography.

SR and CT) in a multivariate analysis adjusted on smoking habits, only CT scan (score *f* 12) appeared to be significantly associated with the diagnosis of nasal polyposis compared with other diagnoses (i.e. normal, rhinitis, rhinosinusitis), as suggested by the univariate analysis in Table 3. The model showed that atopy was significantly associated with rhinitis or rhinosinusitis but not with polyposis when compared with normal examination (Table 7).

Discussion

This study shows that nasal symptoms are very common in asthmatic patients but are difficult to analyze in diagnostic terms, despite the use of a specific questionnaire and nasal imaging. We found that the symptoms questionnaire had good sensitivity but poor specificity. Negative answers to all the questions indicated a very low probability that the patient had rhinitis, rhinosinusitis or nasal polyposis. However, this situation was less frequent in asthma. Regarding imaging, neither SR nor CT proved helpful in the diagnosis of rhinitis or rhinosinusitis.

Using the questionnaire, nasal symptoms were detected in 80% of cases whereas ENT examination revealed more abnormalities (>90%). These results show that nasal symptoms are very common in asthmatic patients, as previously described in other studies (2, 3). Even if rhinitis (both allergic and nonallergic) is very common in asthmatic patients, our data suggest that rhinosinusitis (15) and polyposis are frequent in asthma.

We did not find any significant correlation between nasal diagnosis and asthma severity. In particular, we expected to find more severe asthmatic patients with polyposis, as reported by Bresciani et al. (16) who found the frequency of rhinosinusitis in patients with mild-to-moderate or severe steroid-dependent asthma to be very similar. However, they showed that sinonasal involvement, as evaluated by clinical symptoms and CT, was significantly greater in severe-steroid-dependent asthma than in the mild-to-moderate form.

We did not find any nasal symptom, a feature which could be efficient when differentiating rhinitis from rhinosinusitis or polyposis, except for loss of smell, which was significantly associated with nasal polyposis. However, nasal obstruction, runny nose and sneezing had good sensitivity for predicting architectural abnormalities, mucosal thickening abnormalities or the presence of secretions when an anterior rhinoscopy was performed. One finding of the study is the acceptable sensitivity and negative predictive value of the questions regarding nasal symptoms. The negative predictive value represents the proportion of individuals with a negative test who did not have the disease in question, a finding that is reassuring regarding the absence of disease and which points to the fact that rescreening may not be worthwhile. Nasal symptoms could predict the absence of rhinosinusitis or polyposis in case of a negative answer, particularly nasal obstruction. In this study, we found a negative good predictive value of nasal symptoms for the diagnosis of rhinosinusitis and nasal polyposis.

A subgroup of patients suffering from nasal symptoms presented with a normal examination whereas some patients without such symptoms had abnormal ENT findings. The radiologic profile of patients with normal ENT examination was similar to that of patients with rhinitis. We cannot formally rule out that these patients had taken treatment for their rhinitis, especially since rhinitis symptoms have been reported to impact very negatively on quality of life, as reported by Blanc et al., who showed that these patients frequently resort to alternative therapies (17). Another explanation might be the variability of the clinical expression of the nose disease over time. Others cofactors such as environmental exposure (pollutants or allergens) may influence this clinical expression in asthma. Another explanation is the possible infraclinical expression of the disease, but some patients with symptoms had normal examination findings. Biopsies of nasal epithelium for histopathologic analysis could prove helpful in further studies.

Radiologic techniques did not lead to any improvement in the diagnostic approach. Sinus radiographs had an interobserver agreement lower than CT scan. There was no significant difference between the four ENT diagnoses in terms of SR score. In addition, SR score did not differ significantly between subjects with and without nasal obstruction. We observed the same results for SR score compared with all other nasal symptoms (runny nose, sneezing, loss of smell, etc.). Various authors have highlighted the variable incidence of sinusitis in asthmatic patients as detected by conventional radiography, such variability reflecting the difficulty of accurately diagnosing sinus disease using conventional SR (10). Despite this, prescription of SR by general practitioners or chest specialists is still very common for asthmatic patients with or without nasal symptoms. In our study, CT scan for detection of abnormalities (i.e. architectural, mucosal

thickening, secretion) did not appear to be very efficient in rhinitis, but can be useful in rhinosinusitis and even better in polyposis, despite good interobserver agreement and using a validated score (12). However, sinus CT scores were significantly higher in polyposis and rhinosinusitis than in rhinitis. In addition, our CT scores in patients with normal ENT examination point to the fact that CT scan provide radiologic evidence of sinusitis even in the absence of clinical symptoms. Although many specialists do not consider CT to be a mandatory part of polyposis assessment, its role is important for confidently diagnosing sinonasal polyposis, for appreciating its extent and severity (18) and for diagnosing fungal sinusitis and less frequently tumors (9). The questionnaire appeared to be sensitive but not specific for detecting ENT disorders. It is superior to SR, which would seem to be of little use in daily practice, and is superior to and less expensive than CT scan.

In conclusion, epidemiologic and clinical studies have clearly demonstrated the high frequency of the association between the upper and lower airways. Physicians involved in managing asthmatic patients need to enquire systematically about nasal symptoms using a simple questionnaire such as the one used here. It is sensitive for rhinitis and has good negative predictive value for ruling out rhinosinusitis or nasal polyposis. In rhinitis, imaging is of little use. On the contrary, the hypothesis of rhinosinusitis or nasal polyposis may lead the physician to refer the patient to an ENT specialist, who in turn may decide to prescribe a sinus CT. Nevertheless, because of the high prevalence of nasal symptoms, not all patients can systematically have rhinoscopy that is discomfort-free. The role of anterior rhinoscopy, which could remain the routine examination of the nasal cavities for practitioners, should be evaluated in further studies.

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