Original Research Article

A Study of Relationship Between Sinus Diseases and Lower Respiratory Tract Infections

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Abstract

Background - To find out the association between sinus diseases with lower respiratory tract infections.

Methods – The study was conducted on 100 patients, 59 cases with diagnosis of sinusitis were assigned group I, 41 cases with diagnosis of LRTI were assigned group II. All clinical and radiological characteristics were recorded, incidence of sinusitis in various lower respiratory tract infections was studied. Patients diagnosed with sinobronchial syndrome were divided in control and study group, study group was given medical treatment for sinusitis for 15 days. All patients were followed for 3 months. Subjective and objective improvement /worsening of LRTI in both study and control group was recorded.

Results – Out of 18 cases of bronchial asthma, 9 (50%) had coexisting sinusitis. Incidence of sinusitis in bronchiectasis patients was 50%. 11 out of 19 cases of chronic bronchitis had sinusitis (57.89%). It was also observed improvement in lower respiratory tract symptoms was more in study group than in control group ,i.e., 57.14% versus 5.55% on first follow up, 71.43% versus 11.11% on second follow up.

Conclusions- Paranasal sinusitis has been diagnosed frequently in patients who have lower respiratory tract infections and is important precipitating factor in provoking lower respiratory tract infections. Hence there should be a team approach between chest physician and otolaryngologic surgeon and any patient suffering from disease of either airway should be regarded as suffering from 'Single airway disease'

Keywords – Asthma, Bronchitis, Bronchiectasis, Chronic Rhinosinusitis, Sinobronchial Syndrome

Introduction

The "united airways" concept indicates that upper and lower airway diseases often coexist and share similar pathogenic mechanisms, and asthma-chronic rhino sinusitis (CRS) overlap is a typical "united airways" disease.(1-3) It has been shown that CRS is associated with more severe asthma, especially in CRS with nasal polyp (NP) patients.(2,4) Similarly, incidence of combined sinus disease with bronchitis was reported to be 83% by Abendroth (1952), and 53% by Katz (1978). The prevalence of CRS in patients with bronchiectasis is 45–77%. (3,5-7) Bronchiectasis patients with CRS are shown to have significantly more exacerbations and worse quality of life than bronchiectasis patients without CRS, indicating that the coexistence of CRS in bronchiectasis patients represents a more severe disease subset.(7)

Keeping all these observations in mind, the present study was done in the Department of ENT, Govt. Medical College and Rajindra Hospital, Patiala to determine the relationship of sinus disease and lower respiratory tract infections.

Materials and Methodology

The present prospective study was conducted on 100 patients in Department of ENT, Government Medical College and Rajindra hospital, Patiala. All patients were subjected to detailed history taking and examination with special attention to nose PNS & chest.

59 cases with signs and symptoms or established diagnosis of sinusitis were assigned group I and 41

cases with signs and symptoms of LRTI were assigned group II.

All clinical and radiological characteristics were recorded. X-ray Nose & PNS, NCCT nose & PNS and chest X-Ray were done in all patients for both diagnosis and management. Patients with positive findings on chest X Ray were further subjected to HRCT chest. Antral lavage was done in all patients for both diagnosis and treatment of sinusitis.

Patients diagnosed with sinobronchial syndrome were divided into control and study group. The study group was given medical treatment for sinusitis simultaneously which included systemic antibiotics, decongestants, antihistamines and local nasal decongestants for 15 days. Control group was not given such treatment.

All the patients were followed up every 15 days for 3 months. Subjective and objective improvement or worsening of LRTI in both study and control group were tested clinically and radiologically.

An attempt was made to search for cases of combined upper and lower respiratory tract infection i.e. cases of sinobronchial syndrome. Various clinical and radiological characteristics of sinobronchial syndrome cases were recognized and recorded.

Results

In group I, 59 cases were studied, which consisted of 43 cases of sinusitis and 16 cases of allergic rhinitis. In the group II, 41 cases were studied, which consisted of 19 cases of bronchitis, 18 cases of bronchial asthma and 4 cases of bronchiectasis.

It was observed that most cases in group I were in the age group of 11-30 years while most cases in group II were in the age group of 21-40 years. Amongst 39 cases of sinobronchial syndrome, majority, i.e., 38.4% were in 21-30 age group.

The total number of males studied in this study were 64 (64%) of which 38 (64.41%) were from group I and 26 (63.41%) from group II. Total number of females entering this study were 36 (36%), out of which 21 (35.59%) were from group I and rest 15 (36.59%) were from group II.

In total, 24 (61.54%) male patients were diagnosed as having sinobronchial syndrome, of which 10 were from group I and 14 from group II. Rest 15 (38.46%) patients of sino bronchial syndrome were females, of these 7 were from group I and 8 were from group II.

Among total 41 patients of lower respiratory tract infection studied, 22 (53.65%) had evidence of sinusitis. Of these 22 cases, 11 (57.89%, n=19) cases were of bronchitis, 9 (50%, n=18) were of bronchial asthma and 2 (50%, n=4) cases were of bronchiectasis.

Amongst total 59 patients with sinus disease included in this study, 17 (28.8%) had clinical or radiological evidence of lower respiratory tract involvement. Amongst these 43 cases of sinusitis who were studied, 13 (30.23%) were found to be having lower respiratory tract involvement. Amongst 16 cases of allergic rhinitis, 4 (25%) showed clinical evidence of lower respiratory tract involvement in form of positive history and positive signs.

Amongst the 59 patients of group I, 17 (28.81%) had evidence of lower respiratory tract infections and were diagnosed as sinobronchial syndrome.

Patients of 2nd group were subjected to thorough history and clinical examination for symptoms and signs of sinonasal involvement and radiological examination of paranasal sinuses was done. Amongst the 41 patients who were studied in group II, 22 (53.66%) patients had clinical and/or radiological evidence of sinus disease and were diagnosed as sinobronchial syndrome.

Thus, out of total 100 patients, 39 (39%) patients were diagnosed to be suffering from sinobronchial syndrome.

Out of 43 patients of sinusitis in group I, only 5 (11.65%) had shown abnormality in their chest x-ray posteroanterior view in the form of increased bronchovascular markings and amongst the 16 cases of allergic rhinitis. only 1 (6.25%) had shown increased bronchovascular markings which was suggestive of bronchitis.

Patients of sinobronchial syndrome were divided in 2 groups to study improvement in LRTI with or without treating sinusitis simultaneously. In the study group, which was given treatment for sinusitis simultaneously during first follow up, 12 (57.14%) patients had the clinical evidence of improvement in their lower respiratory tract disease. During 2nd

follow up, in 3 more, i.e., total 15 (71.43%) patients improvement was recorded. In subsequent follow up no addition was made to this list. In control group, during first follow up in only 1 (5.55%) patient improvement was recorded. During second follow up 1 more patient was added to their list making total improved cases as 2 (11.11%). During the next follow up no patients showed improvement.

Discussion

A total of 100 patients were enrolled in the study. 59 patients were selected from department of Otorhinolaryngology out of which 43 presented with initial diagnosis of sinusitis and 16 presented with features of allergic rhinitis.

41 patients were selected from department of medicine, 19 presented with bronchitis, 18 patients presented with bronchial asthma and 4 presented with bronchiectasis.

All of these patients were subjected to detailed history, thorough clinical examination with special attention to the study areas, i.e., nose, paranasal sinuses and respiratory system. Radiological investigations for detection of sinonasal infection and lower respiratory tract infection were done.

Age Incidence

It was observed that in group I, most cases of sinusitis and allergic rhinitis were in the age group of 11-30 years while most cases of group II, i.e., lower respiratory tract infection were in the age group of 21-40 years. Sinusitis commonly affected the patients in 11 to 40 years of age while most patients affected by allergic rhinitis were somewhat younger, i.e., in 11-30 years age group. Flemming and Crombie (1987) reported incidence of allergy in peak age of young adulthood with male predominance.(8) Shigehito Mori and Shigehaw (2002) studied 45 patients with perennial allergic rhinitis with mean age of 25.7 years.(9)

Amongst group II patients (LRTI), out of 19 patients with bronchitis, majority, i.e., 10 (52.63%) were in 31-40 years age group. Amongst the patients of bronchial asthma, most cases (44.44%) were found to be in the 21-30 years age group. It was difficult to draw any conclusion from above findings as the number of patients was less in each disease group.

Sex Incidence

In both the groups, males predominated the females (64% versus 36%). These findings were consistent with the previous study done by Rachelefsky et a.l (1984) who conducted their study on 48 children with asthma of which 32 were males and 16 females.(10) Similarly, Huang et al (1995) in a study of 375 patients with respiratory tract allergies reported male predominance with 245 males and 130 females.(11)

This finding may be explained by the fact that our society is a male dominated society and females are often a neglected section who seek medical advice much later than the males.

Incidence of involvement of lower respiratory tract in cases of sinonasal disease

Amongst the 59 patients of group I, i.e., the patients who presented with predominantly sinonasal diseases, 17 (28.81%) had exhibited the presence of lower respiratory tract affections such as bronchitis and bronchial asthma. Similar to our study, Ragab et al. (2004) studied 25 patients with chronic rhinosinusitis clinically and radiologically and found that 60% of chronic rhinosinusitis patients had lower airway involvement.(12)

Incidence of sinonasal involvement in cases of lower respiratory tract infection

Total 22 cases of Sino bronchial syndrome were diagnosed amongst 41 cases of lower respiratory tract infections making a percentage of 53.65%. A study by Pryvchev and Naidenova (1977) analysed 407 patients with respiratory allergy, which included 245 asthmatic bronchitis and 162 bronchial asthma. Affection of nasal sinuses was revealed in 33% patients with asthmatic bronchitis and 32% with bronchial asthma.(13) Similarly, Fedoseev et al. (1986) conducted their study on 286 patients, of which 229 patients had bronchial asthma and 57 patients had chronic bronchitis. Concomitant diseases of the upper respiratory tracts, mainly of the nasal cavity and accessory nasal sinuses were found in 273 (95.45%) patients.(14)

Bronchial asthma and sinusitis

Out of the 18 cases of bronchial asthma, 9 (50%) cases also had sinusitis. The incidence of sinusitis in bronchial asthma patients ranged from (30-90%) in

the reports of various authors. Spector et al (1976) reported 60%, Monterisi et al (1978) reported 36.2%, Zimmerman and Gold (1991) reported 30-70%, Ferrante et al (1998) reported 43.3%, Matsuno (2008) reported 66.3% and Kazuhiro (2012) reported 73% incidence.

The findings of present study were comparable with the findings of Ferrante et al (1998) and Zimmerman and Gold (1991).(15,16) Incidence rates more than this study were shown by Spector et al (1976), Matsuno (2008) and Kazuhiro (2012). (17-19) A lower incidence rate of sinusitis in bronchial asthma was shown by Monterisi et al (1978). (20)

Bronchiectasis and sinusitis

The incidence of sinusitis in cases of bronchiectasis was found to be 50% in this study.

In literature, Shrihata (1990) found in a retrospective study of 44 patients that the incidence of bronchiectasis was found in 5% of chronic sinusitis patients and chronic sinusitis in 45% of bronchiectasis patients which was almost similar to our study. (21) Yang et al in 2017 also showed similar incidence as 57.6% patients had chronic sinusitis.(22) A recent study conducted by Emma handley in 2019 showed a much higher incidence of 62%.

Chronic bronchitis and sinusitis

Out of the 19 cases of chronic bronchitis, 11 (57.89%) had sinusitis. The incidence of sinusitis as reported by various authors is in range of 33% to 83%. The findings of this study were comparable with the findings of Vanwinkel and Maertens (1958).(23)

The incidence of sinusitis in bronchitis in this study was lower as compared to the study of Klobec (1959) (66.7%) and higher as compared to the studies of Pryvchev and Naidenova (1977) and Zapasnic-Kobierska (1979) who showed incidence of 33% and 45.6% respectively.(24,13,25)

Sinobronchial syndrome cases

When all the 39 cases of sinobronchial syndrome were distributed according to their age, it was observed that maximum cases, i.e., 38.46% were in the age group of 21-30 years followed in decreasing order by 30.77% in 31-40 years age group, 12.82% in 11-20 years age group, 10.26% in 41-50 years age group and 7.69% in 51 years and above age group. Almost similar findings were observed when all 100 patients were classified according to their age groups. This led us to the conclusion that there is no specific predilection for age of occurrence in sinobronchial syndrome.

When sinobronchial syndrome cases were distributed according to their sex, most patients (61.54%) were males and 38.46% were females.

When all the 22 cases of sinobronchial syndrome in group II were examined radiologically, the incidence of isolated maxillary sinusitis was found in 81.82% cases. In 13.64%, both frontal and maxillary sinuses were involved. In 4.54% cases, pan sinusitis was seen. These findings were consistent with the findings of Monterisi et al. (1978) and Ferrante et al. (1998) who stated that maxillary sinuses were seen involved in most cases of sinobronchial syndrome. (20,15)

In chronic sinusitis cases, 13 (30.23%) had clinical features of involvement of lower respiratory tract.

Incidence of lower respiratory tract involvement in allergic rhinitis patients

Amongst the allergic rhinitis cases, 4 (25%) cases showed involvement of lower respiratory tract. This finding was in accordance with the studies of Palma-Carlos et al (2001), Vinuya (2002) and Demoly et al (2005) who showed an incidence of 20-40%, 19-38% and 25% respectively. (26,27,2)

The findings of clinical signs and symptoms in cases of sinobronchial syndrome in group II suggested that the signs and symptoms of sinusitis occur relatively less frequently as compared to patients suffering from sinusitis alone. In 1980, Slavin et al stated that a relative paucity of signs and symptoms of sinus disease often existed in bronchial asthma cases and thus, the physician should keep a high index of suspicion of sinusitis as a precipitant of lower respiratory tract infection.(29)

Improvement in lower respiratory tract symptoms in patients on simultaneous medical treatment of sinusitis

After the medical treatment of sinusitis was given

in study group, it was seen that during follow up, the improvement in lower respiratory tract symptoms and signs was significantly more in study group than in control group, i.e., 57.14% versus 5.55% improvement seen on first follow up, 71.43% versus 11.11% improvement on second follow up. Similar findings were observed by various researchers who treated sinusitis in the sinobronchial syndrome cases either medically or surgically.

In 1974, Phipatanakul et al conducted their study on five cases of bronchial asthma. In all patients, disappearance of bronchial asthma was promptly obtained after appropriate sinus therapy.(30) Similarly, in 1984, Friedman et al published their experience on the study of eight patients with asthma. After medical treatment of sinusitis seven of the eight patients improved clinically. 31 Another study by Rachelefsky et al. in year 1984 on 48 children with asthma and sinusitis, reported an improvement in asthma symptoms with medical treatment of sinusitis. (10)

Conclusion

Paranasal sinusitis has been diagnosed frequently in patients who have lower respiratory tract infections. Previous studies have suggested that sinus disease may be an important precipitating factor in provoking lower respiratory tract infections like bronchial asthma, bronchitis and bronchiectasis. Thus, a physician should keep a high index of suspicion of upper airway disease while treating these cases. In cases refractory to standard treatment, thorough search should be made for possible etiological factor like sinusitis by radiological examination of the sinuses.

By medical treatment of sinusitis most of the refractory cases can be cured if routine medical treatment of lower respiratory infections fails. Otolaryngology opinion for sinus surgery should be taken. There should be a team approach between chest physician and otolaryngologic surgeon and any patient suffering from disease of either airway should be regarded as suffering from 'single airway disease'.

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