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Clinical Significance of Unilateral Sinusitis

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In general, the etiologic factors of chronic paranasal sinusitis are systemic conditions such as nutrition, predisposition, allergy, and local factors such as nasal anatomic conditions. Among these factors, the development of unilateral sinusitis is a model case verifying the influence of local factors. In my study of 640 cases over a certain period of time, a comparison was made between 161 cases of unilateral sinusitis and 479 cases of bilateral sinusitis in order to verify the effects of local factors in the development of this disease. Patients with a history of previous sinus surgery or tumors were eliminated from the cases.

1. *The male-female incidence rate, and the age distribution of the patients at the initial visit showed no prominent differences between unilateral and biliateral cases.*
2. *It was found that a larger number of cases of unilateral sinusitis had a duration of less than one year as compared to bilateral sinusitis which were longe than and year. Therefore it can be said that the duration of unilateral sinusitis is usually shorter than that of bilateral sinusitis.*
3. *In unilateral cases the patients with moderate to severe nasal septal deviation, one number of patients with septal deviation towards the diseased side was twice as high as that on the non-affected side.*
4. *The incidence rate of polyps occurring in the middle meatus was shown to be about twice as high in bilateral cases as in unilateral cases.*
5. *Comparing the size of the right and left maxillary sinuses, it was found that 103 cases (63.8%) of 161 patients with unilateral sinusitis showed a difference in size, and that only 171 cases (35.6%) of 479 patients with bilateral sinusitis showed a difference in size. In addition to the finding that unilateral sinusitis had a greater difference in size between the left and right maxillary sinuses, a smaller sinus involvement was found to be about four times as frequent as the larger sinus in maxiliary sinusitis.*
6. *It was found that most of the cases (80.7%) of unilateral sinusitis showed maxillary involvement, while a large number of bilateral cases (78.1%) showed maxillary sinusitis combined with ethmoid or frontal involvements.*

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INTRODUCTION

Unilateral sinusitis has been a concern of rhinologists not only in the past but also in the pre-

sent. The research on the effects of local factors in the nose, resulting in the development of unilateral sinus infection, seemed to provide us with good data

Many rhinologists (Takahashi et al., 1968; Sakamoto, 1980; Suh and Shin, 1981.) who have studied the etiology of unilateral sinusitis have not reached any clear conclusions and only some believe that there is a possibility that the dissimilarity of the anatomical structures of the nasal cavity causes a difference in the air flow and there fore the different infection-status. Also there is existing controversy regarding the mechanism of anatomical influence.

It is my opinion that most of studies done sofar on this problem placed too much emphasis on unilateral sinusitis itself without a sufficient comparative survey with bilateral sinusitis.

MATERIALS AND METHODS

For the past 3 years, I have compiled data from 161 cases of unilateral sinusitis and 479 cases of bilateral sinusitis occurring during the same period of time in order to compare several factors in the etiology between unilateral and bilateral sinusitis.

Historical review of all patients including local nasal and paranasal findings, roentgenological readings were done retrospectively, and all data were analysed statistically. In this study those cases with previous sinus surgery, dental infections, cyst or tumors were excluded.

CLINICAL RESULTS

Table 1 shows that out of 640 cases of chronic sinusitis, the incidence rate for unilateral sinusitis was 25.2%, but other researchers (Hirabayashi, et al., 1956; Lee. 1965; Kang et al., 1966; Park et al., 1972; Park and Paik, 1972.), have found a minimum of 11.2% to a maximum of 34.2%.

Table 1. Incidence of Unilateral Sinusitis

Total cases: 640	Bilateral sinusitis- 479 cases (74.8%)
	Unilateral sinusitis- 161 cases (25.2%)

This large difference may be attributed to the varying methods of patient selection and also the variable size of the surveyed groups. In any case, it was interesting to see that the number of unilateral cases in each report was not small.

The incidence rate for unilateral and bilateral sinusitis according to a male-female ratio is seen in Table 2. A much higher incidence is seen for males than for females in both unilateral and bilateral cases ($P < 0.01$, respectively).

Table 2. Sex Incidence

Sex \ Side	Unilateral cases	Bilateral cases
Male	106 (65.8%)	290 (60.5%)
Female	55 (34.2%)	189 (39.5%)
Total	161 (100%)	479 (100%)

Table 3 represents the age distribution of the patients at the initial visits and figure 1 shows the age distribution on a graph.

The incidence of sinusitis occurring in those patients for 10 years to 40 years of age is about the same and no prominent difference is seen between unilateral and bilateral sinusitis, except in patients who are younger than age 10 where it was noticed that the incidence of unilateral sinusitis was significantly lower ($P < 0.01$).

Table 3. Age Distribution

Age (yrs) \ Side	Unilateral cases	Bilateral cases
-10	3 (1.8%)	33 (6.8%)
11-20	74 (46.0%)	215 (44.9%)
21-30	49 (30.4%)	121 (25.3%)
31-40	17 (10.6%)	70 (14.6%)
41-	18 (11.2%)	40 (8.4%)
Total	161 (100%)	479 (100%)

Table 4 shows the duration of disease based on the complaints of the patients. There were no noticeable differences in duration of the disease between unilateral and bilateral cases lasting from 1 year to 10 years.

There were only few unilateral cases in patients with disease duration over eleven years compared to bilateral cases. ($P < 0.02$).

Contrary to this, the incidence rate in the under one year duration group of unilateral cases was higher than in bilateral cases ($P < 0.02$).

Table 4. Duration of the Disease

Side / Duration (yrs)	Unilateral cases (161)	Bilateral cases (479)
-1	61 (37.9%)	137 (28.6%)
1-3	62 (38.5%)	186 (38.8%)
4-5	25 (15.5%)	91 (19.0%)
6-10	12 (7.5%)	47 (9 .8%)
11-	1 (0.6%)	18 (3 .8%)
Total	161 (100%)	479 (100%)

As seen in figure 2, it might be said that the duration of unilateral sinusitis is shorter than that of bilateral cases.

There is much concern by researchers (Noh, 1958; Iwamoto et al., 1966.) over nasal septal deviation. My study in this area, shown in Table 5. revealed that out of 161 unilateral cases, a moderate to severe degree of deviation was present in 57 cases (35.4%) while in 479 bilateral cases, deviation was present in 145 cases (30.2%). This was not statistically significant but septal deviation may be a local influence on the development of unilateral sinusitis because in the unilateral cases the septal deviation to the affected side was twice as great as to the other healthy side as shown in Table 5 ($P < 0.01$).

Findings in patients with nasal polyps, and hypertrophy of middle and inferior turbinates are seen in Table 6, 7 and 8. Polyps in the middle meatus were more frequent ($P < 0.01$) in bilateral cases than in unilateral. The incidence of hypertrophy of the inferior and middle turbinates were similar.

By X-ray films showed the size of the maxillary sinus cavities, in bilateral maxillary sinusitis cases the size of the sinus cavities to be almost same in 64.4% of cases, while variation in size was present in 35.6%. The reverse was present in the unilateral cases and the size of the maxillary sinus cavities were almost the same in 36.2% while different in 63.8%. The size of the diseased maxillary sinuses was comparatively smaller in 4.3 times as many cases ($P < 0.01$).

Finally, the single versus multiple involvement of the sinuses were studied. Results are presented on Table 10. This data was obtained from nasal cavity findings, X-ray findings, and some from operation records, so the validity may be different between observers. Multiple sinus involvement, mostly maxillary and ethmoid,

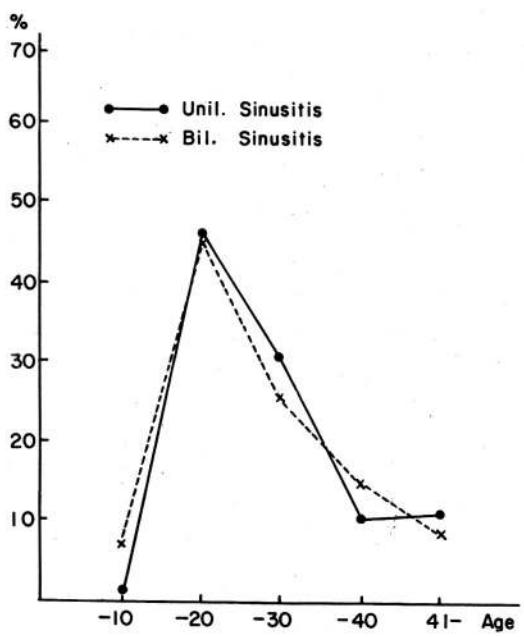

Fig. 1. Age Distribution

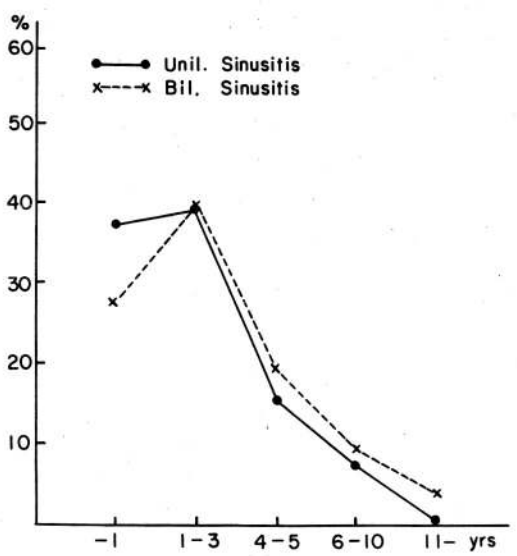

Fig. 2. Duration of the Disease.

Table 5. Septal Deviation

Unilateral cases (161)		Bilateral cases (479)	
Deviation to affected side	38 (66.7%)	Deviation to one side	126 (86.9%)
Deviation to healthy side	19 (33.3%)	Deviation to both side	19 (13.1%)
Total 57 (100%)		Total 145 (100%)	
Deviation rate	35.4%	Deviation rate	30.2%

Table 6. Nasal Polyp

Unilateral cases (161)		Bilateral cases (479)	
Affected side	17 (94.4%)	One side	46 (44.7%)
Healthy side	1 (5.6%)	Both side	57 (55.3%)
Total 18 (100%)		Total 103 (100%)	
Incidence	11.1%	Incidence	21.5%

Table 7. Hypertrophy of Middle Turbinate

Unilateral case (161)		Bilateral cases (479)	
Affected side	7 (100%)	One side	5 (13.9%)
Healthy side	0	Both side	31 (86.1%)
Total 7 (100%)		Total 36 (100%)	
Incidence	4.3%	Incidence	7.5%

Table 8. Hypertrophy of Inferior Turbinate

Unilateral cases (161)		Bilateral cases (479)	
Affected side	63 (98.4%)	One side	5 (2.4%)
Healthy side	1 (1.6%)	Both side	201 (97.6%)
Total 64 (100%)		Total 206 (100%)	
Incidence	39.1%	Incidence	43%

composed about 80% of the bilateral sinusitis, and 20% made up the unilateral cases ($P < 0.01$). The isolated involvement of the maxillary sinus was dominant in the unilateral cases as compared to the bilateral cases ($P < 0.01$).

Summary

Summarizing the results of this report, it may be stated that.

1. The age distribution at the initial visits showed no difference between cases except in children below age 10, where the incidence of unilateral cases were lower than the bilateral cases.
2. 37.9% of unilateral cases showed a short duration

Table 9. Comparison of Sinus Cavity Size between Rt. and Lt.

Unilateral cases		Bilateral cases	
Smaller cases in affected side	84 (52.0%)	Different size	171 (35.6%)
Larger cases in affected side	19 (11.8%)		
Same size	58 (36.2%)	Same size	308 (64.4%)
Total	161 (100%)	Total	479 (100%)

Table 10. Involved Sinuses

	Unilateral cases	Bilateral cases
Single	130 (80.7%)	105 (21.9%)
Multiple	31 (19.3%)	374 (78.1%)
Total	161 (100%)	479 (100%)

of the diseases (less than one year) compared to 28.6% in bilateral cases.

3. The incidence of the septal deviation of the diseased side was twice as great.
4. Nasal cavity findings showed a lower incidence of nasal polyps in unilateral cases than in the bilateral cases.
5. Single sinus involvement, mainly the maxillary sinus, was predominant in unilateral cases.
6. The smaller sinus seemed to be more frequently involved than larger sinuses in the same patient.

These results showing the lower incidence of unilateral cases in children, do not give us a clear explanation, but I believe that general factors such as general conditions, allergy and infections are acting more strongly than local factors in childhood under 10 years.

It might be said that unilateral sinusitis had a tendency towards a short duration of disease, resulting in only mild symptoms when compared to bilateral sinusitis. There is a report that the histopathology of the maxillary sinusitis is generally milder in smaller sinuses than the larger one, and this report seemed to be support that clinically.

The smaller sinuses in maxillary sinusitis showed a higher infection rate than the larger sinuses in unilateral cases, is quite a interesting, but it is hard to say whether the different size had been present congenitally or was acquired.

It is unknown whether the smaller maxillary sinus is more susceptible to infection or the infection caused the underdevelopment of the sinus.

There are many opinions regarding the site and the significance of the deviation in unilateral sinusitis.

I feel that nasal septal deviation on the diseased side may be considered as a local influence in the development of unilateral sinusitis because of the high infection rate on convex side in unilateral cases in this study. In bilateral sinusitis, it is believed that the site of the deviation does not have as much significance as in unilateral cases. It's presence in the nasal cavity is an important factor in producing chronic sinusitis.

This is because the presence of deviation on either side may result in abnormal air flow in both nasal cavities.

As a final consideration, it seemed that there are some characteristic findings in unilateral sinusitis compared to the bilateral cases. Further study with considerations of more detailed anato-physiological factors such as the nature of natural opening of sinuses and the local influence of the autonomic nerve system from the abnormal anatomical structures of the nose should be done.

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