SINUSITIS IN CHILDHOOD

BY

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Sinusitis as a common source of ill-health in children has received but little attention in English medical publications: in American, Canadian and Australian journals articles on this subject have been frequent, its importance being fully recognized by physicians dealing with children. Though in the United States many varieties of common naso-respiratory complaints in children, formerly persistent and troublesome, are now being successfully treated as manifestations of sinusitis, in England these equally common complaints, such as 'winter coughs,' 'wheezy chests' and 'running noses,' are still widely accepted as chronic nasal catarrh and bronchitis. Sinusitis indeed is frequently regarded as a typical American disease, occurring seldom in Great Britain, and attributable to the inclement weather of the United States and the dry over-heated air of American dwellings. That this attitude is unwarranted, sinusitis being a common affection among English children and living conditions only in a minor degree responsible for the disease, is the theme of this article.

In 1913, McKenzie¹ reported three cases of chronic sinusitis in children successfully treated by operation, and in the following year Tilley² reported three other cases, giving details of the procedure. Watson-Williams³ in 1921 wrote on the clinical import of familial infection of chronic sinusitis, dealing with the 'carrier infectivity' of one or more members of the same family. He emphasized the relation between chronic sinus suppuration and appendicitis, his contention being that 'behind the euphemism 'chronic cold' there often hides a disastrous menace.'

The chief contribution to the subject in English medical journals is that of Mollison and Kendall⁷ in 1922. They investigated the incidence of sinusitis in children who were undergoing operations for the removal of tonsils and adenoids, Mollison being convinced that sinusitis was far commoner than usually believed. The results confirmed his conviction. He and Kendall explored the antra of 102 children and discovered pus or mucus in more than 20 per cent. The writers found that puncture of the antra was not followed by ill-effects, that exclusion of antral suppuration as a source of nasal catarrh was necessary especially when tonsils and adenoids had been previously removed, and that removal of tonsils and adenoids in most cases effected a cure.

Watson-Williams⁵ in 1928 reported the incidence of pneumococcus infection in the sinuses of 242 children. In 1929 he with Pickworth⁶ discussed the importance of recognizing chronic sinus suppuration in cases of gastro-intestinal and pulmonary infective diseases, but only with incidental reference to children. In 1921 Cleminson⁸ had written about the importance of investigation of the antra in naso-pharyngeal catarrh in children, especially if removal of tonsils and adenoids had failed to effect a cure.

The articles mentioned above virtually exhaust the bibliography in English publications on sinusitis in children. It will be noted that the most important contribution, that of Mollison and Kendall, deals only with cases that were selected because of tonsillar infection or adenoids. They do not cover sinusitis occurring in children in whom tonsils and adenoids have already, perhaps long ago, been removed.

Present investigations.

The writer, having worked for several years in children's hospitals in America, and being accustomed to the prevalence of sinusitis there, was much impressed after returning to England in September, 1931, by the frequency and persistence of naso-respiratory infections in hospital patients in this country, by their resistance to ordinary methods of treatment for colds, by the fatalistic attitude of mothers to such complaints as 'wheezy chests' and 'running noses,' and finally by the tendency of the medical profession to overlook the possibility of sinusitis in such cases. So many children presented the typical clinical picture of chronic sinus infection, although their living conditions differed greatly from those of the corresponding class of patients in America, that the author undertook to investigate the incidence of sinusitis among the out-patients who came directly under her observation at the Hospital for Sick Children between November, 1931, to June, 1932.

Every child who came for treatment presenting all or several of the cardinal symptoms of sinus infection, such as persistent cough, recurrent colds with or without a 'wheezy chest,' nasal obstruction and, most important of all, a post-nasal muco-purulent discharge, was considered on clinical grounds a possible case of sinusitis. All were radiographed for more precise diagnosis, and for purposes of active treatment the radiological findings were taken as conclusive, although, as will be seen below, there is reason to believe that many of the children who presented negative X-ray findings were suffering from sinusitis.

At first all the suspected cases were transilluminated, but this procedure was found of little value, as transillumination results frequently failed to be corroborated by radiograms and exploration. When the radiologist pronounced the antra as infected or 'opaque,' the patient was regarded as suffering from chronic sinusitis, and was treated either surgically by puncture and irrigation, or medically by nasal drops, steam inhalation, and breathing exercises. All the children received cod-liver oil and malt in doses of from two drachms to half an ounce three times a day in order to raise their resistance to infection, and all particularly debilitated children were sent to convalescent homes for periods varying from two to three months. The ultimate results will be considered below.

The brief details of signs, symptoms, diagnosis, treatment, and results of 72 patients under observation have been set forth in two adjoining tables.

Table 1 deals with 33 patients, or 46·8 per cent. of the total number, in whom the clinical diagnosis was confirmed by the radiologist; and Table 2 covers 39 children presenting clinically a similar picture, but whose skiagrams failed to show any involvement of sinuses.

TABLE 1.

No.	Sex	Age	Weight in lb.	Cough	Colds	Anorexia	Debility	Headache	Lungs: symptoms	Nasal obstruction	Post-nasal discharge	Tonsils	Otitis	Cervical adenitis	Mantoux reaction	X-ray of antra		X-ray of chest	Exploration of antra	Pus	Serum	Nil	Convalescent home	Results
																R	L							
1	M	4½	45	+	+	+						normal		+	—			+	+				+	improved
2	M	4	37	+	+				+	+		+			—			+	+				+	not known
3	M	3½	27	+	+	+	+			+	+	+						+	+					“
4	F	5½	38	+	+	+	+					out			+			+	+		+		+	improved
5	M	10	58	+	+	+		+		+		“						+	+			+		“
6	F	3	32	+		+			+	+	+	“			—			+	+				+	not improved
7	M	9½	44	+	+	+	+		+	+	+	normal						+	+		+			very good
8	F	12	74	+			+		+			out	+	+	—			+	+		+	+	+	“
9	M	4	32	+	+		+			+	+	out						+	+	+		+	+	“
10	F	12	56	+	+			+		+		+						+					+	“
11	F	8	64	+	+					+		+			+			+	+		+			good
12	M	4	38	+	+	+					+	out		+				+	+		+			not known
13	M	5½	43	+	+	+	+			+	+	“	+					+	+		+			good
14	F	12	58	+	+					+	+	“						+	+			+	+	“
15	F	10½	68	+	+			+	+	+	+	+						+	+		+		+	very good
16	M	5½	37	+	+	+	+		+			out			—			+	+			+	+	improved
17	M	6½	44	+	+	+	+					“			+			+	+		+		+	very good
18	M	11½	54	+	+		+	+	+		+	“						+	+			+		“
19	F	9½	51	+			+					“			+			+	+		+			improved
20	M	6	41	+			+					“	+	+	—			+	+			+	+	not known
21	M	10	64	+	+	+	+	+				“			+			+	+			+	+	not improved
22	F	12	81	+	+					+	+	“		+				+	+					not known
23	M	10	69	+			+	+		+	+	“						+	+					“
24	F	11	61	+	+			+		+	+	+						+	+		+	+	+	improved
25	M	7	45	+	+					+	+	“			+			+	+		+			“
26	F	7	44	+	+		+		+	+	+	“			+			+	+		+			“
27	M	10	80	+	+		+	+		+	+	“	+					+	+		+			good
28	M	11	67	+	+	+	+	+		+	+	“			+			+	+		+	+	+	improved
29	F	6½	44	+	+	+	+				+	“	+	+	+			+	+				+	not improved
30	F	9	73	+	+	+	+		+	+	+	“		+	+			+	+	+		+	+	not known
31	F	5½	42	+	+							“						+	+	+				“
32	F	12	63	+	+							“						+	+					“
33	M	5	35	+	+		+				+	“					+	+						“

An examination of Table 1 reveals the following points:—

Sex.—Of the 33 cases of maxillary sinus infection 18 were males and 15 females.

Age.—The age of the children ranged from 3 years to 12, and 17 of the total were 9 or below. The age was taken as of the day of diagnosis.

Persistent cough.—This occurred in all the children. It generally lasted for months, worse in the morning or at night, disappearing in summer and recurring in autumn, with periods of exacerbations coincident with fresh colds and bronchitis.

Colds.—Frequent naso-respiratory infections were reported in 28 cases and were described by mothers as ' wheezy chest ' and ' running nose.'

FIG. 1.—(Case 9, Table 1): both antra opaque; pus discovered in both.

Anorexia of a persistent nature was recorded in 12 children.

Debility as manifested by loss of weight, insomnia, fatigue and pallor was a definite complaint in 13 cases.

Headache, which is an important symptom of sinusitis in adults, was found only in 9 cases, all occurring in children of over 10 years.

Lungs.—Although most patients gave a history of frequent bronchitis, only 9 at the time of diagnosis showed positive clinical signs on examination of the lungs.

TABLE 2.

No.	Sex	Age	Weight in lb.	Cough	Colds	Anorexia	Debility	Headache	Lungs : symptoms	Nasal obstruction	Post-nasal discharge	Tonsils	Otitis	Cervical adenitis	Mantoux reaction	X-ray of head	X-ray of chest	Exploration of antra	Pus	Serum	Nil	Convalescent home	Results
1	F	5	35	+	+				+		+	out				Nil						+	not known
2	M	9	51	+	+				+	+		+		+		"	+					+	good
3	M	8	71	+	+			+	+	+		out			+	"	+					+	not improved
4	M	9	49	+	+	+	+		+	+		"		+	+	"	+					+	"
5	M	8	42	+	+				+	+	+	"				"						+	good
6	M	8	54	+					+		+	"		+		"	+					+	improved
7	F	8½	59		+					+	+	+				"		+			+	+	not improved
8	M	8½	59	+	+	+			+	+		+		+		"	nil					+	improved
9	F	9	54	+	+	+	+			+		+			+	"	+						not known
10	F	7½	48	+	+	+		+		+		out			+	"	+						"
11	M	10½	50		+	+						+			+	"	+					+	improved
12	M	9½	51	+	+					+		normal				+	+						not improved
13	F	8	48	+					+	+		+				"	+					+	very good
14	M	9½	56	+	+			+			+	out				"						+	not improved
15	M	9	73	+								"		+		"							not known
16	F	4½	41		+	+				+	+	+		+		"							improved
17	M	9	49	+	+	+			+	+	+	out		+		"		+	+				"
18	M	8	62	+	+				+	+	+	+		+		"	+				+	+	not known
19	M	9	65	+	+			+		+	+	out			+	"	+					+	good
20	M	7½	42	+	+				+	+	+	"		+		"	+					+	not improved
21	M	4½	36	+	+	+			+		+	"		+		"		+			+	+	very good
22	F	8	37	+	+	+	+			+	+	"			+	"						+	not known
23	F	2	80½	+				+				"				"	nil						"
24	F	7			+	+				+		"				"							not improved
25	M	8		+		+	+		+			"		+		"	+						"
26	M	2		+						+	+	+	+	+		"					+	+	good
27	M	11		+	+	+				+		out	+	+		"							improved
28	F	5½		+							+	"		+		"							"
29	M	10		+	+							normal				"							not known
30	M	6		+					+			+			+	"	+						good
31	M	7	52		+							out		+		"	+						not known
32	F	6	39	+						+	+	+		+		"	nil					+	improved
33	M	7		+				+	+	+	+	out		+		"	nil						not improved
34	M	9	53	+	+	+		+				"				"							not improved
35	F	9	51	+	+	+				+	+	"				"	+						not known
36	F	7	45	+	+	+	+		+	+	+	"				"	+						"
37	M	5	37	+	+					+	+	"		+		"							very good
38	M	10½	58	+	+			+				"				"					+	+	very good
39	M	8	63		+	+				+	+	"				"							good

Condition of the nose and throat.—Eighteen children were mouth-breathers with nasal obstruction caused by deviated nasal septum, hypertrophied turbinates, collapsed alæ nasi and a varying amount of nasal discharge. Seventeen of the 33 children showed a thick post-nasal discharge. Only two patients had apparently normal tonsils, while 6 had infected tonsils; in the remaining 25 the tonsils had been removed previously.

Radiological examination.—Of the 33 patients who were pronounced as suffering from maxillary sinus infection by the radiologist, 20 showed an opacity of both antra, 6 of the left antrum alone, and 7 of the right antrum

FIG. 2.—(Case 21, Table 1): both antra opaque; no fluid discovered on aspiration.

only. Of the 13 children who warranted a radiological examination of the lungs, 11 exhibited a varying degree of past or present infection, such as increased peri-bronchial shadows, calcified hilum nodes, or fibrosis of a base of a lung.

Treatment.—Of the 33 patients 22 were referred to the surgeon for operative treatment; the rest were either treated medically, or are awaiting an operation, or in 3 cases failed to return to the clinic at the stated time for further observation. The surgical treatment consisted of puncture, aspiration of the contents of the antra, and irrigation. Of all the cases so

treated 18 showed pus or serum in both or either maxillary sinuses, and in 4 cases no fluid was obtained. However, one of those 4 cases (No. 18) showed a marked improvement immediately after the irrigation, and within a week all signs of naso-respiratory catarrh disappeared.

Results.—Of the 22 patients treated surgically for chronic antrum infection 7 made an excellent recovery in the sense that all signs of catarrh rapidly subsided, the children have been free from colds since the operation, anorexia disappeared, and they have gained a great deal in weight. Four children made a good but less striking recovery, 7 showed a still lesser degree of improvement because of the persisting nasal obstruction and general

FIG. 3.—(Case 17, Table 2): antra pronounced as unaffected; pus aspirated from left antrum.

debility, and 2 patients (Cases No. 21 and No. 30), both suffering from pulmonary tuberculosis, showed no improvement whatsoever in spite of prolonged stay at a convalescent home. The present condition of 2 patients is unknown as they have failed to return to the clinic since the operation (Cases No. 31 and No. 12).

Of the remaining 11 cases, 3 are booked for operations, 3 have failed to return, and 5 have received medical treatment. One showed remarkable improvement, 3 profited temporarily, and one (Case No. 6) has not responded to treatment.

Table 2 dealing with 39 children whose skiagrams were negative for

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antrum infection, requires little discussion, as the incidence of symptoms and signs is very similar to Table 1. Only clinical signs in the lungs are more frequent (39 per cent. as compared with 27·5 per cent. in Table 1), and fewer children had had their tonsils removed (66·6 per cent. in Table 2 and 75·7 per cent. in Table 1). The similarity of the clinical picture in spite of the negative findings of the radiologist, leaves little doubt in the mind of the writer that the majority of the children in this group also suffered from sinusitis. The reasons for this conclusion will be discussed below.

Thirty-six patients in Table 2 were treated on general medical lines and 3 were referred to the surgeon for exploration of the antra. One of these showed pus in the left antrum and made a fair recovery; another gave a negative puncture, but after irrigation of the antra made a rapid complete recovery. The third gave a negative puncture and showed no improvement with either surgical or medical treatment.

The results in Table 2 are far less satisfactory than those in Table 1 as it is difficult to obtain faithful observance of medical instructions, especially with such tedious treatment as here involved, from mothers of the hospital class. Eleven patients disappeared with results unknown. Of the remainder, 4 made an excellent recovery, 6 a good one, 8 showed a slight improvement, and the other 10 have not benefited at all.

Discussion.

While the series here studied is small the patients examined are well representative of the hospital class of children in London. The evidence indicates that sinusitis is a more frequent and important complication as well as cause of colds in London children than is generally assumed. It goes far towards contradicting the belief that climate and housing conditions as found in America are the chief causes of the disease; they may be contributory influences, but the most important factor is the structural peculiarity of the naso-pharynx which favours mouth-breathing and interferes with the proper drainage of the nasal passages and with effective aeration of the accessory nasal sinuses. A child with a high narrow hard palate, a superior dental protrusion, a small collapsed nose, small posterior nares, a deflected septum and hypertrophied turbinates, is likely to suffer from chronic sinusitis, especially if his general health is below normal.

Radiological diagnosis of sinusitis.

In Table 1 there are 4 cases which on aspiration showed no fluid in the antra. It must be remembered that to distinguish radiologically between the presence of fluid and granulations is impossible. Although no pus or serum was obtained the fault did not lie necessarily with the skiagrams, since the antra may have contained granulations or a markedly thickened membrane; or again the pus, if mucoid, may have been discharged in a single lump just before the operation, leaving the cavity clear. Cases No. 18

in Table 1 and No. 21 in Table 2 may be considered from the rapidity of their recovery as illustrating the foregoing conditions. On the other hand, there always remains the possibility, in rare instances, of a small thick-walled sinus producing an opacity on the screen where no infection is present.

With respect to negative skiagrams as presented in Table 2 the possibility of sinusitis must not be dismissed when all other signs and symptoms are indicative of it. A large deep thin-walled sinus may show a normal appearance and yet contain granulations or pus. Further, the hypertrophic form of sinusitis which often occurs in asthma and which is characterized by simultaneous effusion of serous fluid into several sinuses, may also be undetected radiologically because the rarification of the bone compensates the marked thickening of the mucosa. The author believes it safe to assume that many of the children in Table 2 would have shown serum or pus on exploration of the antra.

Conclusions.

1. It seems highly probable that many naso-respiratory infections in London children are due to sinusitis.
2. The possibility of sinusitis should be investigated in all cases of chronic nasal catarrh and frequent pulmonary infections, especially in children in whom tonsils and adenoids have been removed.
3. The chief causes of sinusitis are nasal obstruction, neglected colds and debility.
4. Skiagrams are an important diagnostic aid, but by no means infallible; the final diagnosis depends on correlation of clinical manifestations, radiological findings, and exploration of the sinuses.

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