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Myxoviruses Associated with Acute Laryngotracheobronchitis in Toronto, 1962-63

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ABSTRACT

Between November 1962 and March 1963, myxoviruses were isolated from 95 of 224 children (40.5%), most of whom were aged less than three years, who were admitted to The Hospital for Sick Children, Toronto, with acute laryngotracheobronchitis (tracheitis or croup). Viral isolates included 87 strains of Parainfluenza-1, five of Parainfluenza-3, and three of Influenza A2. An epidemic of Influenza A2 afflicted Toronto during March 1963, at which time this virus was isolated from tracheitis patients.

Myxoviruses were isolated from nasopharyngeal secretions of 285 of 794 tracheitis patients between November 1960 and March 1963. Parainfluenza-1 virus was the dominant serotype, being found in 241 (30.0%) of subjects. Three peaks of Parainfluenza-1 virus isolations were observed in December 1960, March 1962 and November 1962, and this serotype has been isolated during all months except June and July. Although most of the 28 Parainfluenza-3 virus infections occurred between November and February, this strain has also been isolated during summer. Strains of Influenza A2 and Influenza B viruses have been isolated from tracheitis patients during epidemics of influenza in Toronto due to these agents.

THE syndrome of acute laryngotracheobronchitis (tracheitis) which affects children, especially those aged less than three years, has recently been associated with infections by the myxoviruses in several communities of the north and south temperate zones.[1-3] Although cases of tracheitis have been encountered during all months of the year,[4] they occur most frequently during the cooler months of November through March in the northern hemisphere, but there is less evidence of a pronounced seasonal incidence in the southern hemisphere. The annual admission of as many as 800 children to the Tracheitis Unit of The Hospital for Sick Children, Toronto, during the past few years has provided a superb opportunity for virologic investigation of these patients.

This paper reports the isolation of myxoviruses from 135 of 346 patients during the 12-month period beginning April 1, 1962.

Methods and Materials

Nasopharyngeal secretions collected from patients by the suction technique[5] were suspended immediately in maintenance medium E.L.Y. (Earle's balanced salt solution containing lactalbumin 0.5%, yeast extract 0.1%, penicillin 1000 units per ml. and streptomycin 0.5 mg. per ml.). After centrifugation at 5000 r.p.m. for 30 minutes in a refrigerated centrifuge in order to deposit bacteria, 1.0-ml. aliquots of supernatant were inoculated directly into each of four drained roller tubes containing monolayers of rhesus monkey kidney epithelial cells. The cultures were incubated on roller drums at 37° C. They were examined by hemadsorption using a 0.1% suspension of guinea pig erythrocytes on the third, seventh and tenth days of incubation. Supernatant fluids from tissue cultures which showed hemadsorption were typed by antihemagglutinin tests using heat-inactivated, periodate-treated antisera prepared in this laboratory against the prototype strains of Parainfluenza Types 1, 2 and 3 and Influenza Types A2 and B.[6] On rare occasions, hemadsorption or syncytial formation was observed in uninoculated monkey kidney cultures, which were always examined simultaneously with test cultures. When this occurred, fresh batches of tissue cultures were inoculated with duplicate portions of centrifuged suspensions of nasopharyngeal suctions.

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RESULTS

Between April 1, 1962, and March 31, 1963, 349 nasopharyngeal secretions were examined from 346 patients. In the three patients whose nasopharyngeal secretions were examined twice, the second specimen was obtained during a further bout of tracheitis which occurred one to six months after the first suction was performed. Earlier attacks of tracheitis had occurred in 43 of the 346 patients examined, but a myxovirus was recovered only from six of these 43 patients during recurrences of tracheitis.

Wherever possible the nasopharyngeal secretions were obtained within 24 hours after onset of croupy cough. Suctions were performed daily on the mornings of Monday through Thursday, and only children who were admitted during the preceding 12 to 18 hours were examined. During winter months, when sometimes as many as six to eight tracheitis patients were admitted per day, specimens were examined only from the four youngest patients.

From 349 nasopharyngeal secretions examined, 135 strains of myxovirus were isolated (38.5%). These isolates included 122 strains of Parainfluenza-1, 10 strains of Parainfluenza-3 and three strains of Influenza A2. Antigenically the Parainfluenza viruses clearly resembled their respective prototype strains, and the Influenza isolates were related closely to the A/Singapore/1/57 strain of Influenza A2 virus on antihemagglutinin tests. Picornaviruses were isolated from two additional patients: ECHO 9 during September 1962, and ECHO 2 during January 1963.

During the cooler months, November 1962 through March 1963, myxoviruses were isolated from 95 of 224 patients. The isolates included 87 strains of Parainfluenza-1, five of Parainfluenza-3 and three of Influenza A2 virus (Table I). In common with previous years, the majority of patients were aged less than three years, and most of the virus strains were recovered from this age group. However, Parainfluenza-1 strains were isolated from three of four children aged between six and 11 years of age.

Parainfluenza-1 virus was again the dominant myxovirus associated with tracheitis during the 1962-63 study period (Table II). Its incidence increased sharply during September and October, reaching a peak in November 1962 when 39 of 54 patients yielded Parainfluenza-1 virus, in contrast to the 1961-62 study period when this virus was recovered relatively infrequently during autumn 1961, but its incidence rose during late winter, in February and March 1962. A peak of Parainfluenza-1 infections was also observed in December 1960.

Parainfluenza-3 virus has not been observed commonly in Toronto children during the past 2½ years, but it was recovered during April, August, September, November and December 1962. This virus has occurred somewhat more frequently during cooler months, November through January, in common with Parainfluenza-1.

Influenza A2 strains were isolated from three patients during March 1963, at which time an influenza epidemic of moderate severity swept through Toronto. This finding contrasts with observations during early 1962 when Influenza B virus strains antigenically related to B/Great Lakes/1739/54 virus were recovered frequently both from

TABLE I.—MYXOVIRUS ISOLATIONS FROM 224 TRACHEITIS PATIENTS, NOVEMBER 1962 THROUGH MARCH 1963

Myxovirus type	*Age of patients*						*Totals*
	Under 12 months	*12 - 23 months*	*24 - 35 months*	*36 - 47 months*	*4 and 5 years*	*6 years or more*	
Parainfluenza-1	15	36	18	12	3	3	87
Parainfluenza-3	2	2	1	0	0	0	5
Influenza A2	0	2	0	0	1	0	3
Total positive	17	40	19	12	4	3	95
Total tested	44	76	46	32	22	4	224

TABLE II.—MYXOVIRUS ISOLATIONS FROM 794 TRACHEITIS PATIENTS, NOVEMBER 1960 THROUGH MARCH 1963

Virus type	*April*		*May*		*June*		*July*		*August*		*Sept.*		*October*		*November*			*December*			*January*			*February*			*March*			*Totals*				*All years*
	1961	*1962*	*1961*	*1962*	*1961*	*1962*	*1961*	*1962*	*1961*	*1962*	*1961*	*1962*	*1961*	*1962*	*1960*	*1961*	*1962*	*1960*	*1961*	*1962*	*1961*	*1962*	*1963*	*1961*	*1962*	*1963*	*1961*	*1962*	*1963*	*1960*	*1961*	*1962*	*1963*	
Parainfluenza-1	3	3		1						6		7	5	18	7	1	39	39	1	20	27	7	17	6	9	9	2	12	2	46	45	122	28	241
Parainfluenza-2																			4												4			4
Parainfluenza-3	1	1	1						1	3		1			5		1	1	1	4	1	4		3						6	8	14		28
Influenza-A2																													3				3	3
Influenza-B																						1			5			3				9		9
Total positive	4	4	1	1	0	0	0	0	1	9	0	8	5	18	12	1	40	40	6	24	28	12	17	9	14	9	2	15	5	52	57	145	31	285
Total tested	12	22	10	12	10	12	7	8	6	17	3	23	12	31	40	9	54	69	35	40	51	57	51	17	48	40	13	46	39	109	185	370	130	794

tracheitis patients[6] and from those with typical influenza.

No virus has been isolated from either of two overflow-refill indoor swimming pools from which water samples were obtained at least thrice weekly during late 1962 and early 1963. Bromine was the disinfectant employed in these pools. At Pool No. 5, bromine residuals which usually were maintained above 2.0 parts per million (p.p.m.) between October and December 1962 resulted in virtual elimination of enteric bacteria as well as viruses,[7] despite the high incidence of myxoviruses in Toronto at that time. This contrasts with findings at Pool No. 5 during an earlier wave of myxovirus infections when Parainfluenza-1 virus was isolated from this pool in March 1962,[8] in the presence of a hypobromite level of 1.0 p.p.m.

DISCUSSION

Consistently high isolation rates of myxoviruses from children who were hospitalized with tracheitis (croup) in Toronto during three successive winter periods, November through March of 1960-61 (47.9%), 1961-62 (24.6%) and 1962-63 (40.5%) indicate clearly a high degree of association between these viruses and acute laryngotracheobronchitis. Rising homotypic antibody levels in virus excretors have confirmed infection by Parainfluenza-1 and Parainfluenza-3 viruses at the time of illness.[2, 4]

The dominance of Parainfluenza-1 virus infections in Toronto patients with tracheitis during the past 2½ years, being isolated from 241 of 794 subjects (30.0%), parallels findings in Washington, D.C.,[6] and Melbourne, Australia.[9] Influenza A2 was isolated in March 1963 from three Toronto patients who contracted tracheitis during a late winter epidemic of influenza, in contrast to its more frequent occurrence in Melbourne tracheitis patients who became ill during mid or early winter epidemics of influenza in 1957[10] and 1959,[9] respectively.

Although the present study has been confined to patients with tracheitis, Parainfluenza-1 and Parainfluenza-3 viruses have also been associated with acute upper respiratory infections or pharyngitis in family groups[11] and other adults.[12, 13] However, in longitudinal studies of respiratory illnesses in nurseries in Memphis, Tennessee,[14] and Washington, D.C.,[4] where rhinorrhea and cough affect children frequently during winter, isolation of myxoviruses from throat swabs taken routinely or subsequent detection of rising antibody titres to a particular virus have shown that infection with Parainfluenza-1 and Parainfluenza-3 viruses may result in minimal clinical upsets, and their prevalence would remain unsuspected in the absence of virologic investigations.

SUMMARY

Myxoviruses which were isolated from 95 of 224 Toronto children who were hospitalized with acute laryngotracheobronchitis (tracheitis) between November 1962 and March 1963 included 87 Parainfluenza-1 strains, five Parainfluenza-3 strains and three strains of Influenza A2. From November 1960 through March 1963, myxoviruses were recovered from 285 of 794 tracheitis patients. The dominant serotype, Parainfluenza-1 virus, was found in 241 of 285 virus excretors. Peaks of Parainfluenza-1 virus infections occurred during December 1960, March 1962 and November 1962.

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PAGES OUT OF THE PAST: FROM THE JOURNAL OF FIFTY YEARS AGO

FIRST SIGNS OF INSANITY

Dr. Hollander's book "The First Signs of Insanity", Funk & Wagnalls Company, New York, 1913, is written in so engaging a style, and in so reasonable a spirit, that it will gain entrance within a far wider circle. It will make the profession and the public more alert, and it is quite conceivable that an individual in whose family there is a neurotic taint should become intelligently watchful for those earliest signs of the approaching malady. Each man is the most familiar with his own mind, the secret springs of his conduct, and the normal course of his life. It is for him to set a watch upon himself, to check an abnormal reaction to any given stimulus, or, if that is impossible, to avoid the irritation which leads to disordered conduct.

There are many persons who, in the long course of an even life in the country, conform absolutely with a normal mental standard. When they return to town and are at the mercy of every one who can gain access to a telephone within a radius of four hundred miles, when their eyes and brains are blinded by the electric glare and are denied the calm of the huge and thoughtful night, when they are obliged to attend entertainments which they do not desire and give entertainments which they cannot afford, and are in continual peril of their lives from the abyss in the street and the general disorder of a growing city, their self control breaks down. Such persons should immediately flee to some place of refuge.

There is yet an earlier sign of insanity than any Dr. Hollander has mentioned. It reveals itself in the letters which a man writes. When a man who has always written urbanely and temperately writes a letter which appears to be foolish, vulgar, or impudent, the recipient may well suspect that he has before him evidence of aberration of mind which may be temporary but may be the forerunner of worse symptoms which are to follow.—Editorial, *Canad. Med. Ass. J.*, 3: 880, 1913.