REMOTE PROGNOSIS OF PNEUMONIA.

BY

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While studying the after-history of a number of patients who had been treated for pneumonia at the Children's Hospital, Birmingham, I became particularly interested in the fate of those who had suffered a prolonged pneumonia. In this group, the specific fevers and the age at which the patients suffered pneumonia, appear to have little bearing on the remote prognosis. Certain clinical features are emphasized, which a study of what I shall call ordinary pneumonia patients had led me to suspect as factors disposing to pulmonary catarrh and fibrosis.

As a background for the notes of fifty-eight patients from the Hospital for Sick Children, Gt. Ormond Street, and the Children's Hospital, Birmingham, I will describe briefly what I found in the first two hundred patients recovered for a period of from one to ten years, from pneumonia of all kinds.

It would be tedious to give in this paper all the lists and definitions with which I worked. Briefly, a pyrexial illness with cough and a lowered pulse-respiration ratio lasting more than four days, covered most cases. That the cases were representative of pneumonia in childhood may be seen from Table 1, which includes judgement of type from the case records.

TABLE 1.

Length of pneumonia	No. of cases	Type of pneumonia	No. of cases
Short (less than 5 days) ...	30	Alveolar	100
Average length (5-15 days) ...	130	Interstitial	44
Prolonged (over 3 weeks) ...	29	Indeterminate }	56
Empyema	21	Empyema }	

These patients were examined, and a special history was taken of measles and whooping cough, with their severity, using absence from school and confinement to bed as criteria of severity.

Symptoms.—Nearly half the patients were quite well at the time of examination, and had been without chest symptoms since the illness recorded. Others described cough and ill health for several months or years after their pneumonia. In many of these, the severity of the symptoms gradually declined, or they were cut short by an acute illness, sometimes by another attack of pneumonia.

TABLE 2.

Present age Years.	Symptoms			Total
	Nil	Slight	Severe	
Under 6	23	19	22	64
6-10	17	17	12	46
10-16	48	24	18	90
	88	60	52	200

52 patients (Table 2) were found to be suffering from severe symptoms of recurrent or chronic pulmonary catarrh: they included 14 cases of well-marked fibrosis.

Physical signs.—Diminished expansion of one side of the chest, impairment of resonance, and poor air entry were found together in 5 per cent. of the 'no symptom' group, and in 40 per cent. of the 'severe symptom' group. Added sounds were common in the latter.

Radiography.—The first 125 patients who attended were X-rayed, and 101 successful chest radiograms were reported on by Dr. Black and Dr. Teall. The reports are summarized in Tables 3 and 4.

TABLE 3.

X-ray report	Pneumonic type	
	Alveolar	Interstitial
Number of cases	52	31
Normal chests	15	2
Generalized increase of striae density	19	23
Localized striae increase and localized fibrosis	18	12

A consideration of the figures shown in Table 3 suggests that (*a*) an interstitial pneumonia leaves a generalized increase of peribronchial tissue in a large proportion of cases (Fig. 1); and (*b*) the frequency of scarring is far less after alveolar pneumonia.

TABLE 4.

X-ray report	Present symptoms		
	Nil	Slight	Severe
No of cases	49	29	33
Normal	15	6	4
Generalized striae increase	24	17	23
Localized striae increase and fibrosis	11	7	11

Table 4 shows that (a) those patients who now present slight symptoms or none at all, show five times as many normal radiograms as those patients who suffer severe symptoms of pulmonary catarrh; and (b) a considerable amount of scarring may be present in a chest after pneumonia, although the patient has no symptoms (Fig. 2).

FIG. 1.

Fig. 1. F. A. 11½ yr. Pulmonary fibrosis with severe symptoms. Primary pneumonia at 6 months and at 2 years lasting 6 days. Has had measles, not whooping cough. Skia-gram showing increase in striae density, especially right side and to base.

It has been already stated that 14 patients were found to show well-marked pulmonary fibrosis. Is this lesion due to the pneumonia, for we know that a catarrhal attack in a lung so damaged will simulate pneumonia? Pneumonia secondary to measles or whooping cough is an accredited cause of fibrosis, but a detailed enquiry for the specific fevers left 20 patients with severe symptoms for which those could not be held responsible. These 20 patients had either not suffered from measles or whooping cough, or had had a mild attack of measles only. 14 of them reported two or more attacks of pneumonia,

whereas of 20 patients who had suffered measles or whooping cough with evidence of severe pulmonary complications, seven only, reported more than one attack of pneumonia.

Patients who recover from pneumonia before three years old would appear to have the same after history as children who have pneumonia later (Table 5).

FIG. 2.

Fig. 2. L.S., 13 yr. No symptoms. Had pneumonia at 12 months and at 3 years. Skiagram showing generalized increase in striae with basal spread.

TABLE 5.

Age at pneumonia	No. of cases	Severe symptoms
Under 3 years	96	25
Over 3 years	104	27

FIG. 3.

G. C., 11½ yr. Radiological report, practically normal.

The effect of pneumonic type on the remote prognosis will depend on my judgment from a study of the case records. This was made before the patients were examined, and I have used Professor McNeil's terms of alveolar and interstitial pneumonia for the more usual ones of lobar, primary broncho-pneumonia, and secondary broncho-pneumonia. His clinical criteria were closely followed.

TABLE 6.

Type	Total	Severe symptoms
Alveolar	100	25
Interstitial	44	16
Indeterminate and empyema	56	11

THE REMOTE PROGNOSIS OF PROLONGED PNEUMONIA.

Patients were written to who had been treated during the last ten years for a pneumonia lasting more than three weeks at the Hospital for Sick Children, Great Ormond Street, London, and the Children's Hospital, Birmingham. 58 attended for examination, and of these, one-third were found to be without symptoms, and one-third to be suffering severe symptoms of pulmonary catarrh. When we consider the cause of these symptoms, measles and whooping cough can be recognized and set aside, for the proportion of complete recoveries from the specific pneumonias is nearly the same as the average (33 per cent.). The division at three weeks was arbitrary, and purposed to find out the effect of the duration of inflammation on the lung. Tables are appended showing the type of pneumonia, the ages of the patients, and their present symptoms and signs.

Present physical signs.—Three of the patients without symptoms showed diminished expansion, impaired resonance and weaker breath sounds over the lower lobe of the lung principally affected by the old pneumonia (E.D., G.B., and K.A.). Two showed impaired resonance and faint breath sounds only over the same lung (E.G. and W.C.).

Radiography.—Thirty-three patients were X-rayed independently of the clinical examination and history. Reports were made by Dr. Shires, Dr. Black and Dr. Teall (Table 7).

TABLE 7. X-RAY RESULTS.

Report	Symptoms absent or slight	Symptoms severe
Local fibrosis	3	9
Generalized striæ increase	4	3
Normal	9	2

These reports correspond closely with the physical signs in only one-half of the cases in the second group (viz., J.N., L.H., A.D., V.C., R.R., and F.G.).

DISCUSSION.

It is difficult to escape the conclusion that the long illness in the past is closely associated with, if it is not the actual cause of, the severe symptoms of pulmonary catarrh from which 18 patients now suffer. At the same time I was

impressed by the fact that 40 out of 58 children made recoveries comparable with those 74 per cent. of the previous group which included pneumonia of all kinds. A striking coincidence, or finger post, whichever it is, is marked by the fate of those children whose prolonged pneumonia had an acute onset with evidence of early pleurisy (Table 8).

TABLE 8.

Initials	Age at pn.	Duration	Symptoms	X-ray
N.Y.	3½	3½ weeks	Some cgh. at 6 months intervals.	F.R.
F.H.	1½	4+ "	Winter cgh., no bed.	
N.T.	2¼	6 "	Frequent colds and cgh., better since tonsillectomy.	
S.N.	3¾	3+ "	Occ. cgh., asthma, no bed.	F.L.
E.G.	4	8+ "	nil	Norm.
L.G.	2	8 "	nil	F.R.
A.P.	1¼	5 "	nil	
G.W.	9	5 "	nil	

Not one of the 8 patients in Table 8 is now suffering from severe symptoms, and this does not apparently depend entirely on the absence of a lung scar, unless one is to ignore the radiograms. During the examinations, evidence accumulated that two factors were of almost equal importance in the production of symptoms: first, the lung scar; and secondly, periodic infections from the upper respiratory tract. It seemed over and over again that both were necessary for the production of severe symptoms of chronic or recurrent pulmonary catarrh.

In such a small series any statistical arrangement can hardly be taken seriously, but the figures shown in Table 9 confirm what we know already, and emphasize the 'plural' pneumonias as a cause of mischief.

TABLE 9. SYMPTOMS.

	Cases	Nil	Slight	Severe	% Severe symptoms
Total	58	20	20	18	31%
Chronic interstitial pn. Pneumonia with rickets	16	3	5	8	50%
Acute non-specific pn.	23	10	9	4	21%
Pn. secondary to m. or wh. c. ...	12	4	5	3	25%
Hist. of sev. m. or wh. c. ...	22	8	6	8	36%
Hist. of two or more attacks of pn....	23	3	8	12	52%
Pn. lasting 8 weeks or longer ...	21	7	7	7	33%
Pn. under 2 yrs.	20	8	5	7	34%

TABLE OF PATIENTS WHO HAVE

Initials	No. of attacks	Age in years	Age at pn.	PNEUMONIA		Duration in weeks	PRESENT SYMPTOMS
				Type	Site		
							Without symptoms
G.B.	1	8½	1½	Acute ...	General ...	4½	Nil
E.D.	1	7½	3	? ...	R.L.L., R.M.L.	6+	Nil
K.R.	2	8½	4	Acute ...	Gen. esp. R. ...	?	Nil
T.C.	1	4½	½	Acute ...	Right ...	4	Nil
E.G.	1	8½	4	Acute ...	Left ...	8+	Nil
W.C.	1	5	2	Acute ...	Both esp. R.	7	Nil
E.B.	1	11½	2½	? ...	? ...	4+	Nil
M.M.	1	7	6½	? ...	R.L.L.	3½	Nil
R.C.	1	4½	1½	Spec. wh.	Esp. R.U.L.	8	Nil
R.D.	1	7½	6	? ...	R.L.L.	5+	Nil
A.G.	1	8½	3½	Acute ...	Left ...	3½	Nil
O.S.	1	10	½	Chronic ...	? ...	3	Nil
G.H.	2	4½	1½	Chronic ...	General ...	7	Nil
E.F.	1	10½	7	Acute recurrent	Gen. esp. L. ...	8	Nil
W.M.C.	1	3½	1½	Acute ...	Both ...	4½	Nil
M.H.	1	7½	1½	Acute ...	Gen. esp. L.	9	Nil
A.P.	1	7½	1½	Acute ...	General ...	5	Nil
G.W.	1	13	9	Chronic ...	L.L.L.	5	Nil
W.H.	1	7½	5½	Spec. m.	General ...	?	Nil
L.G.	2	4	2	Acute ...	Right ...	8	Nil
Slight symptoms.							
E.B.	3	8	2½	Chronic ...	General ...	8+	Winter c. no bed, not away from school ...
F.H.	2	6½	2	Acute ...	L.U.L., L.L.L.	3+	Winter c. away from school, no bed
T.B.	2	10½	2½	Acute streptococcal septicaemia.	Gen. esp. R. ...	10	Frequent cz. winter c. no bed : not away from school ...
E.B.	1	6	1½	Acute ...	L.U.L.	3	Past symptoms : none since T. & A. op. 1927 ...
V.J.	2	9½	3½	? ...	L.L.L.	9	Spring cough, away school 14 days, bed 3 days ...
R.R.	1	7	2½	Chronic ...	General ...	9	Winter cough (dry) ...
E.C.	3	7	1	Acute Rickets	Gen. esp. L. ...	4	Cough s. & w. not confined to bed or away from school ...
S.J.	1	11	1½	Spec. wh. c. ...	R. predomin. ...	6+	Slight occasional c. ...
E.B.	1	11½	2	Acute ...	Both ...	4½	Cough now for first time since pn. ...
K.E.	1	7½	2½	Chronic ...	Left ...	10	Slight winter cough ...
N.Y.	2	12	3½	Acute ...	? ...	3½	Cough at intervals of six months ...
A.A.	1	11½	5	Spec. wh. c. ...	R.U.L.	4	Spring c. after cz. bed 2 days ...
F.H.	1	10½	2	Acute ...	Ph. mig. rans. ...	4½	Slight c. in w., not away from school
L.M.	1	16	11	Acute ...	Right ...	3	Slight c. at night. No exacerbations
G.N.	2	6½	3½	Acute ...	Left ...	3+	Ocas. c., worse in w., no bed ; not away from school, ? asthma
I.R.	1	8	1½	Spec. m.	Gen. esp. L.	20	Slight c. and spit : worse in w., bed day or two improving ...
E.S.	1	2½	¾	Acute ...	Right ...	8	Slight morning c. since wh. cough ...
H.S.	1	6½	4½	Chronic ...	R.L.L.	3	Ocas. c. in w. after cz., bed a day or two ...
N.T.	2	6½	2½	Acute ...	R.U., M. & L.L.	6	Frequent cz. and c. before measles : improving ...
A.W.	1	6	2	Spec. m.	Gen. esp. R. ...	6	Slight cough only ...

HAD PROLONGED PNEUMONIA.

PHYSICAL SIGNS.

Dimd. expansion			Impaired resonance			Breath sounds			Added sounds			X-ray report		
Lag. R.	...	...	R.L.L.	...	...	Weak R.L.L.	...	...	Nil	...	...	—		
R. lower	...	...	R. base	...	...	Weak R.	...	...	Nil	...	...	F. gen.		
Lag. R.	...	...	R. base	...	...	Weak R.	...	...	Nil	...	...	—		
L.U.L.	...	...	Nil	...	...	Weak L.U.L.	...	...	Nil	...	...	F. gen.		
Nil	...	...	L.L.L.	...	...	Weak L.	...	...	Nil	...	...	Normal		
Nil	...	...	R. base	...	...	Weak R. base	...	...	Nil	...	...	F. gen.		
Nil	...	...	R. base	...	...	Equal	...	...	Nil	...	...	F. gen.		
Nil	...	...	R. base	...	...	Equal	...	...	Nil	...	...	Normal		
Nil	...	...	L. base	...	...	Equal	...	...	Nil	...	...	L.F.		
Nil	...	...	R.L.L.	...	...	Equal	...	...	Nil	...	...	F. gen.		
R.	...	...	Nil	...	...	Equal	...	...	Nil	...	...	Normal		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	F. gen.		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	F. gen.		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	—		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	—		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	Normal		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	—		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	—		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	S. and R.		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	F.R.		
Both	...	...	Nil	...	...	Dim. bases	...	...	Gen. rhonchi.	...	...	—		
L.	...	...	L.L.L.	...	...	Bronchial L.	...	...	L.L.L.	...	...	—		
Nil	...	...	R.L.L.	...	...	Expn. prolonged...	...	...	Scattered	...	...	F. gen.		
L. lower	...	...	Nil	...	...	Equal	...	...	Nil	...	...	—		
Nil	...	...	L. base	...	...	Dim. bases	...	...	Nil	...	...	—		
Nil	...	...	L. base	...	...	Faint L. base	...	...	Nil	...	...	F. gen.		
Scoliosis	...	...	L.L.L.	...	...	—	...	...	Nil	...	...	Normal		
Nil	...	...	Nil	...	...	Equal	...	...	Both L.L.	...	...	Gen.		
Nil	...	...	Nil	...	...	Equal	...	...	Gen. rhonchi.	...	...	—		
Nil	...	...	Nil	...	...	Equal	...	...	R. base	...	...	F. gen.		
Nil	...	...	Nil	...	...	Equal	...	...	R.L.L.	...	...	F. gen.		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	Normal		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	—		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	—		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	—		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	—		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	F. gen.		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	—		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	Normal		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	F.R.		
Nil	...	...	Nil	...	...	Equal	...	...	Nil	...	...	Normal		

TABLE

Initials	No. of attacks	Age in years	Age at pn.	PNEUMONIA			Duration in weeks	PRESENT SYMPTOMS
				Type		Site		
								Severe symptoms
L.H.	3	4	2½	Chronic	...	Both esp. L.	5+	C. and spit s. and w. getting worse (bronchiectasis) ...
F.G.	3	8½	4	Acute	...	Gen. esp. R. ...	3	C. s. & w., worse in w., not much bed
L.R.	1	5½	4	Chronic	...	R. ...	3	Winter c. keeping pt. in bed ...
H.F.	1	13½	4	Spec. m.	...	Left ...	4	C. and spit s. and w., away school 4 weeks at a time ...
R.R.	1	10	5	?	...	Both esp. R.	4	Sev. w. cough (well-marked bronchiectasis) bed ...
V.C.	3	7¾	5	? Chronic	...	L.U.L., L.L.L.	8	C. s. and w., worse in w., bed 14 days, several times a year ...
A.D.	1	4¾	1½	C. rickets	...	R.U.L., R.L.L.	8	Innumerable crippling attacks of cough and spit. ...
J.N.	2	6½	2	C. rickets	...	R.U.L., R.M.L.	4	Frequent c., worse in w. and now
S.H.	2	5½	1½	Acute	...	Gen. esp. R. ...	12	Cough s. and w. worse in w., bed 1—2 weeks ...
F.N.	2	5¼	1	C. rickets	...	Gen. esp. L.	12	Bad c. s and w. since wh. c. not before ...
J.C.	2	4½	2¼	C. rickets	...	R. than L. ...	8	C. s. and w. worse in w., fever and bed a day or two ...
R.W.	4	4¾	1¾	Chronic	...	L.L.L.	3	Cough each w. bed 2—3 weeks ...
D.W.	1	9	5	Acute	...	R.L.L.	4	Winter cough, bed a week with fever, occasionally ...
I.P.	13	9½	1¾	Spec. wh.	...	General	6+	C. at intervals worse in morning and in s., bed 3 days, loses much time from school ...
V.S.	1	6½	2¼	(Influenzal) Acute	...	Both L.L.	3	Freq. cz. and ottorrhœa since pn. cough follows cz. s and w., not much bed ...
M.R.	2	11½	2	Acute	...	R. ...	4	Cough s. and w. worse in w. short. of breath (congen. morbus cordis)
H.G.	2	3	2	?	...	Gen. esp. L.	6	Sev. winter c., confining to house
V.W.	2	5	2¼	Spec. wh. c.	...	Gen. esp. R. ...	11	C. s. and w., bed 14 days in exacerbations ...

ABBREVIATIONS AND

All pneumonias, complicating measles or whooping cough, are marked specific m. or wh. Under X-ray report:—

F=fibrosis.

F. gen includes reports of peribronchial thickening.

contd.

PHYSICAL SIGNS											
Dimd. expansion			Impaired resonance			Breath sounds		Added sounds		X-ray report	
L.	...	...	Dullness	L.L.L.	...	Bronchial	L.	...	Crepitant	L.L.L.	F.L.
Nil	...	...	R.L.L.	...		—			R. base	...	Bronchiectasis, R.L.L.
R.	...	...	Nil	...	...	Altered	R. base		Right	...	F. bases
L.	...	...	L.L.L.	...		—	...	Nil	...	...	F. gen.
L. lower	...	...	Nil	...	...	Dim. L.	...	Crepitant	L.L.L.		F.L. base
L.	...	...	L.L.L.	...		Bronchial	L.	...	L. base	...	F. gen.
R. upper	...	...	R.U.L.	...	...	Equal	...	R.U.L.	...	...	F. gen.
R.	...	...	R.L.L.	...	...	Equal	...	L.L.L.	...	...	F. bases
L.	...	...	L.U.L.	...	...	Equal	...	Nil	...	...	F.L.
Nil	...	...	Nil	...	...	Equal	...	Scattered	...		F. gen.
Nil	...	...	L.U.L.	...	...	Equal	...	Nil	...	...	F.R.
Nil	...	...	L. base	...	...	Equal	...	Nil	...	...	Normal
Nil	...	...	Nil	...	...	Equal	...	Nil	...	...	E.R.L.L.
Nil	...	...	Nil	...	...	Equal	...	Nil		...	—
Nil	...	...	Nil	...	...	Equal	...	Nil	...	...	—
Lag R.	...	...	Nil	...	...	Equal	...	Nil	...	...	Normal
Nil	...	...	R.L.L.	...	...	Equal	...	Nil	...	...	—
Nil	...	...	L.L.L.	...	...	Equal	...	L.L.L.	...	...	—

EXPLANATIONS.

Under Symptoms :—

C.=cough.

S. & w.=summer and winter respectively.

C.=coryza.

H.=confined to house.

A history of catarrhal attacks in infancy, and of severe measles or whooping cough was common in the third group but was not prominent. The pneumonias before two years did not crowd into that group as might have been expected.

CONCLUSION.

From these observations it may be suggested that emphasis is to be placed on the amount, duration and recurrence of the interstitial inflammation, in estimating the remote prognosis of pneumonia. Second or third attacks, and the occurrence or persistence of upper respiratory infections are particularly liable to cripple a child who has once suffered from this disease.

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