AETIOLOGICAL SURVEY OF SHINGLES AND THE RELATIONSHIP OF SHINGLES TO CHICKEN-POX

The North-east England Faculty

The research committee of the North-east England Faculty of the College of General Practitioners have carried out a group research to explore the chicken-pox—shingles relationship. The objects were:

(1) To collect aetiological and clinical data regarding shingles.

(2) To discover how many cases of shingles occurred in the absence of any possible contact with chicken-pox.

(3) To record a four-weekly and six-monthly follow-up of each shingles case to assess the total population at risk in the households of shingles cases and how frequently shingles
   (i) followed contact with chicken-pox or shingles,
   (ii) was followed by outbreaks of chicken-pox or shingles.

(4) To check the presence or absence of systemic complications in these shingles cases, noting the relationship of post-shingles neuralgia to
   (i) sex,
   (ii) urban or rural home location,
   (iii) anatomical site of rash,
   (iv) treatment.

The relationship between chicken-pox and shingles has fascinated doctors for many years. Much has been written relating chicken-pox and shingles clinically and morphologically. In this survey we have attempted to establish an aetiological relationship between them by formulating the following hypothesis:

That shingles occurs only in patients whose antibody response is modified by previous chicken-pox.

The virus enters the body and spreads systemically as chicken-pox. The chicken-pox virus residuum remains latent in the dorsal root ganglia and is expressed locally at a later date as shingles.

If this hypothesis is correct, each patient with shingles should be able to recall an antecedent attack of chicken-pox.

Historical

Von Bokay first described the relationship of shingles to chicken-pox in 1909. In Christmas Island, shingles is common, but chicken-pox unknown, and in Tristan da Cunha, where varicella is unknown, a shingles outbreak occurred without chicken-pox appearing among receptive inhabitants (Cantor, S. J., 1921; Wooley, 1946). A

further example of this relationship in reverse arose in a Shetland community when a chicken-pox outbreak followed a single shingles case (Paterson, P. H., and Black, S. A. B., 1946). In 1952, Bruusgaard inoculated patients with shingles vesicular fluid which produced a localized or generalized vesicular eruption resembling chicken-pox. Netter and Urbain (1924) found that shingles and chicken-pox convalescent serum fixed an antigen in a saline extract of chicken-pox crusts or shingles vesicular fluid when complement was present. Amies (1934) discovered that shingles and chicken-pox fluids both agglutinated the elementary bodies of shingles and chicken pox. Ruska (1943), Nagler (1948), and Rake *et al.* (1948) noted that the elementary bodies of shingles and chicken-pox were identical in size and shape under the electron microscope. Taylor Robinson (1959) showed that complement fixing antibodies appeared earlier and in higher titre in patients with shingles, suggesting antecedent chicken-pox might initiate an antibody-forming mechanism.

Recent attempts to reassess this problem led to the conclusion that the different expressions of these two diseases depended on variations of host community and not the virus *per se* (Barker 1939). Laboratory studies on the growth of the virus from the two clinical entities in tissue culture suggested that they were identical (Weller and Wilton, 1958: Weller and Bell 1958).

Chicken-pox rarely occurs twice in the same subject—shingles may do so. The virus in the dorsal root ganglia cells is unaffected since serum antibody prevents any viraemia with generalized epithelial involvement. Hence the shingles rash is localized as in herpes simplex. Deep x-ray therapy sometimes precipitates a rash resembling shingles on the exposed area.

Second attacks of shingles are thought to be re-expressions of the dormant virus and do not necessarily arise in the same anatomical site. This was illustrated in three of our cases (1 per cent) and may depend on variations of local tissue immunity.

Method

A group of thirty volunteer general practitioners were asked to record on forms details of all cases of shingles encountered in one year.

Criteria of diagnosis.

The practitioners taking part completed a form, ringing the data they considered necessary for a diagnosis of shingles to be established. The result was as follows:

Irritation (4 practitioners)
Pain in approximate region of rash (24)
Vesicular rash covering area of more than 1 in. diameter (18)
Vesicular rash with more than one patch of vesicles (9)

Rash with more than five vesicles (4)
Local adenitis (0)
Other essential criteria (1)

It was decided that shingles would be diagnosed when a vesicular rash, involving an area of more than 1 in. diameter with more than four vesicles, occurred in a localized anatomical area, and was preceded or accompanied by pain and swelling of the regional lymph nodes. In the cases without pain the rash was only classified as shingles, providing there was a characteristically localized anatomical location together with accompanying regional lymph gland swelling.

If the practitioner worked in a group practice he made arrangements to see all the shingles cases himself, unless his partner was also participating in the survey.

Statistical advice on age and sex breakdown.

A simple method of assessing the returns was discussed with a statistician. An overall age sex grouping might have discouraged doctors from continuing in the survey or taking part in future work, so we decided on a one in twenty sampling which would be applicable only to this project and yet be statistically valid. This was completed by eighteen of the thirty practitioners taking part. (The technique required over 20,000 patients to make it feasible. In a one in twenty sample from a group of 40,000 patients the variation of an age group which makes up 20 per cent of the total would be plus or minus 2 per cent and smaller numbers of patients or smaller age groups would increase this error).

Record forms.

The final structure of the two forms included:

An initial clinical description of the case and a four weekly follow-up.
A six-monthly follow-up.
Information was requested on certain specified clinical, aetiological, and treatment details.
The doctor recorded if he was treating chicken-pox in his practice at the same time as his patients with shingles.
The monthly follow-up indicated complications and cases of chicken-pox or shingles occurring in the same or contact household. The six-monthly follow-up cards assessed complications and the total population at risk to chicken-pox or shingles in the patient's household.

To prove our hypothesis each patient was asked whether he remembered suffering previously from chicken-pox or mumps.

The question about mumps, a disease of comparable severity and age incidence, was designed to test the patient's memory.

The survey began on 1 March 1958 and ended on 1 March 1959 with a six-months follow-up, terminating on 1 September 1959.

Results

During the year 241 cases of shingles were reported. Detailed analysis of these cases yielded the following information:— *Seasonal*

incidence (Figure 1). There was no epidemic peak. Considering the scatter of the practices there was a surprising uniformity in the number of cases reported each month.

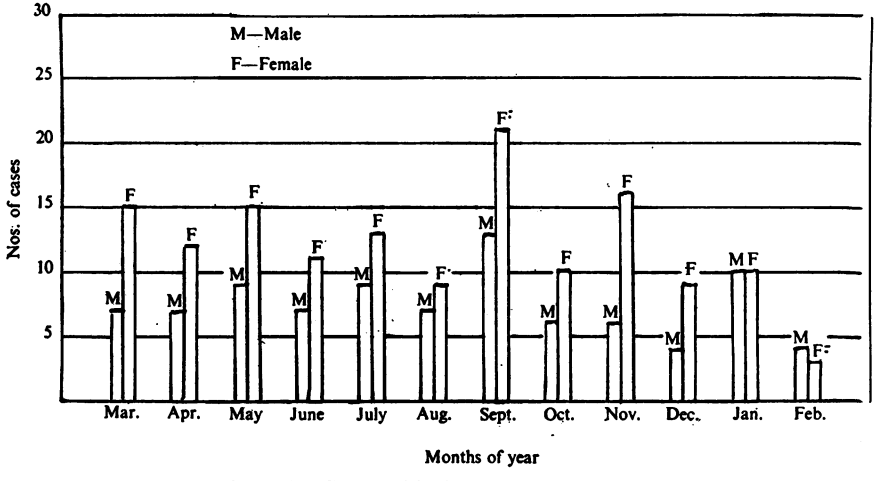

Figure 1. Seasonal incidence of shingles cases

Age and sex incidence. (Table I). The maximum age frequency fell between 50 and 70 years for both sexes. However, the incidence of female cases in the 50—70 age group was greater. The male to female ratio was 1 to 1.6.

In the two practices with the highest shingles incidences when total National Health Service patients numbered 7,900 and 8,600 respectively, no more than six cases in the former, and five in the latter occurred in any one month and these were equally distributed mongst men and women in each practice.

TABLE I.
AGE AND SEX DISTRIBUTION OF SHINGLES CASES

Age	*Male*	*Female*
0—	5	1
10—	8	10
20—	8	14
30—	12	7
40—	9	15
50—	18	41
60—	19	32
70—	11	20
80—	3	6
90—	—	—
X	—	—
	93	146

Attack rate. The attack rate per 1,000 National Health Service patients for each age group of the total sample is presented in figure 2. It shows a slow rise in incidence to the age of 50 years and thereafter a fourfold increase from 50—80 years.

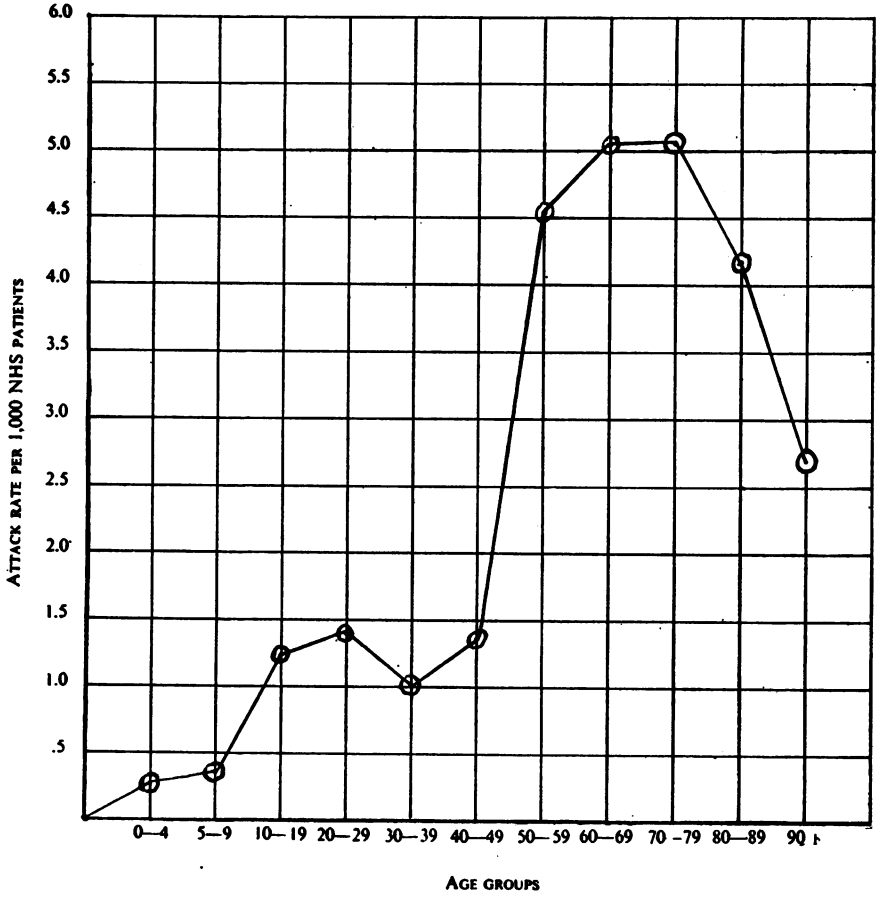

Figure 2. Incidence of shingles cases per 1,000 NHS patients arising in each age group

Analysis of practices with an incidence of shingles. Four practices with a higher than average incidence of shingles had a greater number of old people on their lists (figure 3).

It might be concluded that the larger number of older patients in these practices accounted for the greater shingles incidence, but when the age structures of the practices were broken down and the shingles incidence below the age of 50 years and above 50 years was compared with the above 50 and below 50 shingles incidence of

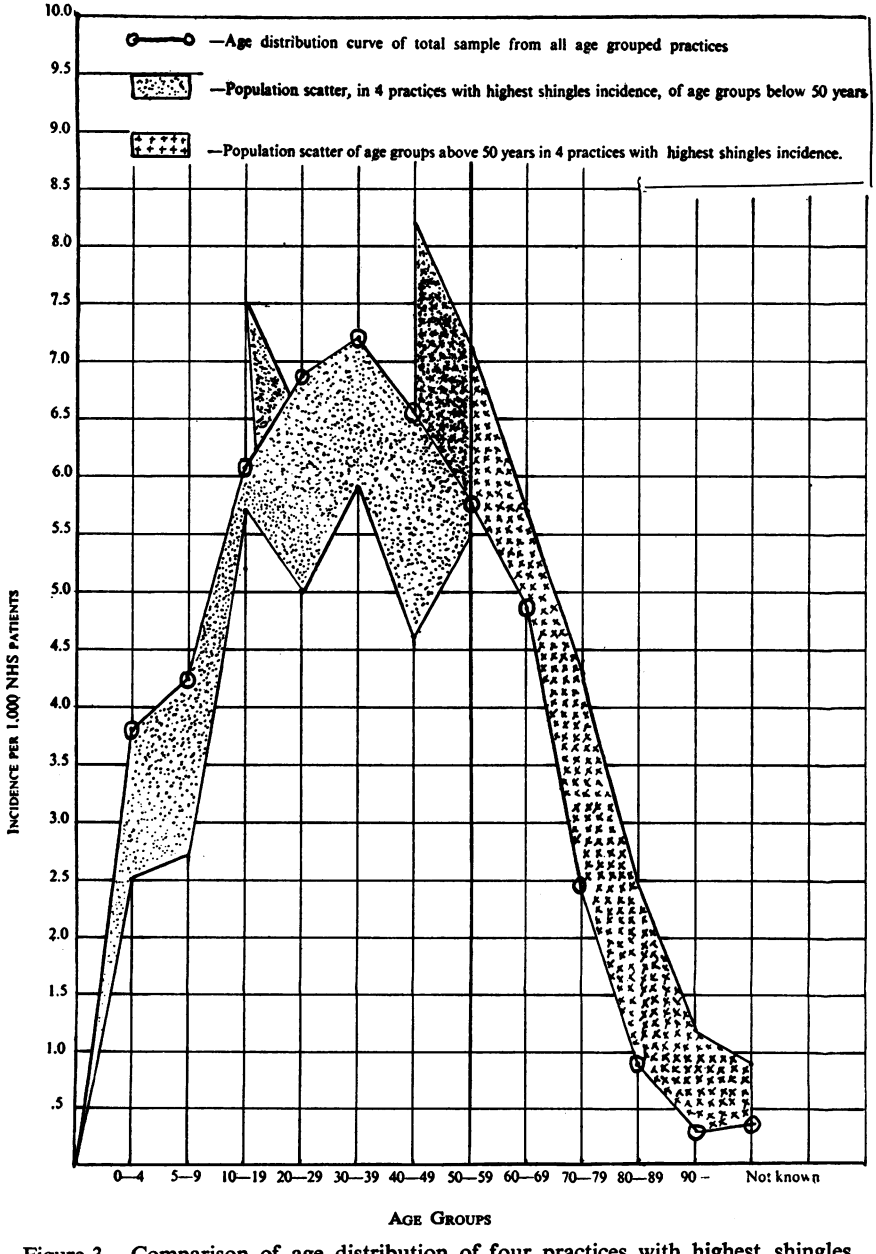

Figure 3. Comparison of age distribution of four practices with highest shingles incidence with the age distribution of the total sample

the total sample, the emerging pattern in each case was almost identical (figure 4).

Therefore, it cannot be said conclusively that a practice having a larger number of old patients will have a correspondingly greater shingles incidence.

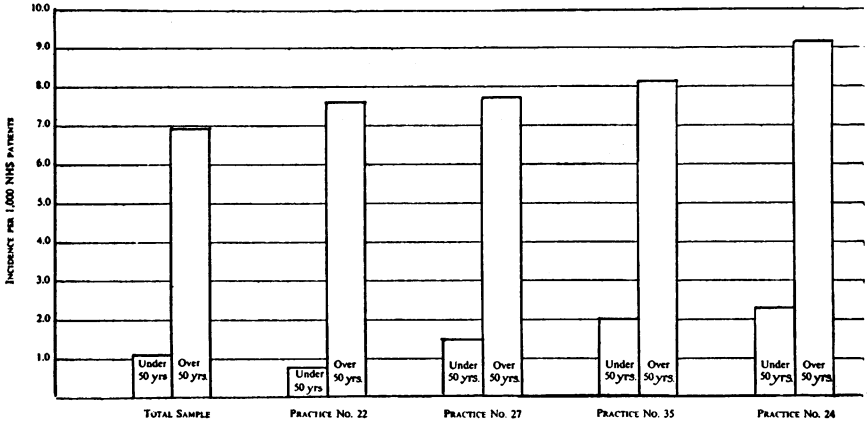

Figure 4. Four practices with greatest shingles incidence compared with total sample divided into below and above 50 years incidence in each example

Rural-urban incidence. When the rural/urban sex groupings were scrutinized (see figure 8) there was a proportionately larger number of townswomen and countrymen who contracted shingles (rural 22 men and 12 women; urban 71 men and 136 women). This suggests that shingles is a domestic disease in towns, since more cases occurred among townswomen than countrywomen. Yet a greater number of countrymen as opposed to townsmen in this survey developed shingles. This at first appeared confusing and paradoxical. One explanation could have been that town women and countrymen working outside the home might have brought the infection back with them. Unfortunately the figures here were not analysed by occupation.

Accuracy of diagnostic criteria. The difference in the figures for town and country cases suggested that a diagnosis other than shingles should be considered, e.g. flea bites or insect bites. The upper third of the practices with the highest shingles incidence were compared with the lower two thirds of practices with a correspondingly reducing shingles incidence, in order to see if uniform criteria had been adopted to confirm a shingles diagnosis and to correct the impression aroused by this unusual rural/urban sex breakdown.

The sex ratio for rural and urban cases was determined by applying the formula—

Males	Females	Upper third high incidence practice
Males	Females	Lower two thirds lower incidence practice.

This resulted in a uniform ratio for urban and rural cases.

Urban	Male 19	Female 46	(upper third)
	Male 27	Female 47	(lower two thirds)
Rural	Male 5	Female 5	(upper third)
	Male 8	Female 5	(lower two thirds)

This confirmed the fact that uniform criteria for a diagnosis of shingles had been adopted by each doctor participating in the survey, and indicated that they must accordingly have been dealing with a similar clinical problem and nullified the doubt raised by figure 8.

Practice incidence. This shews a range of figures from 0.3 to 4.65 per 1,000 N.H.S. patients (figure 5). The higher incidence shewn in some practices was not apparently due to the greater number of aged patients in these practices as previously described.

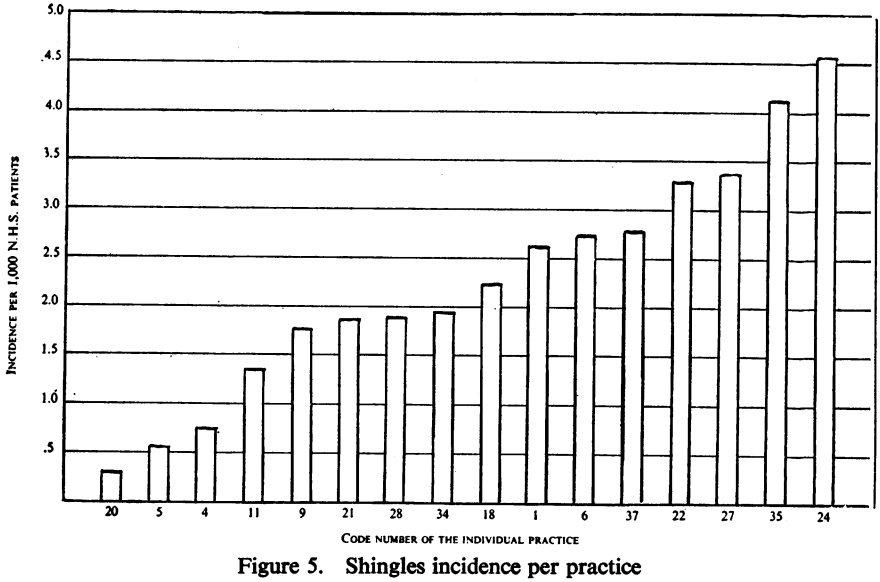

Figure 5. Shingles incidence per practice

Anatomical location of shingles rash.

It was difficult to record strict anatomical root distribution from the small body map on the form so for statistical assessment five main sites were selected—head, neck, trunk, arms, legs.

The trunk distribution accounted for more than half of the cases

in this series with head and legs, neck and arms following in this order of numerical frequency (table II).

TABLE II.

ALLOCATION OF CASES TO FIVE ANATOMICAL LOCATIONS

Distribution	*Male*	*Female*
Head	17	30
Neck	7	13
Arms	7	17
Trunk	61	91
Legs	11	19
Not recorded	5	8
TOTAL	108	178

Since the rash distribution could not easily be assigned to one specific anatomical locus.

The distribution of the rash on the right or left side of the body was almost identical in both sexes, and there was no tendency for the rash to involve one side of the body any more than the other.

Relationship of pain to the anatomical location. At the four-weekly follow up, 71 patients had pain and by the end of six months 26 were still suffering.

Incidence of post-herpetic neuralgia related to anatomical location. When the incidence per 100 shingles cases having post-herpetic neuralgia as a complication was related to anatomical site of rash it was found that the trunk anatomical location accounted for the greatest number of post-herpetic neuralgia cases (62 per cent) with a fairly even scatter amongst the other four groupings, head 17 per cent, neck 7 per cent, arms 4 per cent, and legs 10 per cent.

These figures suggest that shingles rash on the trunk is more frequently followed by persistent pain than when on any other area.

Presenting Symptoms

Pain was the presenting symptom in about three quarters of the cases (65 male and 118 female, i.e. 183 of 241 total—see table III). This represented 69 per cent and 79 per cent respectively of the total for each sex. Pain was therefore more common as a presenting symptom in women.

Rash. A total of 67 cases had a rash as the presenting symptom; thirty one (32 per cent) males and 36 (22 per cent) females, i.e., 67 of 241 total (table III).

Other symptoms. The "other symptoms" which patients described included vertigo, vomiting, headache, insomnia, and paraesthetic sensations in the area of the rash.

TABLE III.

PRESENTING SYMPTOMS OF SHINGLES CASES. (NUMBER OF TIMES EACH SYMPTOM WAS MENTIONED AS " PRESENTING ")

	Male	*Female*
Pain	65	118
Rash	31	36
Other	19	31
Not known	1	2
TOTAL	116	187

In 175 patients pain was present at least three days before a patient consulted a doctor—(54 male and 121 female) and in four it was present for as long as 15—17 days before the first visit to the doctor.

Details abstracted from table IV shewed the relationship between the duration of pain and the duration of rash and " other symptoms ". Forty-three males and 79 females (total 122) had pain which preceded the rash by at least two days. (A fortnight in one case). Thus pain was the only presenting feature in half the cases and a tentative diagnosis of shingles should always be considered in any clinical problem presenting with anatomically localized pain as the sole manifestation.

TABLE IV.

DURATION OF PRESENTING SYMPTOMS

	Pain		*Rash*		*Other symptoms*	
Days	*Male*	*Female*	*Male*	*Female*	*Male*	*Female*
0—2	22	39	51	69	11	11
3—5	31	62	23	41	11	14
6—8	15	28	9	10	4	8
9—11	6	7	1	2	2	2
12—14	—	2	—	1	—	1
15—17	2	2	1	1	2	3
Earlier than 17 days	—	—	1	—	—	—
Symptoms absent	8	3	—	—	61	105
Not known	—	—	—	—	—	1
Symptom occurred later	9	4	7	23	2	2
TOTALS	93	147	93	147	93	147

In 20 patients pain occurred after the rash (12 males and 8 females) but was completely absent in 11 (8 males and 3 females).

Thirty men and 57 women (total 87) had pain and rash within two

days of each other and 11 males and 18 females had pain and their other symptoms within the same period of time, while 11 males and 15 females (total 26) had other symptoms preceding the pain by at least two days.

In 166 cases there were no other symptoms at all.

In practically every case the clinical episode exemplified by rash and pain was expressed within a five-day period before seeing a doctor.

The treatment of shingles.

The treatment for shingles was divided into four broad classifications:—

(*a*) Analgesics
(*b*) Cytamen
(*c*) Antibiotics
(*d*) " Other treatments" (local applications, vitamins, etc).

The distribution of cases made it difficult to assess complications arising in specific treatment groups outlined above owing to the combinations of one or other groups (table V).

TABLE V.
DISTRIBUTION OF TREATMENT COMBINATIONS GIVEN TO SHINGLES CASES

Analgesics alone	113	Other alone	19
Analgesics with cytamen ..	33	No treatment	8
Analgesics with antibiotics	4	Analgesics, cytamen and antibiotics	1
Analgesics with other ..	26	Analgesics, cytamen and other	20
Cytamen alone	14	Analgesics, antibiotics and other	—
Cytamen with antibiotics ..	—	Cytamen, antibiotics and other	1
Cytamen with other ..	1	All four	—
Antibiotics alone	—		
Antibiotics with other ..	1		

This, however, was not the original intention. It was desired to obtain a general idea of the treatment pattern used in general practice for shingles. When the cases were summarized it was found that:

198 of the 241 cases had analgesics at some time
69 of the 241 cases had cytamen at some time
6 of the 241 cases had antibiotics at some time
68 of the 241 cases had other treatment at some time
8 of the 241 cases had no treatment

Comparison of relationship of post-herpetic neuralgia to treatment.

(*a*) *Analgesics.* The two sets of follow-up figures after four weeks and six months were compared and it was found there was a striking improvement in the " analgesics only " group, with a drop in total

numbers from 31—11 of the cases which had post-shingles neuralgia at the end of a month (table VI).

TABLE VI.

FOLLOW-UP OF CASES OF SHINGLES HAVING PAIN AT 4 WEEKS AND 6 MONTHS, RELATED TO TREATMENT GROUPS

	With pain at monthly follow-up	*Without pain at monthly follow-up*
Analgesics alone	31	82
Analgesics with other	11	15
Analgesics with antibiotics	3	1
Analgesics with antibiotics and other	—	1
Analgesics with cytamen	13	20
Analgesics with cytamen and antibiotic	1	—
Analgesics with cytamen and other	8	12
Antibiotics and other	1	—
Cytamen alone	1	13
Cytamen with other	—	1
Other alone	—	19
Not treated	2	6
	170	71
	TOTAL 241	
	With pain at 6 monthly follow-up	*Without pain at 6 monthly follow-up*
Analgesics alone	11	98
Unrecorded	3	—
Untraceable	1	—
Analgesics with other	3	16
Untraceable	1	—
Unrecorded	6	—
Analgesics and antibiotics	2	1
Unrecorded	1	—
Analgesics, antibiotics and other	—	1
Analgesics and cytamen	4	29
Analgesics, cytamen and antibiotics	—	1
Analgesics, cytamen and other	3	17
Antibiotics and other	1	—
Cytamen alone	—	14
Cytamen with other	—	1
Other alone	—	19
Not treated	2	6
	38	203
	TOTAL 241	

One hundred and ninety eight had analgesics alone, or in combination, and of this group, 23 had post-herpetic neuralgia as a complication after six months. (12 cases were unrecorded or untraced).

(*b*) *Cytamen.* Two of the 14 patients having only cytamen had no pain, but at the six-monthly follow-up all were free of post-herpetic

neuralgia. All those in the " other treatment " group were free of post-herpetic neuralgia by the fourth week; these were probably only mild cases to begin with, since analgesics were not necessary.

In the 69 where cytamen was used alone and in combination, only seven had post-herpetic neuralgia as a complication after six months.

(*c*) *Antibiotics* were used in six patients, and three still had post-herpetic neuralgia after six months. (One could not be traced). This group was too small to draw any conclusion.

(*d*) *Other treatments.* " Other treatments only " and groupings of other treatment accounted for 68 cases and seven of these had post-herpetic neuralgia after six months. No treatment was given to eight and two of these had persistent post-herpetic neuralgia after six months.

No specific treatment made any difference to the emergence of persistent post-herpetic neuralgia (table VII). The percentage of cases with persistent post-herpetic neuralgia from the antibiotics and " no treatment " groups were not significant as the total numbers were too small to draw any definite conclusion. All the cases which had " cytamen only " as a treatment of choice completely cleared up without post-herpetic neuralgia. But the total numbers treated were too small to be statistically significant.

TABLE VII

CASES WITH POST SHINGLES NEURALGIA AFTER SIX MONTHS RELATED TO TREATMENT GROUPS

Treatment	*Total treated*	*Number with pain*	*Percentage of total of each treatment group*
Analgesics	198	23	12
Antibiotics	6	3	50
Other	68	7	10
Cytamen	69	7	10
Not treated	8	2	25

These figures suggested that treatments used in this survey in the early stages of shingles failed to prevent the emergence of post-herpetic neuralgia since this condition appeared to have a uniform incidence throughout the main treatment groupings.

Other complications of shingles.

In the monthly follow-up, eye complications were reported in four patients and central nervous system features ranging from paraesthesia to transient paresis were present in seven. Insomnia, infected rash, vertigo, headaches, dermatitis, accounted for the remaining 14. At the six-monthly follow-up, 13 had post-herpetic neuralgia

and other complications, and 9 " other " complications only. Hyperæsthesia, paræsthesia, and anaesthesia accounted for " other " complications in 20, corneal scarring in one and eczema another.

An apparent discrepancy in the returns was due to two or more groups of treatment being used in one case, and the same complication recorded in both groups. There was a surprising uniformity in incidence of other complications throughout the groups, except the antibiotic group, but no conclusion could be drawn from the small number of cases.

To ascertain which other complications were evenly distributed throughout the treatment groups the patients in which persistent post-herpetic neuralgia was marked after six months were compared with the patients in which " other " complications were present after six months. The two sets of figures were practically identical for each treatment group, and this strengenthed the suggestion that post-herpetic neuralgia and " other " complications would emerge independently of treatment.

It may be inferred that treatments used in this series would not influence the persistence and development of other complications except in the " cytamen only " group, in which every case cleared up completely. Only 14 were selected for this treatment and this number was too small to be statistically significant.

Relationship of sex to post-herpetic neuralgia. Between the monthly and six-monthly follow-up there was a proportionate reduction in each group amounting to one third. (See table VIII). When the

TABLE VIII.
RELATIONSHIP OF SEX TO POST-SHINGLES PAIN

Sex	*With pain at monthly follow-up*	*Without pain at monthly follow-up*	*With pain at 6 monthly follow-up*	*Without pain at 6 monthly follow-up*
Male	22	71	8	85
Female	49	99	18	130
	71	170	26	215
	TOTAL 241		TOTAL 241	

percentage incidence of patients with post-herpetic neuralgia was assessed with reference to sex at the end of six months there was a higher incidence of post-herpetic neuralgia among females. (Females 12.2 per cent, males 8.6 per cent). Perhaps women had more opportunity to visit their doctor to discuss their symptoms and possibly they do not tolerate pain so well.

Relationship of domicile to post-herpetic neuralgia. There was a reduction of numbers of cases proportionately per group amounting to one third between the monthly and six-monthly follow-up (table IX). The percentage incidence of post-herpetic neuralgia cases related to domicile shewed a higher percentage of urban cases with post-herpetic neuralgia as a persisting feature than rural ones (rural 9 per cent, urban 11 per cent). This difference, although slight, was difficult to account for, and could have been due to the ease of access of a doctor in an urban community.

TABLE IX.

RELATIONSHIP OF DOMICILE TO POST-SHINGLES PAIN AT MONTHLY AND SIX MONTHLY FOLLOW-UP

	With pain at monthly follow-up	*Without pain at monthly follow-up*	*With pain at 6 monthly follow-up*	*Without pain at 6 monthly follow-up*
Rural	9	25	3	31
Urban	62	145	23	184
	71	170	26	215
	TOTAL 241		TOTAL 241	

Relationship of age to post-herpetic neuralgia. The maximal age range of cases with post-herpetic neuralgia fell in the " over 50 " group for both sexes. When the percentage incidence of post-herpetic neuralgia was assessed above and below the age of 50 years the incidence of post-herpetic neuralgia in women below the age of 50 years was greater, whereas the pattern was fairly constant for both sexes above the age of 50 years. (Above 50 years, male 18 per cent, females 15 per cent; below 50 years, males 2 per cent, females 16 per cent). It was difficult to account for this persistent post-herpetic neuralgia in the " under 50 " female group. No explanation is offered for this.

Did shingles occur only in patients who had had chicken-pox?

There were 241 cases of shingles recorded and a previous history of chicken-pox was recalled by 58 of these. In the control series of 241 cases, a history of chicken-pox was recalled by 61 patients. There was clearly no association between an attack of shingles and the ability to remember having had an attack of chicken-pox.

Chicken-pox is, however, more closely associated with childhood than shingles. Therefore, if the supposition that every case of shingles has had a previous attack of chicken-pox is correct, then this association will more easily be recalled by younger patients.

There was no definite evidence that cases of shingles, even in the

very young, were preceded by an attack of chicken-pox. In fact, the " under 9 " group had no cases with antecedent history of chicken pox (table X).

TABLE X.

ASSOCIATION OF SHINGLES WITH CHICKEN-POX

	Cases with shingles	*Controls*	*Statistical comment on association*
0—9 years			
Previous history of chicken-pox	0	11	Fisher's exact test shows that the association is not significant
No or doubtful	6	27	P.O.157
Previous history of mumps	2	4	No significant association
No or doubtful	4	34	
10—29 years			
Previous history of chicken-pox	18	31	No significant association
No or doubtful	22	42	
Previous history of mumps	18	29	No significant association
No or doubtful	22	44	
30—59 years			
Previous history of chicken-pox	29	13	No significant association
No or doubtful	74	66	(x^2—3.41 P-7.05) 1°F.
Previous history of mumps	37	32	No significant association
No or doubtful	56	47	
Over 60 years			
Previous history of chicken-pox	11	6	No significant association
No or doubtful	81	45	
Previous history of mumps	24	9	No significant association
No or doubtful	66	42	
Totals			
Previous history of chicken-pox	58	61	No significant association
No or doubtful	183	180	
Previous history of mumps	81	74	No significant association
No or doubtful	160	167	No significant association

It was apparent from these figures that the comparison of memory recall for mumps and chicken-pox was unnecessary but it was worth noting that it would have been vital had an association between shingles and chicken-pox been shewn.

Did shingles occur at the same time as doctor was treating chicken-pox?

The shingles cases occurred more frequently in eight practices with the highest shingles incidence, at a time when the doctor was not treating chicken-pox (77 cases of shingles were treated when chicken-pox was not present as opposed to 47 when it was). In two prac-

tices, out of a total number of 18 and 22 shingles cases respectively, 15 shingles cases occurred in each when no chicken-pox was being treated. This suggested that shingles cases might precede chicken-pox outbreaks.

How frequently did shingles follow contact with shingles or chicken-pox?

Two shingles cases (1 per cent) reported chicken-pox contact in the same household six weeks beforehand and two others (1 per cent) occurred within seven days of each other in the same household.

How frequently did cases of chicken-pox or shingles follow cases of shingles?

The total population at risk in the households where shingles arose was 628 adults and 151 children, a total of 779. In the six-monthly follow-up in this population at risk, 11 children had developed chicken-pox, two in one household; of these, seven sibs, one child and three grandchildren, with ages 0—9 years in 7 cases and 10—19 years in the remainder had an interval between the onset of the rash of:

7—13 days in 5 cases
14—20 days in 3 cases
21—28 days in 3 cases

When these eleven cases were analysed it was found that doctors were already treating chicken-pox in the neighbourhood simultaneously; except in one practice where chicken-pox appeared in a month later, and all of these children could have been incubating chicken-pox from a contact source outside.

There were only three subsequent cases of shingles, none in close relatives, all over the age of 50 years, with time intervals between contact and appearance of rash 0—6 days in two and 14—20 in one. This suggested that cross infection between the two diseases was uncommon and that shingles infectivity was low.

General discussion of survey

This survey, the first of its kind in the north-east, began as a prelude to the establishment of an organized research team of general practitioners. Its scope rapidly developed to include two aspects of the shingles problem. First to check the aetiological aspects of the disease, and secondly to find whether all cases of shingles had had chicken-pox.

The survey failed to prove the relationship between shingles and chicken-pox. Nevertheless, many cases of shingles could have had subclinical attacks of antecedent chicken-pox limited to one or two vesicles only, an episode too trivial to be remembered.

When the incidence of shingles above and below the age of 50

years was assessed in the four practices which had the highest shingles incidence and then compared with the shingles incidence above and below the age of 50 years for the total sample, the results were practically identical (see figure 3). This corrected the former assumption that larger numbers of older patients in a practice would be responsible for an increased incidence of shingles.

The unusual rural-urban case distribution proved to be another difficulty which challenged the diagnostic reliability of the doctors taking part, but when the figures were further examined and broken down into sex ratios for high and low incidence practices, they shewed uniformity when compared, and this consequently confirmed the diagnostic accuracy of the doctors.

The monthly incidence suggested shingles was endemic, since no epidemic peaks occurred in any one month during the survey.

In one practice, a doctor had treated patients with shingles for ten months before chicken-pox appeared in his practice and two other doctors saw no chicken-pox at all during the year they took part in the survey (table XI).

TABLE XI.

TIME INTERVAL BEFORE CHICKEN-POX APPEARED IN A PRACTICE

14 practices—chicken-pox was already being treated at commencement of survey
2 practices—no chicken-pox seen
3 practices—chicken-pox appeared after one month
3 practices—chicken-pox appeared after two months
1 practice—chicken-pox appeared after seven months
1 practice—chicken-pox appeared after ten months

There were three examples of shingles-to-shingles transmission, one of which was observed during a fortuitous visit of a doctor to a household where a female relative was looking after an old woman who had had shingles three weeks previously, and she had subsequently developed a classical painful shingles rash on the forehead and face, but would not have reported it if attention had not been drawn to the rash by the visiting doctor.

There were only eleven cases of chicken-pox (7 per cent of the child population at risk) appearing in shingles households where the total population of children at risk and exposed to the shingles infection was 151. This suggests that shingles *per se* was not very infectious. These chicken-pox cases could easily have been incubating the infection from sources outside their homes, since chicken-pox was already present in the areas where most of these cases occurred.

Although the above findings suggested that in younger age groups it was possible to develop shingles without a previous attack of

chicken-pox, this contradicted much of the recent work which suggests that shingles only occurs in patients whose immunity to chicken-pox—shingles virus has been modified by a previous attack of chicken-pox. If the two observations are to be reconciled, subclinical attacks of chicken-pox have occurred in those children who developed shingles with no history of previous chicken-pox.

It is not uncommon to observe chicken-pox contacts who develop one or two chicken-pox vesicles. These children would be especially likely to develop shingles because their immunity to the chicken-pox —shingles virus would be expected to fade more quickly.

Summary

A group study by thirty general practitioners of the North-east of England Faculty of the College of General Practitioners has reported observations on 241 cases of shingles.

1. There were 93 male and 148 female cases of shingles.

2. The diagnostic accuracy of participating doctors in the survey was assessed.

3. The monthly incidence of shingles remained steady with no epidemic peaks.

4. The attack rate per 1,000 N.H.S. patients shewed a steady rise to the age of 70 years, with a slow decline above this.

5. The highest practice incidences were not accounted for by the larger number of older patients in these practices.

6. Post-herpetic neuralgia present after six months occurred most frequently in cases with the trunk anatomical location and the shingles rash on the right and left side of the body was equally distributed between the sexes.

7. Pain was the presenting feature in 183 of the 241 cases.

8. The incidence of post-herpetic neuralgia present six months after the infection was similar in the three main treatment classifications—(*a*) analgesics, (*b*) cytamen and (*c*) other.

9. The incidence of other complications present six months after the original attack of shingles, was similar in the three main treatment groups, and closely resembled the group with post-herpetic neuralgia. It is postulated that post-herpetic neuralgia and other complications arise independently of treatment.

10. Post-herpetic neuralgia was more common in women than in men.

11. Post-herpetic neuralgia occurred more frequently in urban than rural cases.

12. Post-herpetic neuralgia was more common in women below

the age of 50 years than in men. The sex distribution of cases with post-herpetic neuralgia above the age of 50 years was similar.

13. The relationship of shingles to chicken-pox was studied. This work suggests that the infectivity of shingles is low and that cross infection between the two diseases is uncommon. It also suggests that shingles can occur in patients who have never had a clinical attack of chicken-pox. In such cases subclinical attacks of chicken-pox may have preceded the shingles.

14. The total population at risk in the shingles households were 628 adults and 151 children, a total of 779. Eleven children (7 per cent) developed chicken-pox, two in one household.

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