Comparison of independent randomised reading of radiographs with direct progression scoring for assessing change in asbestos-related pulmonary and pleural lesions

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ABSTRACT Direct scoring of progression of pleural and parenchymal lesions was compared with change assessed by independent readings to the ILO classification among 155 men from HM Dockyard, Devonport, followed-up for 10 years. For pleural calcification the two methods agreed closely, whereas direct scoring yielded relatively too little progression of small opacities and too much progression of pleural thickening. The choice of method for assessing progression should depend on objectives.

Liddell and Morgan¹ have reviewed the methods of reading serial posteroanterior chest radiographs to obtain measures of progression of pneumoconiosis. On the evidence from British and American sources they recommended side-by-side reading, that is the reading of each radiograph to the International Labour Office classification with the other chest radiographs for the same individual displayed for comparison. The American evidence indicated little difference between methods, but Liddell and Morgan still preferred side-by-side reading if only because of its relative simplicity.

In a recent study² to assess the attack rate over a 10-year period of asbestos-related pulmonary changes in a group of 155 men from HM Dockyard, Devonport, who already had pleural lesions, the opportunity was taken to compare direct readings of progression with independent readings to the ILO U/C 1971 classification.³

Methods

Each man in the survey had two chest radiographs taken, one in 1966 and one in 1976. These were read in random order to the ILO U/C 1971 classification³ independently by three readers.* Subsequently, each

reader working independently assessed each pair of radiographs for progression, no progression, or regression of small opacities, pleural thickening, and pleural calcification, without separate grading of the radiographic appearances.

For each radiograph read to the ILO U/C 1971 classification, the median reading was determined and the readings for each pair of radiographs were compared to assess progression. For example, if small opacities were read for the 1966 and 1976 radiographs as 0/1, 0/1, 1/0 and 0/1, 1/0, 1/2, then the median readings were 0/1 and 1/0 and the progression was one subcategory. Similarly, if the direct progression readings were none, possible progression, and definite progression, the median progression reading was possible progression.

Results

The median independent and direct progression readings are compared in tables 1-3. For small opacities 36 film pairs were recorded as showing possible or definite progression based on the direct progression readings compared with 61 pairs based on the independent ILO readings, although the correlation was quite strong (table 1). For pleural calcification (table 2) the two methods of assessment agreed well.

For uncalcified pleural lesions, however, independent readings showed more cases to have regressed

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Received 9 March 1979

Accepted 5 February 1981

Table 1 Comparison of median assessments of progression of small opacities as determined by independent reading or by direct progression reading

Independent ILO classification	Direct progression			No
	No change	Possible progression	Definite progression	
- 2 subcategories	100% (3)			3
- 1 subcategory	100% (14)			14
Unchanged	87% (66)	12% (9)	1% (1)	76
+ 1 subcategory	76% (25)	24% (8)		33
+ 2 subcategory	38% (11)	48% (14)	14% (4)	29
No	119	31	5	155

Table 2 Comparison of median assessments of progression of pleural calcification as determined by independent reading or by direct progression reading

Independent ILO classification	Direct progression			No
	No change	Possible progression	Definite progression	
- 2 Steps				0
- 1 Step				0
No change	92% (96)	3% (3)	5% (5)	104
+ 1 Step	19% (5)	23% (6)	58% (15)	26
+ 2 Step	4% (1)	8% (2)	88% (22)	25
No	102	11	42	155

Table 3 Comparison of median assessments of progression of pleural thickening as determined by independent reading or by direct progression reading

Independent ILO classification	Direct progression				No
	Regression	No change	Possible progression	Definite progression	
- 2 Steps		100% (6)			6
- 1 Step	6% (1)	71% (12)	6% (1)	18% (3)	17
Unchanged	1% (1)	65% (66)	20% (20)	15% (15)	102
+ 1 Step	7% (2)	45% (13)	28% (8)	21% (6)	29
+ 2 Steps			100% (1)		1
No	4	97	30	24	155

and fewer to have progressed than did direct progression reading. Some of this effect could arise because of the coarseness of the ILO classification, as it is possible for progression to have occurred and

yet for the classified "extent" to be unchanged.

Discussion

Relative to the difference between the ILO independent readings of the 1966 and 1976 radiographs, direct reading of progression underestimated progression of small opacities, overestimated progression of uncalcified pleural thickening, and agreed well about pleural calcification. Thus, as for side-by-side reading,¹ the results of direct progression scoring do not agree completely with those from the use of independent readings to the ILO classification.

The decision on which method to use when reading a large series of radiographs, however, is influenced by other factors, including the technical comparability of serial films and the previous experience of the readers. Some would argue that all available films for each subject should be read side-by-side to the ILO U/C 1971 classification, but this is unlikely to be feasible in a major survey. The choice of method is also influenced by the objectives of the survey. Whenever an estimate of prevalence is required, independent randomised reading to the ILO classification is necessary, because of the bias that is recognised to occur in side-by-side reading and confirmed in this study. If it is just change in radiographic appearance which is of interest, however, then direct reading of progression would be the method of choice. The recommendation to use side-by-side reading to the ILO U/C classification irrespective of objective is a compromise that cannot meet both objectives satisfactorily.

References

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