ASBESTOS RELATED PLEURAL PLAQUES AMONG SEAMEN

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PURPOSE OF STUDY

This study was conducted to investigate the prevalence of asbestos related pleural plaques among seamen. A high prevalence of such plaques has been reported among building and factory boilermen as well as among steam locomotive engineers and repairshop workers.[1,2] We had experienced cases with pleural plaques among engineers on warships also.[3] In 1986, the Collegium Ramazzini headed by I. Selikoff held a symposium on asbestos exposure on merchant ships.

SUBJECTS AND METHODS

An investigation was made of seamen over age 50 who were reported to have worked in uncontrolled environments on board ships and who certainly exceeded the latent period for the development of pleural plaques, which usually manifest 20 or 30 years after the first exposure. Under the life time employment system in Japan, almost all the these subjects had gone to sea soon after leaving school at the age of 18 to 22 depending upon their job. They had received annual X-ray examinations according to government regulations, usually using film size of 100 × 100 mm. Two experienced readers, one of whom was a U.S. B-reader, reviewed blindly all films on five rolls which had been taken in 1983 to code for pleural abnormalities. The films of seamen were identified later from the film ID numbers.

RESULTS

Among 90 members in the engineer group, nine (10%) were found to have plaques. Their duration of work had been 27 to 39 years, average 35 years, except for one whose duration of work could not be determined. (Figure 1) On the other hand, plaques were found in only three (2.0%) out of 136 deckmen and stewards whose duration of work ranged from 28 to 37 years, average 34 years. This difference in prevalence between the two groups was significant ($p < 0.05$). Age-sex-matched positive and negative controls also were investigated. Plaques were found in 20 (13.7%) out of 146 workers at steam locomotive repairshops but in none of the 100 clerical staff of the same company. No pulmonary parenchymal fibrosis was found in any of these workers. The seamen with pleural plaques are listed in Table I by job, age and at the time they had gone to sea. The radiographic patterns are shown in Figure 1. Of the three deckmen with pleural plaques, one had exclusively worked as a wireless radio operator, while the other two had engaged in miscellaneous work before promotion to deckman. The X-ray picture of case #201, an engineer, is shown in Figure 2. He is a 55-year-old-male who had entered the company as a fireman in 1948 and worked for 36 years. Prominent bilateral en face and profile plaques are seen with left diaphragmatic protrusion.

DISCUSSION

The radiological diagnosis of pleural plaques has not been standardized internationally. Some readers record only definite changes while others even the slightest changes. Thought the ILO Classification of Radiographs of Pneumoconioses included the coding of pleural plaques in 1971, of even greater importance is the actual procedures followed in reading the films. To avoid a bias in the results, this study used both positive and negative controls. Even if there were disagreements with the reading criteria used in our study, a comparison of such abnormalities is possible among groups. All of the ships on which these subjects had worked were replaced during the 1960s with ships equipped with modern, remote controlled engine systems. Therefore, exposure to asbestos probably was limited to the period prior to that time when the engineers probably worked in rooms where much of the apparatuses were wrapped with asbestos sheets. In Japan, civil seamen numbers 195,000 in 1960 even though there were only 1,600 civil ships in 1964. (Tables II, III) Though the number of ships decreased, the number of seamen remained stable until the early 1980s when the number increased. The younger seamen were probably less contaminated with asbestos. There has been controversy over the question of whether the pleural plaques increase the risk of lung cancer or mesothelioma. Our previous data on workers in steam locomotive repairshops suggested a somewhat higher incidence of lung cancer in asbestos related workers than in the control group.[4] Older seamen or retired seamen should be followed up carefully in every ocean-going country.

CONCLUSION

A higher prevalence of pleural plaques was found on 100 × 100 mm miniature X-ray films of seamen over the age of 50; in nine (10%) of 90 engineers, and in three (2.0%) of 126 deckmen and stewards. The prevalence among the age-sex-matched controls was found to be 20 (13.7%) out

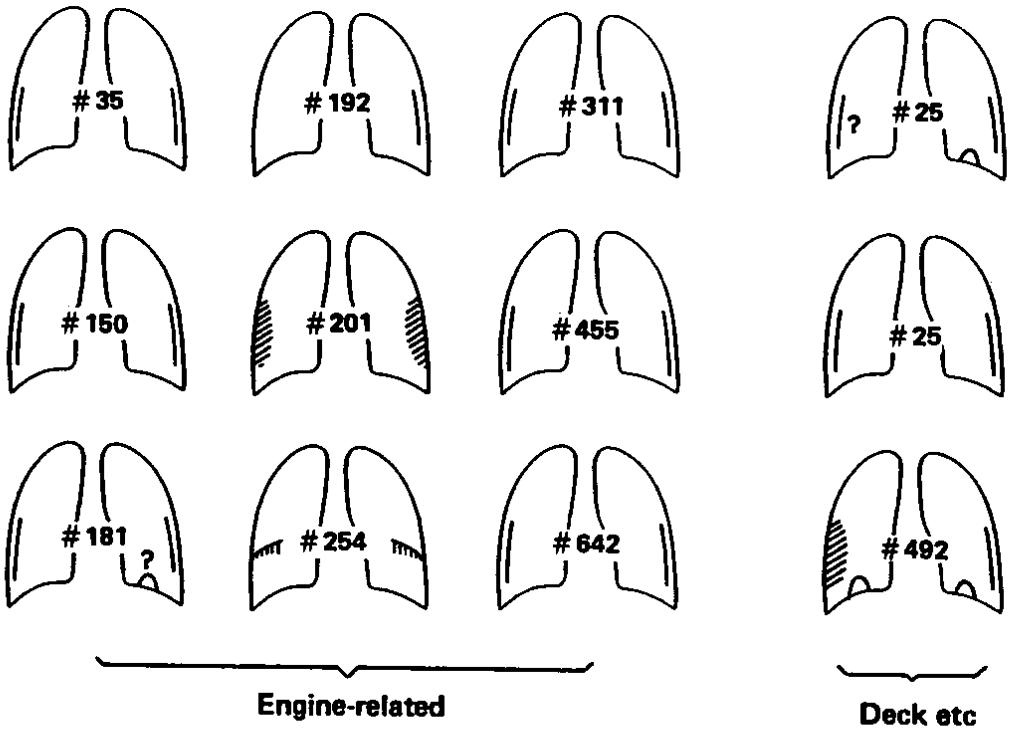

Figure 1. Plaque cases according to jobs.

Table I
Individuals with Pleural Plaques

Job	Film No.	Age (yr)	Work Duration (yr)	Entry to Sea
Engineers	# 35	55	32	1944
	#150	55	38	1944
	#181	55	39	1944
	#192	54	38	1945
	#201	55	36	1948
	#254	54	27	1957
	#311	55	37	1947
	#455	54	36	1947
	#642	54	?	19 ?
Deckmen	# 25	56	37	1944
	#232	54	28	1955
	#492	52	37	1947

Table II
Number of Merchant Marine Ships in Japan

Year	Number
1964	1,600
1970	13,200
1975	14,400
1980	15,100
1985	9,100

Table III
Number of Merchant Marine Seamen in Japan

Year	Number
1960	195,000
1966	94,000
1970	112,000
1975	234,000
1981	187,000
1985	172,000

Figure 2. A 55-year-old male who had entered the company as a fireman in 1948 and worked for 36 years.

of 146 workers in steam locomotive repairshops but nil among 100 clerks of the same company. Older seamen or retired seamen should be followed up carefully in every ocean-going country.

REFERENCES

1. Hosoda, Y., Saitou, N., Nobutomo, K.: Epidemiology of Asbestos-Related Lung Cancer in Japan. *J. UOEH*, 5 Suppl.:83-87 (1983).
2. Kikuchi, H., Hirga, Y.: Clinical and Epidemiological Investigations on Asbestos-Exposed Workers. *J. Sapporo Med. College*, 52:599-612 (1983).
3. Hosoda, Y.: Unpublished.
4. Hosoda, Y., Saitou, N., Nobutomo, K.: Asbestos Exposure and Lung Cancer—Epidemiological Significance of Asbestos-Related Pleural Plaques. *J. UOEH*, 4 Suppl.:47-52 (1982).

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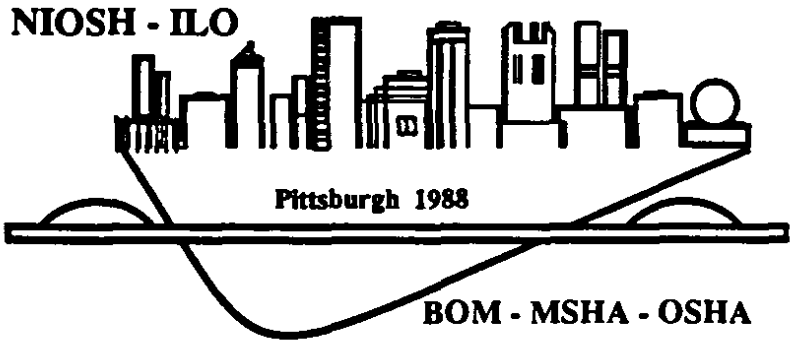

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