

Distribution Of Small Opacities On Chest Radiographs Of United States Coal Miners

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Background

Review articles and textbooks describe the location of the radiographic shadows of coal workers' pneumoconiosis (CWP) as predominately in the upper lung zones. Using National Institute for Occupational Safety and Health (NIOSH) surveillance data we evaluated the zonal distribution of small pneumoconiotic opacities in working US coal miners.

Methods

Data were derived from the NIOSH-administered Coal Workers' Health Surveillance Program (CWHSP). As part of the program, all US coal miners working underground are offered chest radiographs (CXR). NIOSH B Readers interpret CXRs from participating miners according to the International Labour Office Classification of Radiographs of Pneumoconioses, recording small opacity profusion, size, and shape, as well as the involvement of each of the six lungs zones. Included in this analysis were results of the most recent classification for all miners examined between 1970 and 2009 with CXRs judged consistent with pneumoconiosis and demonstrating profusion $\geq 1/0$ (n=14,572).

Results

CWP was recorded in a total of 63,311 lung zones, averaging 4.3 of the 6 zones among the affected miners. Overall, small opacities were noted approximately equally over the 63,311 affected zones, with 32.5% of the total involvement noted in the upper zones, 32.4% in the middle zones, and 35.1% in the lower zones. The primary shape was recorded as rounded for 9,241 (63.4%) miners and irregular for 5,331 (36.6%). For CXRs with primarily rounded opacities, no zonal predominance was evident (upper=35.3%, middle=32.0%, lower=32.7%). In contrast, for CXRs showing primarily irregular opacities, lower zone involvement was predominant (upper= 26.6%, middle=33.2%, lower=40.3). In the subgroup of 433 miners whose CXRs demonstrated primarily rounded opacities in only a single lung zone, an upper zone predominance was observed (upper=60.0%, middle=15.7%, lower=24.2%).

Conclusions

The overall distribution of small pneumoconiotic opacities on the chest radiographs of working US coal miner participants in the CWHSP was not consistent with the conventional expectations of upper lung zone predominance in CWP.

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