

Pathologic Characteristics Of Coal Workers' Pneumoconiosis By Primary Radiographic Small Opacity Shape

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Introduction:

The NIOSH Coal Workers' Health Surveillance Program includes both chest X-ray (CXR) surveillance and the National Coal Workers' Autopsy Study (NCWAS). Recent CXR results among working underground coal miners with small opacities consistent with pneumoconiosis indicate that the opacity shape is primarily rounded in 62% and irregular in 38%. This study examined radiographic and pathological abnormalities in a group of coal miners for whom both CXR and autopsy reports were available from 1981 to 1996. We assessed potential differences in lung pathology between miners with rounded versus irregular radiographic shadows and the contribution of smoking, age, and various coal mine exposures to the radiographic appearances.

Methods:

Working underground U.S. coal miners are offered CXRs every 5 years; abnormalities consistent with pneumoconiosis are recorded by NIOSH certified B Readers using the International Labour Office Classification system. The NCWAS database includes mining tenure, miner age, smoking history, and pathology reports using standardized diagnostic criteria. This study group comprised miners with 1) complete autopsy reports during 1981–1996, 2) a CXR with an opacity shape classification, and 3) complete smoking and mining histories. Prevalence ratios were calculated using log binomial regression to assess pathologic and other disease indicators between miners with radiographs classified as primarily rounded versus irregular, adjusted for smoking (pack years) and mining tenure.

Results:

A total of 44 miners met study inclusion criteria. CXR were taken an average 5.4 years before death. The dominant opacity shape on the miner's CXR was classified as irregular for 22 and as rounded for 22. Ever smoking was more common among miners with primarily irregular type opacities (95.5%) compared to miners with rounded opacities (72.7%) ($p=0.04$, Table 1). Mean underground tenure tended to be greater with rounded opacity shape ($p=0.05$, Table 2). No other significant differences in pathologic and radiographic factors were observed between those with primarily rounded vs. irregular opacities, adjusting for smoking and tenure histories. As previously observed, the zonal distribution of radiographic opacities was correlated with opacity shape.

Conclusions:

Determinates of the recording of opacity shape on CXR have yet to be adequately characterized and are likely multi-factorial. This preliminary study found that after accounting for mining tenure and smoking, lung pathologic lesions of CWP, silicosis, and emphysema were similar irrespective of radiographic opacity shape. Because this study was limited by sample size, continued efforts are warranted to define the pathologic basis for the recording of differences in the shape of radiographic opacities.

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