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EPIDEMIOLOGY OF PNEUMOCONIOSIS IN COALMINERS OF NORD - PAS DE CALAIS IN FRANCE

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ABSTRACT

This is a longitudinal study of 3 167 active or retired pneumoconiotic coalminers from Nord - Pas de Calais collieries (HBNPC) recognised through medico-legal decision over three defined periods: 1942-61, 1962-81 and 1982-87.

Periodic medical examinations of pneumoconiotics are provided by the medical services of HBNPC for miners and ex-miners. Physicians involved in this follow-up programme are concerned with the high incidence of progressive massive fibrosis (PMF).

The objectives of this study were to describe pneumoconiosis at time of compensation, assess progression of simple pneumoconiosis, estimate age-specific prevalence of PMF and examine medical and environmental factors related to occurence of PMF.

For each subject, two radiological films were extracted from medical files. They were reinterpreted according to ILO classification (ILO, 1980) by three independent readers.

Results indicated that radiological criteria for compensation had changed over time, a marked predominance of category 2/2 small opacities was noted for cases compensated before 1962 and a predominance of category 1/1 among those compensated after 1982. Comparison of distribution of small opacity types in the 1942-61 period to that in 1982-87 confirmed the progressive fall reported by other investigators of the proportion of predominant micronodular opacities accompanied by an increase in proportion of small irregular opacities at compensation (COCKROFT and ANDERSON, 1987). Age-specific prevalence rates of PMF reached 38.6% in pneumoconiotics aged 65 or more. When time interval between films was taken into account, profusion of small opacities at compensation greater than 1/1 was associated with a probability of 40% or more to develop PMF.

Since 1982, severity of incident cases of CWSP in HBNPC has been seen to decline and the disease to occur mostly after retirement. The changes in small opacity types reported suggest a reduction in incidence of pure silicosis. Occurence of PMF was highly correlated with age and profusion of small opacities at compensation. The high prevalence rates of PMF among pneumoconiotics was comparable to that reported in high coal rank collieries (SHENNAN et al.1981; HURLEY et al. 1987).

METHODOLOGY

The 3 167 subjects represented a sample from the population of miners and ex-miners compensated for CWSP in HBNPC. Study subjects had to be resident of Nord - Pas de Calais region, born after 1917 and alive on December 31st 1981. From the 31 328 prevalent cases in HBNPC (1986) (STAT. ANN. 1988), 25 240 cases met selection criteria. Three defined calendar periods were defined for compensation date (before 1962, 1962-1981 and 1982 or later). Random sampling was done in the two first periods and all 1 594 subjects of the last period were included. After further exclusion, 2 719 subjects were left for analysis (GAUTRIN et al. unpublished).

All radiological films had to realised in a HBNPC medical centre. The first film corresponded to date of compensation (+/- 2 years), the second, to the 1987 examination or to the closest date prior to 1987 (later than 1982). Films were read by three independent readers blind as to medical and occupational history of cases. They were interpreted mainly according to ILO classification (ILO, 1980), with knowledge of film order but not of dates. The first film was placed on the viewing box and read; both films were then placed side by side for comparison; after removal of the first film, the second was read by itself.

Median readings were used for analysis. Occurence of PMF was considered as possible, probable or definite if one, two or three readers reported presence of large opacities.

RESULTS

Among the group of 326 miners compensated before 1962, 68% had reached category 2 of CWSP (Fig.1). They had on average 33.6 years of age and were mostly active (97.1%) with 14.6 mean years of coalmining experience. The 1 368 miners compensated in 1982 or later had a mild form of CWSP. Only 25.1% were active. Mean age was 53.3 and mean coalmining experience 29.4 years.

<Figure 1>

Before 1962, almost all pneumoconiotics were compensated with small rounded opacities, proportion of type q opacities was 91%. Figure 2 illustrates the progressive change in proportions of small opacity types between first to third period of compensation.

<Figure 2>

The 645 definite and probable cases of PMF were mainly identified at follow-up. However, a small number (n=39) were identified as they were first compensated for CWSP; this occured mostly among retired miners (76.9%). Age-specific prevalence rates of PMF increased from 1.3% in the 41-45 age group to 38.6% in the 65 and older.

Progression to PMF was associated both with time since compensation and with category of CWSP at compensation (Fig.3). Type q small opacities were the most frequently observed at onset. Pneumoconiotics compensated with irregular type opacities were not given equal opportunity to progress.

<Figure 3>

Coalminers compensated for CWSP before 1962, between 1962 and 1982 and in 1982 or later started work respectively in 1942, 1946 and 1948, on average.

DISCUSSION

A fall in severity of CWSP among incident cases at compensation was observed in HPNPC collieries between 1950 and 1987. An increasing number of cases were compensated at an earlier stage of the disease. This appeared to reflect a change in medico-legal criteria for compensation. Over the same time period, a significant increase of age at compensation was observed.

The changes observed in types of lesions among incident cases of CWSP cannot be attributable only to changes in radiological techniques. They indicate a reduction in incidence of pure silicosis and suggest emergence of new radiological characteristics of the compensated disease. Irregular type opacities have been demonstrated to be related to coal dust exposure by other investigators (COCKCROFT and ANDERSON 1987), independently of smoking.

The present data suggest that the reduction in severity of CWSP at compensation, the decrease in proportion of rounded opacities (type q) together with an increase in proportion of small irregular opacities, and the increased age at onset may be partly associated with a change in age distribution of coalminers at risk. Indeed, differences in mean year of birth as well as mean year at first employment between the three sub-populations defined in this study, were small compared to mean calendar year at first compensation. Pneumoconiotics compensated between 1982 and 1987 represent a group of coalminers who remained free of nodular CWSP during most, if not all, of their active life. The disease entity diagnosed at a date close to their retirement appeared different from that diagnosed among young coalminers. Differences in individual susceptibility, personal work practices, cumulated dust exposure or coal rank

(SHENNAN et al. 1981; HURLEY et al. 1987) could explain the two clinical pictures of the disease compensated as CWSP. Verification of these hypotheses would need further investigation.

Twenty years or more follow-up of 506 pneumoconiotics confirmed the importance of category of CWSP at compensation as a factor for the development of PMF (MACLAREN et al. 1989). Those compensated with irregular type opacities were not given an equal opportunity to progress and therefore, their risk of developing PMF could only be assessed through further follow-up.

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Figure 1. Distribution of category of small opacities at compensation (<1962 and 1982-87)

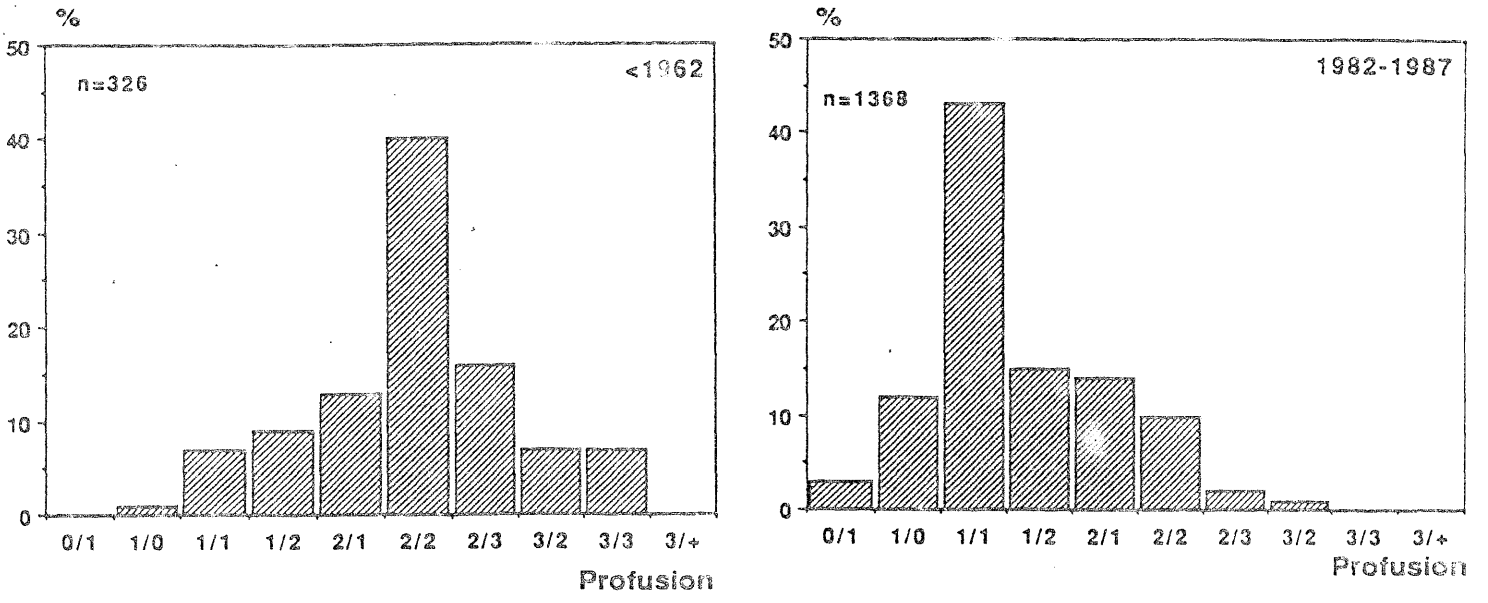


Figure 2. Percentage distribution of small opacity types at compensation

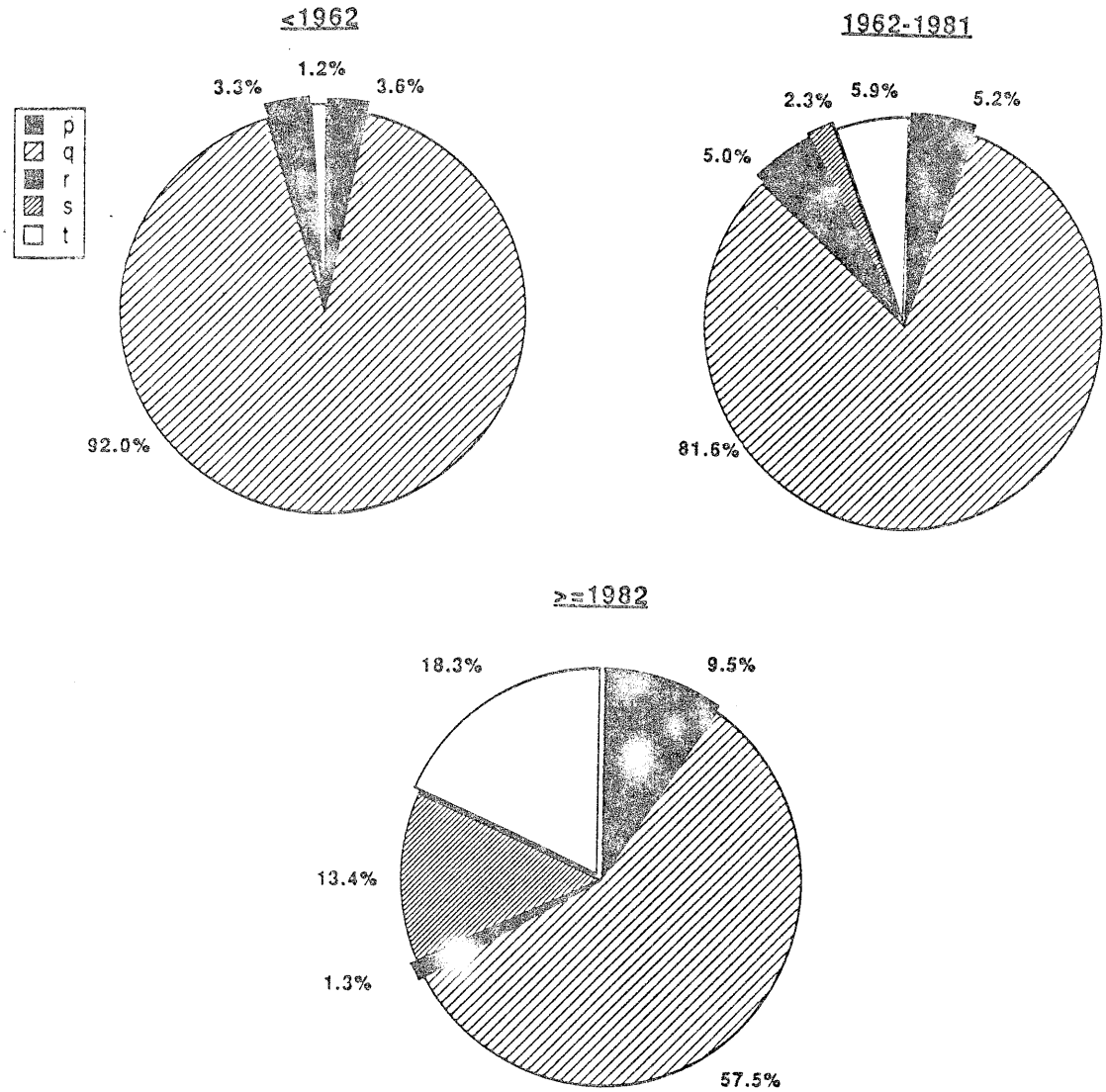


Figure 3. Proportion of subjects with PMF at follow-up by time to follow-up and by category of CWSP at onset

