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Controversy in Detection

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Abstract: *In many countries, the work of mining, quarrying, construction of tunnels and galleries, abrasive jet cleaning and smelting continue to present significant risks of silica exposure and silicosis epidemics still occur, even in developed countries. Patients with silicosis are particularly susceptible to opportunistic lung infections such as aspergillosis and tuberculosis. Occasionally silicosis is associated with scleroderma, systemic lupus erythematosus, nephritis and cancer. Early detection of silicosis is made by chest X-ray method, being the presence of rounded opacities the main sign of illness. However, no systematic information is available that allows use as a standard method of evaluation because their interpretation remains operator dependent both conventional radiological technique, digital and interpretation of computed tomography with high resolution.*

Keywords: *silica, silicosis, radiology.*

1. INTRODUCTION

The pneumoconiosis is an occupational disease, the word derives from the Greek pneuma: *air* and kovni: *dust*. It is characterized by marked progressive lung fibrosis [1]. The silicosis is currently the most common of pneumoconiosis; the disease is detected by conventional imaging of the chest, classified according to their natural evolution.

Quartz is a mineral composed of silica which corresponds to 60% of the earth's crust. Silica inhalation and contact with the pulmonary alveoli can produce local and immunological reaction [2], the pathogenesis and evolution depend on the individual condition of the person who is exposed or were exposed to inorganic solid waste.

The elementary lesion, of the silicosis is the nodule rounded appearance, which is detected by conventional radiology, to the perform the biopsy, the nodule has a central portion fibrous, to sometimes hyalinized, surrounded by concentric layers of collagen and a peripheral zone with silica-laden macrophages and other cells [3].

The complicated silicosis is characterized by the presence in the lung of masses greater than 1 cm diameter called silicomas. Notably silicosis has no symptoms initially, however the silicoma distorts the structure of the bronchi, determining altering lung function parameters and gas exchange in very advanced stages.

The silicosis patients are particularly susceptible to opportunistic infections such as aspergillosis and lung tuberculosis [4], no clutch most often observed in these patients, is the development of chronic bronchitis, emphysema, pneumothorax and pulmonary hypertension [5, 6].

Occasionally silicosis is associated with scleroderma [7, 8, 9, 11], systemic lupus erythematosus [10, 11], nephritis [11] and cancer [12]. In many countries, the work of mining, quarrying, construction of tunnels and galleries, abrasive jet cleaning and smelting continue to present significant risks of silica exposure and silicosis epidemics still occur [13], even in developed countries.

2. THE ART OF EARLY DETECTION

Early detection of silicosis from its beginnings as a public health problem has been widely addressed by the International Labour Organization, the World Health Organization and the National Institute for Occupational Safety and Health in the United States. They have proposed programs to work in cooperation in the global struggle against silicosis.

This program is based on the assessment and classification of chest radiographs to help diagnose this pneumoconiosis [14]. The purpose of this classification was to codify the radiographic abnormalities in a simple and reproducible, this scheme has led to a better international comparability of statistics on this lung disease, which has led in the last decade to use other imaging techniques to assess lung tissue [14], including chest computed tomography with high resolution in 2008 and digital radiography thoracic in 2011.

2.1 Conventional Chest Radiography

The first classification of the radiographic technique was proposed in the First International Conference of Experts on Pneumoconiosis, which took place in Johannesburg in 1930. In 1958, in Geneva established a new classification based solely on radiographic changes. Since then, it has been revised several times: 1968, 1970, 1972, 1980, 1989, 1992.1995, 1997, 1998, 2000, 2008 and the last in 2011 [15].

The purpose of these reviews was to provide improved versions to use extensively for clinical and epidemiological. Each new version of the classification proposed by the ILO has led to modifications and changes based on international experience in the use of previous classifications.

The classification is based on a series of standard radiographs, a written text and a series of notes. It consists of 22 chest radiographs [15], which have been selected after international trials in order to illustrate the rules of intermediate categories of profusion of small rounded opacities and to provide examples of the rules of the categories A, B and C for large opacities (silicomas).

2.2 Thoracic Computed Tomography with High Resolution

This test has been shown to be more sensitive and specific for the diagnosis of silicosis to detect early subpleural rounded opacities in the upper lobes or mediastinal and lymph nodes that are not visible on conventional radiography 16, even in the early detection of cancer 17. Making it possible to infer the onset of this disease by this technique pulmonary 18, 19, 20, 21, 22.

2.3 Digital Radiography Thoracic

Is considered now to digital radiography the greatest advance technological imaging systems. The International Labour Organization and the National Institute for Occupational Safety and Health in the United States presents new guidelines for the detection and classification of pneumoconiosis, through digital radiography thoracic in the 2011 23.

3. DISCUSSION

The base the diagnosis of silicosis is the radiographic finding of diffuse lung opacities [24], risk associated with a history of inhalation to silica dust. Namely history occupational is one of Key elements orientation clinic front the finding diffuse pulmonary nodules.

Given the frequent interobserver variability exists in the interpretation of conventional and digital x-ray plate, the International Labour Organization in conjunction with international organizations concerned with the health of workers, have developed a widespread radiological classification based on the type, size and profusion of lung injury caused by exposure to silica [15,23].

At present the use of other imaging techniques, such as computed tomography high-resolution, allowed early detection parenchyma abnormalities caused by exposure to silica [16, 19].

However, the above techniques do not have systematic information that allows use as standard evaluation method for the early detection of silicosis because their interpretation remains operator dependent [25].

3.1 Controversy

The conventional chest radiography is relatively specific to certain conditions, presents technical difficulties observed in obese, is suitable for the evaluation of benign pleural disease, there is little intra and inter observer agreement compared with digital radiography thoracic, generates less ionizing radiation that digital radiography thoracic.

The chest computed tomography with high resolution, is more sensitive to interstitial commitment, has greater specificity under certain conditions, is appropriate in obese patients, there is a greater according intra and inter observer compared with conventional chest radiography and digital, generates higher radiation doses.

The digital radiography, allows analyze result through a personal computer or notebook, evaluates images simultaneously and several miles away, there is little agreement intra and inter observer compared with conventional chest radiography, generates more ionizing radiation that chest radiography Conventional,

These generate ionizing radiation techniques may affect the functioning of organs and tissues 26, if the dose is low or received along for an extended period there is likelihood of cells to repair successfully however exposure to ionizing radiation is cumulative eventually cause mutagenic and carcinogenic over time.

3.2 Challenges

Sensitizing the rulers of the magnitude of the public health problem that causes the silicosis and thereby create regulatory agencies who care to ensure working conditions within companies.

Through state policies encourage to universities in the constitution of specialization programs in occupational medicine and thereby spread the art of knowledge the employer and employee, designing preventive to maintain health and life.

Encourage training in early identification of lung disorders caused by exposure to silica, using internationally recognized programs (National Institute for Occupational Safety and Health in the United States - University of Fukui in Japan).

4. CONCLUSIONS

The impact of the modern concept of the cascade of events in the pathogenesis of silicosis has not altered the traditional method of surveillance of workers, but has significantly improved the capacity of early medical diagnosis of the disease, at a time that this only has had a limited impact about pulmonary function.

They are certainly individuals who are in the early stages, which must be identified and removed from further major exhibitions, if we are to prevent disability through medical surveillance.

5. RECOMMENDATIONS

Improved ventilation systems and aspiration, isolation process, wet techniques, personal protection including proper selection respirators, reduce exposure.

It is also important to educate the workers and the company about the dangers of silica dust exposure and measures to control such exposure.

If identified a case silicosis a worker, it is advisable remove exposure. Unfortunately, the disease may progress even in the absence of further exposure to silica.

In addition, the finding of a case of silicosis, should trigger an evaluation of the workplace to protect other workers also are are at risk.

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