Mesothelioma in Mongolia: case report

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Background: More than 80% of cases of mesothelioma worldwide have a history of asbestos exposure. In Mongolia, workers in coal burning thermal power plants (TPP) have widely utilized asbestos as an insulation material.

Methods: We describe the case of a 47-year-old woman diagnosed with a malignant pleural mesothelioma. She worked in a TPP in Ulaanbaatar, Mongolia for 28 years.

Results: A computer tomography (CT) scan showed a circumferential ring around her left lung, and tissues' samples had a biphasic variant of mesothelioma with epithelioid and sarcomatoid components.

Discussion: This is the first reported case of mesothelioma in Mongolia. We expect additional cases of mesothelioma, as well as other asbestos related diseases, will be identified in the future. In order to properly track asbestos related diseases in the country, we recommend the creation of an asbestos related disease registry.

Keywords: Asbestos, Asbestos related disease, Mesothelioma, Mongolia, Power plant, Insulation

Introduction

Mesothelioma is a rare neoplasm arising from the mesothelial cells lining the pleura, pericardium, and peritoneal cavity.¹ More than 80% of mesothelioma cases are associated with asbestos exposure.^{2–4} Many industries use or have used asbestos because of its high tensile strength, flexibility, and its resistance to chemical and thermal degradation.^{5,6} Studies of mesothelioma patients have included workers in power plants, asbestos mines, and construction companies.^{7–10} Other studies have identified that individuals with mesothelioma were exposed in familial and non-occupational environmental settings.^{11,12}

The World Health Organization (WHO) estimates that 125 million people worldwide are exposed to asbestos at workplaces, with more than 107 000 people dying annually from asbestos related diseases, including mesothelioma, as a result of occupational exposure.¹³ The WHO registered 92 253 cases of mesothelioma from 83 countries between 1994 and 2008.¹⁴ Virtually all cases result in death. Over half of the WHO identified cases (55.6%) were from the United States, United Kingdom, Japan, Germany, and France. This is a result of the high asbestos use during the period of peak consumption (between the

1940s and 1990s). These countries also have well developed reporting systems.^{14,15}

Industries in Mongolia started using asbestos as a component of thermal insulation and construction material in thermal power plants (TPP), metal processing, and construction in 1961. A total of 14 893 workers are employed in 28 companies, which use asbestos or asbestos containing materials. Mongolia imported 35 484 metric tons of asbestos between 1995 and 2010, almost exclusively from China or Russia (99%).¹⁶ No cases of asbestos related diseases were reported prior to this report. This paper reports the first case of a malignant mesothelioma caused by occupational exposure to asbestos in Mongolia.

Case Report

In 2013, a 47-year-old woman was hospitalized due to left pleuritic chest pain, cough, weakness, shortness of breath, dry mouth, and swollen legs. She worked in a coal burning TPP in Ulaanbaatar, Mongolia as an operator of an oxygen compressor machine for 28 years. While her primary responsibility was operating this machine, she also performed insulating work, specially sealing window leaks in the power plant. She performed this task each fall (September–October), and removed the seals or insulation each springs (May–June) between 1985 and 2005. To seal the windows, she mixed raw chrysotile asbestos with water, using the mixture as the seal. She had no history of asbestos exposure prior to age 19, when she

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Figure 1 Computer tomography (CT) scan shows left sided thickness of pleura

started working in the power plant. After diagnosis, she was treated with chemotherapy at the National Cancer Center of Mongolia in Ulaanbaatar. She died from her mesothelioma in 2014.

For 1 year prior to diagnosis, she reported a cough and throat discomfort. At the time of diagnosis, there were no breath sounds in her left lung and she had a palpable mass on the anterior third left rib. Her legs were swollen and her oxygen saturation on admission was 88%. A computer tomography (CT) scan showed a circumferential covering around the lung parenchyma throughout her left lung (Fig. 1). The CT scan also showed a small area of pleural plaquing in the right posterior chest. Tissue samples were collected in October 2013 and she was subsequently diagnosed with a malignant pleural mesothelioma. It seemed most compatible with a biphasic variant with epithelioid and sarcomatoid components, based upon review by a member of the USA–Canadian Mesothelioma Panel.

Discussion

According to the National Asbestos Profile of Mongolia, asbestos and asbestos containing materials are used in TPP, metal processing and construction industries.¹⁶ Thermal power plants widely use asbestos containing products including raw asbestos, asbestos containing boards, sheets, gaskets, cement, textile, and cord materials to make thermal insulation for piping systems, furnaces, turbine systems, electrical cables, and windows.¹⁷ Thermal insulation activities release asbestos fibers into the breathing zone of workers due to disruption of asbestos containing materials. Previously, we conducted a study on asbestos exposure at power plants in Ulaanbaatar, Mongolia. A researcher (ND) observed work practices of asbestos involved job tasks at power plants as well as protective measurements during sample collection. Workers did not use any respiratory protective equipment. Therefore, workers coming into contact with

insulation, including insulators, maintenance workers, plumbers, renovation workers, mechanics, welders, furnace operators, carpenters, and housekeepers are at an elevated risk for asbestos related diseases.^{18,19} Individuals who are not directly exposed may be at risk from household members who are occupationally exposed.

In an accompanying paper, we report both area and personal sampling results of Mongolian workers in power plants, documenting excessive exposure. While this appears to be the first reported case of mesothelioma, we predict that additional cases of this disease, as well as other asbestos related diseases, will be identified in the future. In order to properly track asbestos related diseases in the country, we recommend the creation of an asbestos related disease registry in Mongolia. Industries utilizing asbestos should be required to undertake asbestos related medical evaluation of employees. There is also a need for increased manpower in various occupational health fields to meet the needs of industry in controlling the use of asbestos. In Mongolia, there are currently no standards for exposure to asbestos. We recommend that a standard be adopted immediately and with ultimate goal of total elimination.

Disclaimer Statements

Contributors All authors contributed in data collection of occupational history, medical records in this case report, development of the manuscript, discussed the case report, and critically reviewed the manuscript.

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Conflicts of interest None of authors have conflict of interest in this paper.

Ethics approval This is not a bio-medical study. The authors have permission from the patient to publish her personal information.

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