Sir,

A 26-year-old non-smoker lady, presented with right-sided chest pain and gradually progressive dyspnea on exertion for four months. She was a homemaker and her entire childhood as well as post marriage life was spent in Bisai-Bihar state of India, except for six months of her life in Jharia-Dhanbad at five years of age. A detailed interview with the father did not reveal asbestos exposure at home or at the work place. On examination there were signs of superior vena cava (SVC) syndrome causing dilatation of the veins over the chest and abdomen. There was an increased volume of right hemithorax with swelling over the chest and decreased breath sounds. Computed tomography of the thorax and abdomen [Figure 1] showed a heterogeneously enhancing mass in the right hemithorax. The mass had crossed the diaphragm leading to scalloping of the surface of the liver, with a few liver parenchymal metastases. A separate sheet and nodular mass-like deposits were seen along the pelvic peritoneum in the bilateral adnexae, along the anterior surface of the bladder and in the rectouterine pouch.

Fine needle aspiration cytology (FNAC) of the axillary lymph node, ultrasonography (USG)-guided lung biopsy, and FNAC of the pelvic mass showed a malignant tumor with an epithelial appearance, consistent with adenocarcinoma or epithelioid mesothelioma [Figure 2a]. FNAC of the breast was performed for right breast enlargement and showed normal breast tissue. Immunohistochemistry of the lung biopsy, to differentiate between adenocarcinoma and mesothelioma, confirmed the diagnosis of an epithelioid variety of malignant mesothelioma (MM). The results were as follows: Calretinin-positive [Figure 2b], Wilm tumor 1 (WT1)-positive [Figure 2c], carcinoembryonic antigen (CEA)-negative, CD 15-negative, epithelial membrane antigen (EMA), and thyroid transcription factor-1 (TTF1)-negative [Figure 2d]. The lung biopsies for alanine lymphoma kinase (ALK) by the fluorescence in situ hybridization (FISH) method, and the epidermal growth factor receptor (EGFR) mutation by polymerase chain reaction (PCR) were negative. Radiotherapy was given to her for symptomatic relief of the SVC syndrome. She was advised cisplatin and pemetrexed-based chemotherapy. She received one cycle and then abandoned the treatment due to non-tolerance and poor prognosis of the disease.

Malignant mesothelioma is a relatively rare tumor that arises from the mesothelial cells. Most MMs are related to occupational or environmental exposure of asbestos. Our case could be classified as non-occupational mesothelioma, but possibly not as non-environmental mesothelioma.
Mesothelioma was possibly due to environmental exposure of coal-mines. She lived for six months in Jharia, at five years of age. The age of presentation was 26 years, which coincides with the incubation period required for mesothelioma due to the exposure. Jharia coal mines are surface mines that create a lot of air pollution, making residents breathe highly polluted air. It is estimated that 15% of the coal mines are contaminated with asbestos and have exposure rates above the safety limit proposed by the Mine Safety and Health Administration (MSHA). Compensation has been given to coal workers developing mesothelioma. The Hong Kong study on coal mines at Jharia has warned about the health hazards, as safety measures are not in place due to cost-cutting measures. A number of asbestos product-related industries are present in Dhanbad - the origin of this asbestos is not known. Asbestos abatement is also available in Jharia, indicating the possibility of asbestos in the coalfield. Hence, the possibility of mesothelioma due to coal-mine exposure seems most likely in this patient.

Our patient not only had an unusual exposure for mesothelioma, but she had many unusual clinical manifestations as well. There are very few cases below 30 years of age reported with mesothelioma. Our patient’s age at presentation was 26 years. SVC obstruction with mesothelioma is also very rare. Our patient had mesothelioma causing pleural mass and pelvic peritoneal mass. Co-occurrence of pleural and peritoneal MM is also very rare. Our patient had a dry type of MM, causing formation of a large mass with a rare finding of a shift of the mediastinum to the opposite side. Pleural MM usually leads to shrinkage of the hemithorax. Systemic lymphadenopathy seen in our patient is also rare with MM.

Immunohistochemistry is essential for distinguishing epithelioid mesothelioma from adenocarcinoma. Calretinin, WT1, and cytokeratins 5/6 are established as highly reliable positive mesothelioma markers. CEA, CD15, and TTF-1 are essential adenocarcinoma markers. Our patient had positive MM markers, that is, Calretinin and WT1 positive and negative adenocarcinoma markers, that is, CEA, CD15, and TTF-1 negative, establishing the diagnosis of MM.

As per the International Mesothelioma Interest Group staging system adopted by the American Joint Committee on Cancer, our patient was in stage IV. Cisplatin and pemetrexed are considered the standard line of management for these cases. It was tried in our patient for one cycle, however, due to non-tolerance to therapy and poor prognosis, the patient refused another cycle. Targeted therapy with gefitinib or erlotinib with EGFR expression has shown benefit. ALK inhibitors have also been suggested as targeted therapy for MM. However, both EGFR gene expression and ALK gene mutation were negative in our case. Radiotherapy is an accepted method for palliative therapy of the SVC syndrome. There was significant reduction in symptoms of the SVC syndrome in our patient with radiotherapy.

To conclude, our young patient had many unusual findings. These were, MM, possibly due to coal-mine exposure, with presentation at a very young age, SVC syndrome, pleural plus peritoneal mesothelioma, increased hemithoracic volume, and metastasis to the axillary lymph nodes. Despite our best efforts she remained non-treatable. Thus, it is essential to identify more patients from the locality, look for the environmental cause, and prevent its occurrence in other populations, as prevention is the best mode of treatment for this lethal disease.

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