attributed to multiple previous transfusions (Fig 1C, white arrow). Immunohistochemically, the malignant lymphoid cells were positive for B-cell marker CD20, with 90% of them expressing the proliferative marker MIB-1 (Ki-67). They were negative for bcl-2. In situ hybridization for Epstein-Barr virus (EBV)–encoded small RNA was negative. The overall features were consistent with diffuse large B-cell lymphoma involving primarily the liver. The patient then underwent three courses of chemotherapy of rituximab, prednisolone, epirubicin, cyclophosphamide and vincristine sulfate. PET/CT was repeated for reassessment. The previously noted numerous hypermetabolic lesions throughout both lobes have almost completely resolved, leaving behind only a few scattered tiny hypodensities in both lobes which do not demonstrate discernable FDG uptake (Fig 1D, arrows), in keeping with complete metabolic response to treatment.

Primary hepatic lymphoma (PHL) is extremely rare and only accounts for 0.016% of all non-Hodgkin's lymphoma.[1] PHL has been reported to occur more frequently in the context of chronic hepatitis C virus infection and immunosuppression, including infection with HIV.[2,3] Clinical features include abdominal pain, constitutional symptoms, and hepatomegaly. The predominant histological type is diffuse large B-cell lymphoma.[2] Three patterns of hepatic involvement have been described, including a solitary mass, multiple liver masses, and diffuse infiltration.[3,4] There is a scarcity of data on imaging studies in PHL. On ultrasonography, hepatic lymphomas usually present as hypoechoic and homogenous lesions. Occasionally, anechoic lesions may be found with posterior enhancement.[5] On CT, hepatic lymphomas are usually hypodense, and rim enhancement may be present in the portal venous phase.[3] Magnetic resonance imaging show PHL as hypointense lesions in T1-weighted images and hyperintense in T2-weighted scans.[3,6] However, similar imaging features may be observed in liver abscess or metastases.[6,7] PET/CT was valuable in our case, as being a whole-body functional scan, other sites of involvement were excluded, thereby demonstrating the primary hepatic origin of the lymphoma. In agreement of the study of De Renzo et al,[8] PET/CT was a useful tool for response assessment. Our case arose in the setting of chronic hepatitis B virus infection and heavy previous immunosuppression for the autoimmune hemolytic anemia. Since EBV was absent, the case was different from EBV-related lymphomas arising in immunocompromised or organ-allograft patients. However, our case confirmed the previously observed association between an immunocompromised state, chronic infection with a hepatotropic virus, and PHL.[1,3]

Winnie K.S. Chan
Department of Diagnostic Radiology, University of Hong Kong, Hong Kong

Eric W.C. Tse
Department of Medicine, University of Hong Kong, Hong Kong

Yuen-Shan Fan
Department of Pathology, Queen Mary Hospital, Hong Kong

Jingbo Zhang
Department of Diagnostic Radiology, University of Hong Kong, Hong Kong

Yok-Lam Kwong
Department of Medicine, University of Hong Kong, Hong Kong

Pek-Lan Khong
Department of Diagnostic Radiology, Queen Mary Hospital, University of Hong Kong, Hong Kong

AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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Malignant Pleural Mesothelioma After Household Exposure to Asbestos

A 70-year-old female with diabetes, hypertension, and a 20 pack-year smoking history presented with new onset cough. She had pleuritic chest pain with dyspnea on exertion, without any fever or hemoptysis. She reported a 10-pound weight loss over 2 months with occasional night sweats. She quit smoking 25 years before diagnosis and denied any occupational exposure. Patient's husband of 35 years had died of mesothelioma 12 years earlier. Her second-hand exposure was related to shaking out and washing her husband's clothes. Her husband worked in a construction business spraying asbestos (crocidolite) as a fire repellant. Computed tomography (CT) scan revealed a large right pleural effusion, near total atelectasis of the right lung, and mild pleural thickening with multiple nodular pleural masses (Fig 1, arrows). Pleural biopsy revealed a sarcomatoid mesothelioma. The cells exhibited mild to

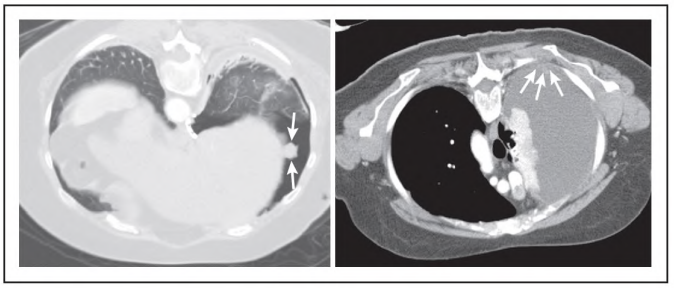

Fig 1.

moderate nuclear atypia and frequent mitoses. The cells appeared spindled and were growing in a storiform pattern with short fascicles. Immunohistochemistry was positive for CK 5/6 and focally for calretinin. WT-1, TTF-1, carcinoembryonic antigen, Ber-EP4, CD34 and Bcl-2 were negative, consistent with a sarcomatoid mesothelioma. Additional pleural biopsies done revealed sarcomatoid mesothelioma. She received five cycles of cisplatin (75 mg/m^2) and pemetrexed (500 mg/m^2), but progressed on follow-up CT scans. She progressed on gemcitabine (1,000 mg/m^2). Over the ensuing months, she developed multiple subcutaneous nodules (Fig 2). She was begun on vinorelbine (25 mg/m^2) and cisplatin (75 mg/m^2), but developed grade 4 neutropenia with one cycle. Presently she is on single-agent vinorelbine.

A 77-year-old female with a history of angina, hypertension, congestive heart failure, and ductal carcinoma in situ on tamoxifen was found to have a right upper lobe mass on surveillance x-rays over 6 years. She worked as a grocery store clerk. She had a 70 pack-year history, but quit 10 years prior. She did not give a history of direct exposure to asbestos; however, she shook out and washed her husband's clothes daily. Her husband of 53 years was a pipe fitter and had died of mesothelioma. An increase in size of the mass prompted CT and positron emission tomography scans. She underwent a right upper lobectomy for stage IA adenocarcinoma. At the time she had a pleural-based opacity on the opposite lung. Surveillance CT scans following the lobectomy revealed that the left pleural-based 1.5-cm × 1-cm nodule which had been present at the time of right upper lobectomy, increased to 2.7 cm × 2.3 cm over 4 years (Fig 3, arrows). An ultrasound-guided needle biopsy of the pleural mass revealed bland, epithelioid cells growing in both papillary and solid configurations. Hematoxylin and eosin stain of pleural biopsy showed mildly atypical, monomorphic cells with moderate amounts of eosinophilic cytoplasm with scarce mitotic activity (Fig 4A). Hematoxylin and eosin and Papanicolaou stain of pleural mass shows focal areas of tubular and papillary growth (Fig 4B). By immunohistochemistry, the cells were cytokeratin (CK) AE1/3, CK5/6, CK7, calretinin (Fig 4C), and WT-1 positive. In the setting of an appropriate panel of antibodies, calretinin stain identifies the cells as mesothelial and helps exclude carcinoma. They were negative for Ber-EP4, TTF-1, mucin and carcinoembryonic antigen (not shown). The morphology, immunophenotype, and clinical picture were thus consistent with malignant epitheloid-type mesothelioma.

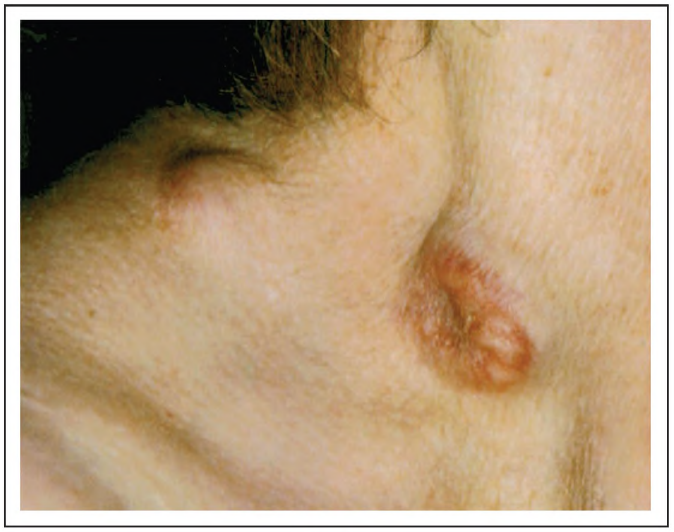

Fig 2.

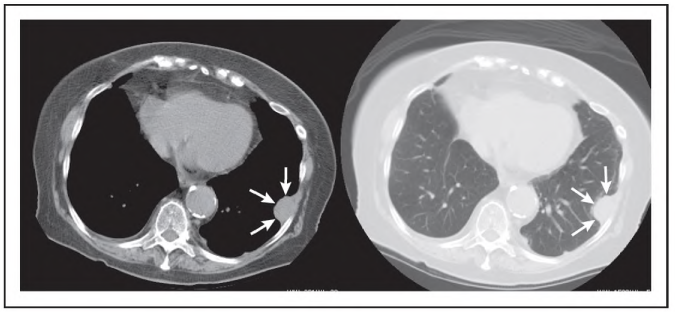

Fig 3.

Here we describe two female patients who never had direct asbestos exposure, but developed mesothelioma from second hand asbestos exposure, perhaps by washing their husbands' clothes.

Asbestos, a naturally occurring fiber, is widely used in many industries. Inhalation of asbestos fibers can result in a distinct pathologic process, ranging from benign plaques to malignant mesothelioma. Malignant pleural mesothelioma (MPM) is an uncommon, fatal neoplasm arising from mesothelial cells lining the pleura. In the United States, MPM occurs in approximately 2,500 persons per year, with 20% being women.[1] The peak global incidence of asbestos-related disease is expected to occur 30 to 40 years after the period of peak usage. The disease is expected to increase in incidence globally until 2020.[2] There is a clear link between exposure to asbestos and MPM. An inverse relationship exists between intensity of asbestos exposure and length of the latency period. The construction industry accounted for nearly 15% of decedents with MPM, followed by ship and boat building and repairing, industrial and miscellaneous chemicals, petroleum refining, and electric light and power. Interestingly, housewives had the second highest mortality rate (6.8%) after managers and administrators (7.6%) in 1999.[1] Bystander risks related to asbestos exposure have been described previously.[3] The high mesothelioma risk was predominantly influenced by exposure to amphibole asbestos (crocidolite and amosite), which reached its peak usage in the 1960s and thereafter declined. Rates of mesothelioma peaked for males in early 1990s and have since declined, but remained steady for females throughout.[4] Some countries and cultures exposed to asbestos through common household tasks like whitewashing the home have higher rates of mesothelioma in females.[5,6] A report from Germany reported five cases of MPM in housewives, which were attributed to inhalative household contact with asbestos. An occupational history of asbestos exposure could not be revealed. A causal relationship between the fatal disease and the inhalative household contact with asbestos was established based on the cleaning of asbestos contaminated workclothes of the husbands.[7] An Italian study noted that family members of asbestos workers were at higher risk of developing malignant mesothelioma with increased standardized mortality ratio for pleural cancer 21 observed *v* 1.2 expected; standardized mortality ratio = 18.00; 95% CI, 11.14 to 27.52).[8] An Australian study reported higher MPM rates in male subjects and those with more than 15 years since first exposure, but women had a steeper dose-response curve.[9] The steeper dose-response slope for women was

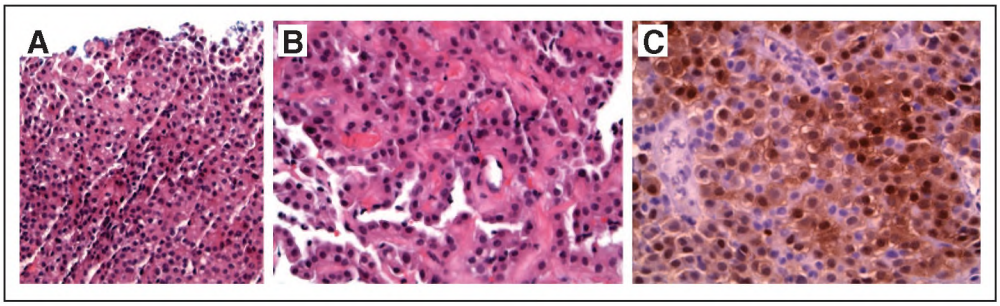

Fig 4.

thought to be due to smaller lung volume with higher forced expiratory flow rate and a higher forced expiratory volume in 1 second/forced vital capacity ratio. This may lead to greater alveolar fiber deposition and greater fiber retention than in men with larger lungs. In a multicenter report, moderate or high probability of domestic exposure was associated with an increased risk of developing MPM in cases without evidence of occupational exposure to asbestos.[10] This corresponded to three situations: cleaning asbestos-contaminated clothes, handling asbestos material, and being in the presence of asbestos material susceptible to damage. The largest case series of second-hand exposure consists of 32 patients over 15 years.[11] Relationships were wife,[15] daughter,[11] son[3] and others.[3] Occupations of the workers included shipyard,[13] insulator,[7] and others.[12] Of the 27 pleural cases, 13 were epithelial, five were fibrous, three were biphasic, and six were not specified; of the five peritoneal cases, four were epithelial and one was fibrous. Latency was greater than 40 years in 27 cases; six cases were age 40 to 49 years and 17 were 60 years or older.[11] In contrast to the long latency period reported in above study, an aggressive course with a short latency period in three bystander cases has been reported.[12] Exposure to the crocidolite form of asbestos was most often associated with the development of MPM.[12,13] A study to determine the lung tissue concentration of asbestos in persons with MPM examined 73 cases and estimated highest increase in relative risk for crocidolite.[13] Crocidolite asbestos, also known as blue asbestos, accounted only for approximately 4% of the total asbestos used in the United States. These straight, needle-like fibers are easy to inhale and remain in the lungs indefinitely. Incidence of MPM is approximately 18% to 24% in those who have mined this form of asbestos.[14-16] Epithelial mesothelioma (50% to 75%) is the most common histologic subtype, with a better prognosis then sarcomatoid (15% to 20%) or mixed-type (20% to 30%) mesotheliomas.[17-19] The differential diagnosis on biopsy varies according to the histologic type. Epithelioid-type mesothelioma must be distinguished from primary or metastatic carcinoma, while sarcomatoid mesothelioma can mimic organizing effusion, sarcoma, or other spindled tumors of the pleura such as solitary fibrous tumor. MPM remains an aggressive tumor, usually associated with a poor prognosis. Male sex, older age, weight loss, chest pain, poor performance status, low hemoglobin, leukocytosis, thrombocytosis, and nonepithelial cell type ($P < .05$) are poor prognostic factors. Most patients have stage III (48%) or IV (40%) disease at the time of presentation, and remain unresectable.[20] Response rates with chemotherapy remain low, though combination regimens have better response rates compared to single agent chemotherapy. Novel chemotherapy regimens with definite activity such as antifolate (pemetrexed or raltitrexed) -platinum combinations, and new radiotherapy techniques such as intensity-modulated radiation therapy have shown promising results. Currently agents targeting epidermal growth factor receptor, vascular endothelial growth factor, and platelet-derived growth factor are under evaluation in MPM. MPM remains an aggressive malignancy despite treatment, with a median survival of 6-11 months and 1-year survival ranging between 18.4% and 57.6%. Early diagnosis is thus a key element in successful treatment, and awareness of this entity should be heightened. In the differential diagnosis of a mass involving pleura and lung, physicians should consider the possibility of mesothelioma both with a history of direct asbestos exposure, but also in the setting of secondary asbestos exposure.

Anush V. Patel
Department of Medicine, Roswell Park Cancer Institute, Buffalo, NY

Paul N. Bogner
Department of Pathology, Roswell Park Cancer Institute, Buffalo, NY

Donald Klippenstein
Department of Radiology, Roswell Park Cancer Institute, Buffalo, NY

Nithya Ramnath
University of Michigan Comprehensive Cancer Center, Ann Arbor, MI

AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

The author(s) indicated no potential conflicts of interest.

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Spontaneous Pneumocephalus Associated With Recurrent Colorectal Carcinoma

A 69-year-old male with carcinoma of the sigmoid colon metastatic to the liver underwent surgical resection of the primary tumor and subsequent chemotherapy with infusional fluorouracil, leucovorin, and oxaliplatin (FOLFOX) plus bevacizumab. The patient developed lower abdominal pain and weight loss 8 months after completion of therapy. A complete diagnostic work-up revealed a 7.1- × 4-cm tumor recurrence at the surgical anastomosis. Systemic palliative therapy with infusional fluorouracil, leucovorin, and irinotecan plusbevacizumab was administered for 4 months until enlargement of a pelvic lesion. Subsequent systemic palliation was administered with a combination of FOLFOX plus cetuximab until further disease progression was once again documented. Four days after completion of this regimen, the patient developed tightness in the muscles of the thighs and uncontrollable pain in the perineal area prompting a hospital admission. Soon after, the patient became unresponsive, requiring airway protection and respiratory support. Physical examination was remarkable for edema of the right proximal thigh and nuccal rigidity. Imaging studies of the brain, chest, abdomen, and pelvis demonstrated an extensive air pattern in the soft tissues surrounding the rectal mass into pelvis tracking down to the thighs (Fig 1A, arrows), and extending along a right sacral nerve root (Fig 1B; T, large lobulating mass with air inside; bottom arrow indicates air in sacral space) into the spinal canal (Fig 1C, arrows). The air could be followed in the spinal canal all the way up to the brain (Fig 1D, arrows). The patient expired within few days of the complication.

Spontaneous pneumocephalus is a common complication in neurosurgical patients and is usually associated with trauma, tumors, infection, or during intracranial surgery.[1] However, its occurrence in patients with cancer has only been reported with tumors involving the brain parenchyma,[2] otic nerve,[3] nasopharynx,[4,5] and spine.[6] Other commonly described settings include ventricular peritoneal shunts,[7,8] thoracotomy,[9] temporal bone fractures,[10] and displacement of ventriculo-peritoneal shunts into the sigmoid colon.[11] Pneumocephalus must be considered whenever the dura is dysrupted, especially if a CSF leak is present. Therapy depends on the degree of tension, symptomatology, and etiology. The development of a spontaneous pneumocephalus in the patient presented herein most likely resulted from a fistulous tract developing between the tumor and a sacral nerve root (Fig 1B). To our knowledge, this is the first case describing a spontaneous gas communication between a malignancy of the gastrointestinal tract into the spinal canal and secondary meningitis.

Angela Torres

Department of Research, Oncology Consultants, Physicians Associates, Houston, TX

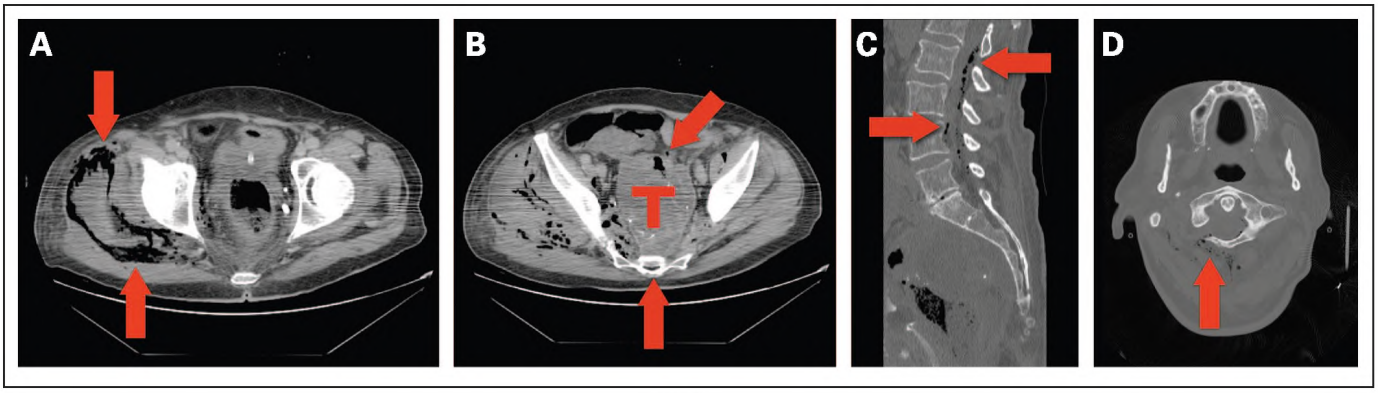

Fig 1.