

# Application of medical thoracoscopy in diagnosis of sarcoidosis-related pleural effusion

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## Introduction

Sarcoidosis is a chronic disease of unknown etiology characterized by noncaseating granulomas in the organs involved. Although lung is often affected, pleural manifestations are said to be infrequent. The use of computed tomography (CT) has increased awareness of this unusual site of involvement in sarcoidosis, but frequently without histologic confirmation. Here, we report three cases with sarcoidosis-related pleural effusion that were diagnosed by medical thoracoscopy to better document the importance of this finding.

## Case One

A 39-year-old male was hospitalized with bilateral moderate pleural effusions and pericardial effusion. Besides the fluid, CT showed bilateral diffuse parenchymal nodules and hilar lymph node enlargement. A transbronchial biopsy of the right lower lobe showed noncaseating granulomas. Thoracoscopy of the right thorax showed multiple whitish-gray nodules of unequal size distributed throughout the

## Abstract

Pleural effusion caused by sarcoidosis is unusual. Medical thoracoscopy could help clinicians detect associated pleural disease, yet studies on thoracoscopic observations in sarcoidosis pleural involvement are rare. In this article, we report the utility of medical thoracoscopy in diagnosing sarcoid-related pleural disease for three patients. Pleural nodularity was common with solitary and multiple nodules evident; biopsies confirmed the presence of diagnostic noncaseating granulomas.

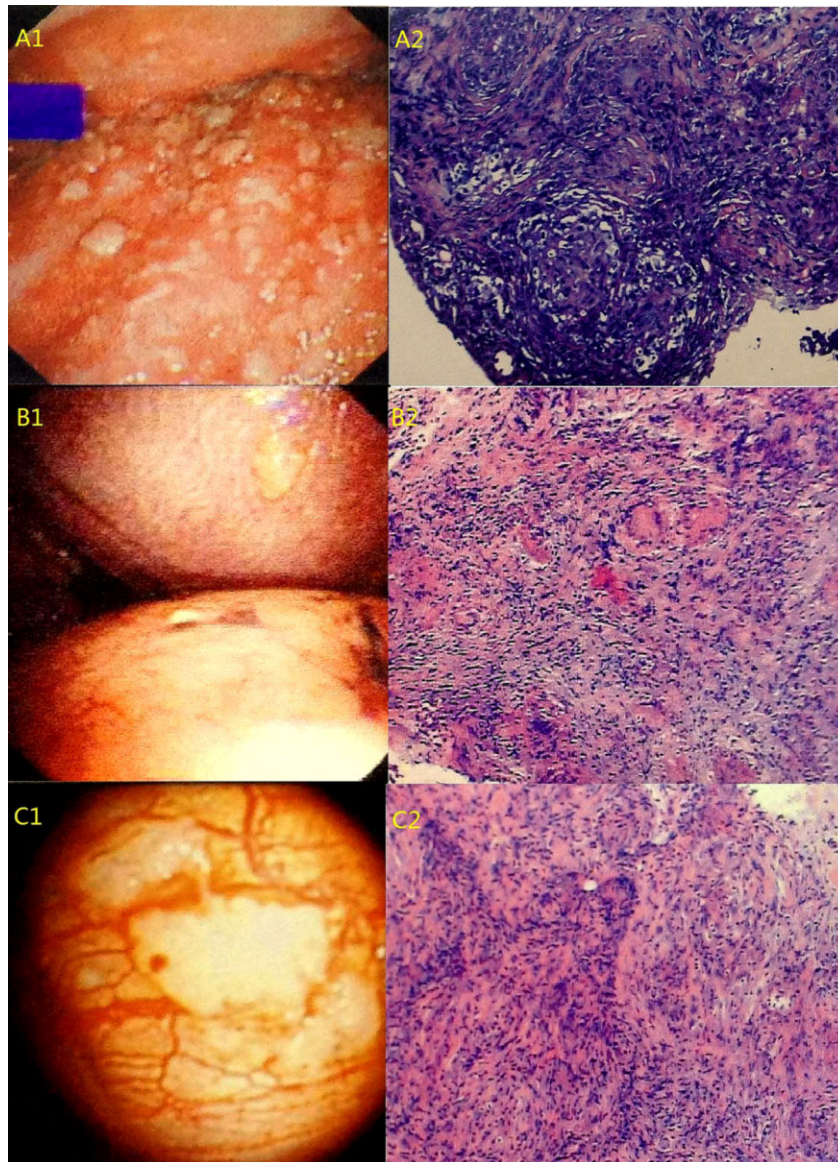
parietal, visceral, and diaphragmatic pleura. Noncaseating granulomas with negative AFB (acid-fast bacillus) stain were found in the pleural nodules biopsy (see Fig. 1). This patient was diagnosed as stage 2 sarcoidosis, with pleural involvement, according to all the imaging, pathological, and laboratory findings (see Table 1).

Methylprednisolone therapy with 32 mg daily was started, and tapered with clinical improvement. Three months later, symptoms gradually resolved and CT showed resolution of the parenchymal, pleural, and pericardial disease. There was no evidence of disease recurrence at 1 year.

## Case Two

A 49-year-old female was hospitalized with a recurrent right-sided pleural effusion. Three liters of yellow fluid was drained before admission. Computed tomography revealed right middle lobe atelectasis, right hilar lymphadenopathy, and a moderate right effusion. A right side bronchial biopsy showed noncaseating granulomata. During thoracoscopy, we found two whitish-gray parietal pleural nodules near the costophrenic border and a solitary small yellow diaphragmatic pleural nodule; a few white nodules were observed on the visceral pleura. Biopsies of the pleural nodules showed noncaseating granulomas consistent with the bronchial

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**Figure 1.** The thoracoscopic appearances and histological images showing noncaseating granulomatous inflammation from cases one (A1, A2), two (B1, B2), and three (C1, C2). (H&E stain, original magnification,  $\times 25$ ).

biopsy and a diagnosis of stage 2 sarcoidosis with pleural involvement.

This patient was given methylprednisolone 32 mg daily, which tapered to 4 mg daily with clinical improvement. At 3 months, the effusion had resolved. Her follow up CT imaging at 6 months confirmed this with associated parietal pleural thickening and persistent mediastinal lymphadenectasis seen.

### Case Three

A 51-year-old female was hospitalized with recurrent cough and dyspnea. CT showed multiple nodules in bilateral

upper lung, bilateral hilar lymphadenopathy, and bilateral pleural effusions of moderate volume. Mediastinoscopic biopsies of the right upper paratracheal nodes showed noncaseating granulomata. Medical thoracoscopy was performed, during which we found multiple white nodules on the parietal, visceral, and diaphragmatic pleura with hyperemia and inflammatory change. Biopsies of the pleural nodules showed epithelioid noncaseating granulomas. This patient was diagnosed as stage 2 sarcoidosis, with pleural involvement.

Prednisone therapy with 30 mg daily was employed and gradually tapered with clinical improvement. A CT at 3 weeks showed her pleural effusions had decreased and the

**Table 1.** The pleural fluid characteristics of three cases.

Laboratory test	Case one	Case two	Case three
Nature	Exudative	Exudative	Exudative
Appearance	Sanguineous	Yellow	Yellow
pH	7.396	7.421	7.457
Glucose (mmol/L)	5.43	5.05	7.21
Protein (g/L)	59.9 (74.6% of serum value)	28.5 (47.9% of serum value)	48.4 (75.7% of serum value)
LDH (U/L)	143 (79.0% of serum value)	81 (68.1% of serum value)	129 (64.5% of serum value)
ADA (U/L)	37	14	17
Cytology	Lymphocytes	Lymphocytes	Lymphocytes
Cell count ( $\mu$ L)	15,250	9300	10,600
Mycobacterial smear and culture	Negative	Negative	Negative

ADA, adenosine deaminase, normal range in pleural effusion: 21–45 U/L; LDH, lactate dehydrogenase.

bilateral hilar lymphadenopathy partially regressed; at 6 months appearances were normal.

## Discussion

Clinical investigators recognize four major forms of sarcoidosis pleural involvement: pleural effusion, pleural thickening, pleural micro-nodules, and pneumothorax. Among them, pleural effusion has long been thought rare. The incidence of pleural thickening with sarcoidosis is 11–71% as detected by CT, as reported in some studies [1], while the incidence of sarcoid-related pleural effusion ranges from 2.8 to 3% [2, 3]. We concluded that the pleural disease evident in our cases was caused by sarcoidosis, not tuberculosis, despite the high prevalence of the latter in China. The exact diagnosis of sarcoidosis pleural involvement and the differential diagnosis with other causes of granulomatous pleuritis depend on the pathologic findings in pleural biopsies. However, it is difficult for clinicians to obtain the accurate pathologic evidence by thoracentesis or closed pleural biopsy.

Medical thoracoscopy allows pulmonologists to directly access and assess the pleural cavity with minimal invasiveness. However, there are little reported thoroscopic data on sarcoidosis-related pleural disease. In our study, sarcoidosis-related pleural lesions were identified and confirmed pathologically with the aid of thoracoscopy. During thoracoscopy, we found that pleural involvement was variable with multiple nodules present in some cases and subtle change in others (e.g. case two). These observations are consistent with previous reports [4]. Pleural biopsies from

our patients confirmed sarcoidosis pleural involvement with noncaseating granulomas seen. Cultures for AFBs were negative. Pleural adhesions were rarely seen, an observation contrary, in our experience, to thoracoscopic appearances in tuberculous pleurisy and malignant pleural effusion. In sarcoidosis, medical thoracoscopy can provide clinicians with important clues to assist differentiation of the cause for pleural effusion in this condition.

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## Disclosure Statements

No conflict of interest declared.

Appropriate written informed consent was obtained for publication of this case report and accompanying images.

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