Acute, Transient Middle Lobe Disease

EUGENE ROSENMAN, M.D., F.C.C.P.
Los Angeles, California

The special significance of atelectasis of the middle lobe was first pointed out in 1946 by Zdansky\(^1\) and Brock,\(^2\) independently. Zdansky described two cases of middle lobe atelectasis in adults caused by compression of the middle lobe bronchus by a calcified lymph node. He noted that in children enlargement of a lymph node often causes compression of a major bronchus leading to atelectasis of the entire lobe without any predilection for any one bronchus and lobe. In adults, on the other hand, atelectasis of an entire lobe will occur more frequently in the middle lobe. In the other lobes, only the smaller bronchi will be compressed leading to segmental atelectasis. This can be explained by the fact that in children all the major bronchi are narrow and easily compressible, while of the major bronchi in adults only the middle lobe bronchus is narrow and is rendered even more easily compressible by virtue of the acute angle it forms with the main bronchus. He, therefore, called the right middle lobe “locus minoris resisteniae der Lunge.” Zdansky also noted that besides cases of permanent atelectasis of the middle lobe one not uncommonly encounters a patient presenting an acute febrile illness in whom a chest film will reveal atelectasis of the middle lobe, which however, will reexpand after a few days with subsidence of symptoms. Not uncommonly one may find an enlarged lymph node near the origin of the bronchus. It is of interest to note here that Shaw,\(^3\) in his excellent presentation of a “new clinical entity” caused by mucoid impaction of bronchi, reported 10 cases of segmental atelectasis, bronchiec-tasis and fibroid pneumonitis caused by plugs of mucus obstructing a bronchus of a second order in patients with asthma or chronic obstructive bronchitis. In one of these cases the middle lobe was involved. Brewer in his discussion of this paper reported a similar case.

Brock in “The Anatomy of the Bronchial Tree” also takes note of the frequency of the middle lobe collapse. He points out that the middle lobe bronchus is particularly vulnerable to the effects of glandular enlargement because it lies in the lymphatic pathway from the right lower lobe and is closely surrounded by glands which drain the lower and middle lobes. He mentions, however, that left upper and lower lobe bronchi are also liable to be compressed by the many glands which surround them at their origin.

The first one to coin the term “Middle Lobe Syndrome” was E. Graham\(^4\) who in 1947 reported 12 cases of nontuberculous adults having compression of the middle lobe bronchus by enlarged lymph nodes. All were characterized clinically by hemoptysis and recurrent episodes of pulmonary infection. Atelectasis, fibrosis and bronchiec-tasis were the pathologic findings. The enlarged compressing lymph nodes showed changes of a chronic non-specific lymphadenitis. He stressed the necessity of investigating all the lobes in each patient.
Paulson and Shaw reported 32 adult patients, of whom lobectomy was performed. The pathological findings in the lung were the same as described by Graham. However, they found enlarged lymph nodes in only 15 of these cases. They postulate the possibility that the enlarged nodes may be secondary to the inflammation within the lobe. They noted that many of their patients gave a history of previous pneumonia. Duration of symptoms varied from five months to 20 years.

While in Graham's 12 cases and Paulson's 32 patients the disease was non-tuberculous, tuberculosis was considered as the underlying cause of the pathology in the 16 cases reported by Rubin and in the eight patients of Cohen, all of whom were adults. These workers based their diagnosis on the presence of calcified lymph nodes.

In all these reports as well as in the reports of Doig, Brock, Harper and Fretheim the cases were chronic. In this article the writer reports four cases of acute transient atelectasis of the middle lobe with or without acute pneumonitis all of which cleared up completely within one to four weeks.

Report of Cases

Case 1: H. M., a 52 year old male has had a chronic cough for many years with periodic exacerbations during which time sputum would become "thicker and hard to raise." When seen during one such episode in July 1944 (at the age of 44), the physical examination of his chest showed no abnormal findings. The breath sounds were normal. There was no wheezing and no rales were heard. The temperature was normal. Fluoroscopy of the chest and a posteroanterior film were negative. My diagnosis was chronic bronchitis and possible bronchiectasis. Further work-up was refused. The next time he was seen on May 5, 1952, he stated he got along fairly well with his usual symptoms of cough and occasional exacerbations. Lately he noticed increased expectoration but no other symptom. The physical examination was the same as eight years previously, viz. negative. Fluoroscopy in the posteroanterior view was essentially negative, except for suspicious shadowing near the right heart border. View in the lordotic position disclosed the characteristic triangular shadow of atelectasis of the middle lobe. Chest films (Fig. 5a and b) corroborated this. He was scheduled for bronchoscopy, but he delayed for one week. He returned May 12, 1952 and at that time fluoroscopy was negative in any positioning. Posteroanterior film taken June 16, 1952 (Fig. 5c) was negative. Cough and expectoration diminished gradually to the usual amount with fairly good general health.

Case 2: G. D., a 37 year old male was seen February 20, 1953 because of chills and fever five days previously followed by dry cough. On physical examination a few postural rales were heard in the right midaxilla. The temperature was normal. Fluoroscopy, posteroanterior and lateral films (Fig. 2a) revealed atelectasis of the middle lobe. He was put on antibiotic treatment. On his return 12 days later there were no rales in his chest and fluoroscopy showed considerable clearing of the shadow in the middle lobe. By March 14, 1953 the atelectasis disappeared completely as shown on the posteroanterior and lateral films (see Fig. 2b). He is well and working since then.

Case 3: T. H., a 38 year old female who was hospitalized November 27, 1951 because of fever of 103°F. of one week duration, and non-productive cough. Posteroanterior and lateral films on admission (Fig. 3a) showed evidence of atelectasis of the right middle lobe and pneumonitis in the middle lobe and possibly in the adjacent portion of the upper lobe. The following day the cough became productive and the temperature dropped to normal. Posteroanterior and lateral films taken four days later showed considerable clearing of the pneumonitis. Bronchoscopy was done December 10, 1951. The right middle lobe bronchus was found to be blocked by a plug of mucus. This was removed by suction. On December 20, 1951, a posteroanterior film (Fig. 3b) was negative except for a small area of infiltration in the right mediobase. She was discharged as improved. She failed to return for a re-check examination until March 5, 1952. A film taken on that day was entirely negative.

Case 4: M. P., a 47 year old male was first seen on March 3, 1953. He complained of severe productive cough of one month duration, fatigue and loss of 12 pounds of weight and sticking pains in his right chest. Posteroanterior and lateral films (Fig.
Figure 1. Case 1. (a) Posteroanterior film May 5, 1962 shows infiltration near the right cardiac border, which on the lateral film (b), proved to be afebrility of the middle lobe. (c) Posteroanterior film June 16, 1962 shows complete clearing of the infiltration.
4a) showed middle lobe atelectasis and pneumonitis. He was referred to a chest surgical clinic for further study. By the time he was given his first appointment in that clinic seven days later, March 10, 1953, a chest film disclosed considerable clearing of the consolidation and infiltration. By March 28, 1953 the chest film (Fig. 4b) was entirely negative. He became symptom-free and was discharged from the clinic.

Discussion

Bronchial occlusion leading to atelectasis of the corresponding lobe or segment may occur either by pressure from without, (e.g. by an enlarged lymph node or tumor), or by narrowing and obstruction from within, (e.g. by edema or fibrous stenosis of the wall or by a plug of mucus occluding the lumen).

A peculiar positioning of a bronchus may make it especially vulnerable to any of these causes of occlusion. Such is the case with the right middle lobe bronchus. It arises from the main stem bronchus at an acute angle and runs in close approximation with the anterior surface of the right lower lobe bronchus for a distance of about 0.75 cm. before curving away from it in an anterior direction. This makes it more vulnerable to compression by the surrounding lymph nodes or to occlusion by a narrowing process within it. Moreover, this positioning may hinder adequate drainage from the inflamed lobe, leading to greater frequency of recurrence and chronicity of pneumonitis in this lobe. This greater frequency of occlusion of the right middle lobe bronchus as compared with the other major bronchi does not occur in children, because in a child all the major bronchi are of a narrow caliber and are easily compressible. Hence, lobular atelectasis in children occurs without any predilection for any one lobe. Such a situation exists also in adults in the case of the smaller secondary or tertiary bronchi; hence, segmental atelectasis in adults occurs with equal frequency in any lobe. It is only in the case of the major bronchi in the adult that a greater frequency of occlusion of the middle lobe bronchus occurs as compared with the other major bronchi. This greater frequency of involvement of the middle lobe justifies the term middle lobe syndrome, even though it may be of varying etiology and pathogenesis. Indeed, if the cases caused by active tuberculous lymphadenitis or bronchitis were to be excluded, one could consider this a disease entity of relatively frequent occurrence.

The name middle lobe syndrome is suggested as an all inclusive term for all cases of middle lobe atelectasis regardless of etiology, and the name middle lobe disease for all cases of atelectasis and pneumonitis which are not caused by active tuberculosis or by neoplasm. While conceivably some cases might have been caused originally by tuberculous lymphadenitis in childhood, the resultant pneumonitis later in life is non-specific and not distinguishable from pneumonitis caused by non-tuberculous lymph nodes or by mucus plugs and poor drainage. Middle lobe disease can thus be defined as characterized by atelectasis and pneumonitis of the middle lobe which may be either transient or chronic with or without accompanying bronchiectasis and caused by poor drainage from the middle lobe due to the peculiar positioning of the middle lobe bronchus.

In every case presenting a history of persistent or recurrent respiratory
Figure 2 Case 2: (a) Film taken February 20, 1953 shows atelectasis and pneumonitis of the right middle lobe.—(b) March 14, 1953 complete resolution of the pneumonitis and disappearance of the atelectasis.

Figure 3 Case 3: (a) Film November 27, 1951 shows pneumonic infiltration in the entire right midlung field.—(b) Film December 20, 1951 shows only slight infiltration remaining in the right mediobase. (A film taken on March 5, 1952, not shown here, was entirely clear.)

Figure 4 Case 4: (a) Film taken March 3, 1953 shows atelectasis and pneumonitis of the middle lobe.—(b) Film March 26, 1953, negative.
infection one should, among other diagnoses, entertain the possibility of middle lobe disease. On fluoroscopy of such a patient one should not depend on posteroanterior viewing alone. Quite often the shrunken middle lobe, lying in close proximity with the right heart border, may not be seen in that view—even a posteroanterior roentgenogram may fail to demonstrate it. It is, therefore, imperative also to fluoroscope in the lordotic position and take films in the lateral position.

Middle lobe disease should be differentiated from atelectasis caused by active tuberculous lymphadenitis or bronchitis and from that caused by bronchogenic carcinoma. The latter should be considered first in every case of atelectasis occurring in a middle-aged or elderly individual. However, in middle lobe atelectasis carcinoma is a less likely finding. Brock found that out of 1200 cases of bronchogenic carcinoma, only eight were in the middle lobe. Perhaps this is only a relative infrequency, due to the fact that atelectasis from various other causes is so much more frequent in the middle lobe.

Once the diagnosis of middle lobe disease has been established, one should make a thorough search for involvement in any of the other lobes. Bronchography should be done whenever feasible to rule out bronchiectasis in any other lobe, especially in cases of chronic pneumonitis considered for surgery. Bronchoscopy should be done in every case.

**SUMMARY**

1. Four cases of acute transient middle lobe disease have been presented.
2. The name middle lobe syndrome is suggested as an all inclusive term for all cases of middle lobe atelectasis regardless of etiology, and the name middle lobe disease for all those cases of atelectasis and pneumonitis which are not caused by active tuberculosis or by neoplasm.
3. Attention is being called to the fact that a considerable number of cases of middle lobe atelectasis may be of an acute and reversible nature. Due to the peculiar positioning of the middle lobe bronchus, drainage from an infected middle lobe is poor and mucus plug formation is frequent. As soon as the plug is expectorated or as soon as free drainage is reestablished, the lobe reexpands and a more favorable condition for the clearing of the pneumonitis is created. It is possible that chronic pneumonitis with or without atelectasis of the middle lobe (the latter may be obscured by the enlarged volume of the consolidated lobe) occurs as a result of failure of reestablishing free drainage. Bronchoscopy may be a therapeutic measure in some of these cases, in addition to being a diagnostic procedure.
4. Emphasis is placed on the importance of fluoroscopy in the lordotic position, since posteroanterior viewing may fail to demonstrate the shrunken middle lobe. A lateral film is of importance to establish the definite site of pneumonitis and atelectasis.

**RESUMEN**

1. Se han presentado cuatro casos de enfermedad aguda, transitoria del lóbulo medio.
2. Se sugiere el nombre de síndrome del lóbulo medio comotérmino que
incluye todos los casos de atelectasia del lóbulo medio sin tener en cuenta su etiología; y el nombre de enfermedad del lóbulo medio para todos los casos de atelectasia y de neumonitis que no son causados por tuberculosis o neoplasia.

3. Se llama la atención sobre el hecho de que un número considerable de casos de atelectasia del lóbulo medio pueden ser agudos y reversibles. Debido a la peculiar posición del bronquio del lóbulo medio la canalización de ese lóbulo es deficiente y de ahí el tapónamiento con masas mucosas. Tan pronto como el tapón es expectorado ocasionando la canalización se reexpande, se reexpande el lóbulo se crean condiciones favorables para la limpieza y curación de la neumonitis. Es posible que la neumonitis crónica con o sin atelectasia del lóbulo medio (siendo este susceptible de ser enmascarado por una área de consolidación más extensa) ocurra como resultado de la falta de restablecimiento de la canalización.

La broncoscopia puede ser un procedimiento terapéutico en algunos de estos casos, además de ser un método de diagnóstico.

4. Se hace énfasis sobre la importancia de la fluoroscopía en la posición de lordosis puesto que el aspecto anteroposterior, pue de dejar de mostrar el lóbulo medio retraído.

Una película lateral es de importancia para establecer con precisión la ubicación de la neumonitis y de la atelectasia.

RESUME

1. L'auteur rapporte quatre observations d'atteintes du lobe moyen réalisant une évolution aigue et passagère.

2. Il envisage d'utiliser le terme de “syndrome du lobe moyen” pour toutes les formes comportant une atélectasie de ce lobe, sans tenir compte de son étiologie. Il demande qu' ceilings sous le nom de “maladies du lobe moyen” les atteintes atélectasiques ou pneumoniques, dont l'origine n'est ni la tuberculose évolutive, ni une néoplasie.

3. Il attire l'attention sur le fait qu'un nombre important d'atélectasies du lobe moyen peuvent être dues à un processus aigu et réversible. Étant donné la situation de la bronche lobe moyenne, el drainage en cas d'infectio du lobe moyen se fait mal; et il y a fréquemment constitution d'un bouchon de mucus. Des que ce bouchon est expectoré, ou des que le drainage est de nouveau établi, le lobe reprend son expansion et l'ombre pneumonique se trouve dans des conditions qui lui permettent de s'éclaircir. Il est possible que l'absence de rétablissement d'un drainage normal soit la cause de la pneumonie chronique. Celle-ci pouvant ou non s'accompagner d'atélectasie du lobe moyen (ce lobe peut être masqué par l'expansion du reste du poumon) Outre sa valeur diagnostique, la bronchoscoiie peut avoir un intérêt thérapeutique dans certains de ces cas.

4. L'auteur insiste sur l'importance de la radioscopie en position lordo-
tique, la position antéro-postérieure ne pouvant dans certains cas mettre en évidence l'atélectasie du lobe moyen. Un cliché de profil est de la plus grande importance para montrer le siège véritable de la pneumonie ou de l'atélectasie.
REFERENCES