Transient Paradoxic Motion of Diaphragm with Pneumonia

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A MISDIAGNOSIS OF BRONCHOGENIC CARCINOMA with mediastinal extension can be made very readily in patients with paradoxical motion of a hemidiaphragm associated with pneumonitis. This report consists of a review of three patients\(^1\)\(^2\)\(^3\) with transient paralysis of a hemidiaphragm associated with pneumonitis on the same side, two patients\(^4\)\(^5\) with an improving paralysis of one hemidiaphragm soon after their infections, and one patient\(^6\) with a permanent paralysis which cleared partially with resolution of her pneumonitis. All of these patients were referred with a presumptive diagnosis of bronchogenic carcinoma with probable mediastinal extension.

CASE 1

F. M., 64-year-old carpenter, seen on June 6, 1950 with a history of swelling of his face, pain and partial paralysis in his arms, chest and shoulders, dyspnea, weakness and a chronic productive cough since a severe reaction to tetanus antitoxin a year before. A chest x-ray film showed marked elevation of the right diaphragm with paradoxical motion on fluoroscopy, and infiltration above the diaphragm. Bronchoscopy on June 21, 1950 failed to show any tumor or bronchial obstruction other than by mucous plugs. Following bronchoscopic aspiration and continuous antibiotics, all of his symptoms gradually improved over a period of a year. His right diaphragm began to move normally, as did his arms beginning about two years after the administration of the tetanus antitoxin. The exact time of return of function in his arms and shoulders was obscured by disability compensation and the development of some arthritic changes in his shoulders from prolonged disuse. His lungs have remained clear during the past 12 years.

CASE 2

P. H. This 58-year-old woman was seen on April 1, 1958 with a history of dyspnea on exertion during the past few months which prevented her from working. A chest x-ray film showed marked elevation of the left hemidiaphragm with an infiltration in the left lower lung, and an enlarged left hilar shadow. Paradoxic motion was noted on fluoroscopy. Bronchoscopy on April 2, 1958 showed no cancer on either direct or microscopic pathologic examination. Following the bronchoscopic aspiration and antibiotics, the pneumonitis and hilar adenopathy disappeared, associated with a marked improvement in her dyspnea. Repeated examinations during the past five years have shown a slight elevation of the left hemidiaphragm persisting with some paradoxical motion, but much less than in 1958.

CASE 3

S. O., a 65-year-old woman seen on May 25, 1959, with a four-month history of dyspnea, weight loss and tightness in her chest following a cold. A chest x-ray film showed marked elevation of the right hemidiaphragm with some overlying plate-like atelectasis, and paradoxical motion of the diaphragm on fluoroscopy. A bronchoscopy on May 26, 1959 showed no tumor or obstruction. Considerable improvement in symptoms occurred following the bronchoscopic aspiration and antibiotics, although two years were required for the right hemidiaphragm to resume its normal position and normal motion.

CASE 4

L. C., 53-year-old man with a five-day history of pain in the right chest and shoulder, associated with fever. The patient showed elevation and paradoxical motion of the right hemidiaphragm, with some infiltration in the right lower lung. Bronchogram on December 24, 1962 showed no evidence of tumor or bronchial obstruction or irregularity. Laminograms revealed no mediastinal lesion. Subsequent studies showed a resolution of the pneumonitis without evidence of the development of any cancer, and a beginning return of normal motion to the right hemidiaphragm. It is anticipated that a full range of diaphragmatic motion will recur, but insufficient time had elapsed to observe this return when last checked four months following his pneumonia.

CASE 5

H. K. This 69-year-old man gave a history of chronic cough for the past three months with dyspnea, orthopnea and fever. Elevation and paradoxical motion of the right hemidiaphragm was noted with some overlying increase in the bronchial markings and right hilar shadow. Bronchoscopy on March 14, 1963 showed no cancer on direct observation or pathologic examination of the bronchial washings. Subsequent examinations have revealed complete clearing of the right lung with no evidence of the development of
cancer. Normal motion of the right hemidiaphragm is returning slowly, but still was incomplete when checked two months following bronchoscopy.

CASE 6

H. V., 62-year-old railroad conductor with a history of a chest cold with cough, pain in the right chest and loss of 30 pounds during the past month. Bronchoscopy performed on April 2, 1963 showed only mucus plugs in the right lower lobe bronchi. Following bronchoscopy, the paradoxical motion of his right hemidiaphragm and the overlying pneumonitis cleared, associated with a rapid gain in weight.

The first report of a transient paralysis of the diaphragm associated with pneumonia which I have encountered was by Humphrey and Sherwood in 1929. They report syphilis and thoracic aortic aneurysms, as well as tuberculosis and lung cancer, as the principle causes for permanent diaphragmatic paralysis at that time. Freedman, in 1950, suggested that his was the first group of transient paralysis when he reported six patients with temporary paralysis of a hemidiaphragm associated with pneumonia. Couch, in 1953, reported five more similar patients with four temporary paralyses, and one in whom part of the function was recovered. Gagliardi, Feigelson and Shufro reported an additional patient in 1959. Eventration of the diaphragm should not be compared with these transient paralyses since eventration refers to a partial or complete longterm paralysis with marked elevation and thinning of the diaphragm.

Bronchogenic carcinoma is undoubtedly the most common cause for diaphragmatic paralysis. In addition to the transient toxic or direct irritative effect of the adjacent infection on the phrenic nerve, one patient in this group illustrated a new and previously unreported cause for the paralysis. Case 1 developed the paralysis of his right diaphragm apparently at the same time as his neuritis elsewhere in his arms and shoulders following his reaction to tetanus antitoxin. The phrenic nerve paralysis persisted for about two years with a gradual recovery a few months later than the nerves to his arm muscles, although exact dates of recovery of his skeletal muscles were difficult to determine due to the element of disability compensation.

Other unusual causes for diaphragmatic paralysis which have been reported are: poliomyelitis, herpes zoster, and cystic disease of an azygos lobe.

The review of these six patients with paralysis of the diaphragm associated with pneumonitis indicates the necessity for being cautious in assuming the presence of malignancy as the cause for phrenic nerve paralysis. Every patient with an elevated hemidiaphragm should have a fluoroscopic examination with a sniff test to determine the possibility of phrenic nerve paralysis. Every patient with phrenic nerve paralysis should be investigated for the possibility of malignancy, particularly in the presence of associated pneumonitis. One must be careful, however, to avoid placing undue pressure on the pathologist examining the bronchoscopic washings to make a positive diagnosis, or even to suggest a positive clinical diagnosis without visible cancer. In his anxiety to please, the pathologist may be induced to place undue emphasis on squamous metaplasia to create a falsely positive report on the sputum or bronchial washings.

Conclusions

1. Six patients are reported with pneumonitis and paralysis of a hemidiaphragm without evidence of malignancy, although they were referred for bronchoscopy with that presumptive diagnosis.

2. Three of these patients have recovered completely from their diaphragmatic paralysis, two apparently are recovering during their short observation interval of less than six months, and the other one now has only a partial paralysis.

3. Tetanus antitoxin is reported for the first time as a cause for diaphragmatic paralysis.

4. Diaphragmatic paralysis does not necessarily infer the presence of malignancy.

5. An interval of up to two years may be required for return of normal diaphragmatic motion.
Resumen

1. Se describen seis enfermos de neumonitis con parálisis del hemidiaphragma sin evidencias de malignidad aunque fueron enviados para broncoscopia con ese diagnóstico de presunción.

2. Tres de esos enfermos se recuperaron completamente de la parálisis diafragmática, dos aparentemente se están recuperando durante su corto tiempo de observación de menos de seis meses y el otro tiene ahora sólo una parálisis parcial.

3. Por primera vez se señala la toxina antitética como la causa de la parálisis parcial.

4. La parálisis diafragmática no debe hacer inferir forzosamente la presencia de neoplasma maligno. Se pueden requerir hasta dos años para la vuelta a lo normal de la movilidad del diafragma.

Resumé

1. L'auteur rapporte le cas de six malades atteints de pneumopathie et de paralysie d'un hémiaphragme sans preuve de néoplasie, bien qu'ils aient été soumis à la bronchoscopie avec ce diagnostic de présomption.

2. Trois de ces malades guériront complètement de leur paralysie diafragmatique, deux guériront apparemment pendant le temps court de leur observation (moins de six mois) et l'autre n'a plus maintenant qu'une paralysie partielle.

3. L'auteur rapporte pour la première fois l'antitoxine tétanique comme cause de la paralysie diafragmatique.

4. La paralysie diafragmatique ne veut pas nécessairement dire la présence de néoplasie. Un laps de temps pouvant atteindre deux ans peut être nécessaire pour le retour à la motilité diafragmatique normale.

Zusammenfassung

1. Bericht über 6 Patienten mit Pneumonie und Lähmung einer Zwerchfellhälfte ohne Nachweis eines bösartigen Geschehens, obgleich sie einer Bronchoskopie unter dieser mutmaßlichen Diagnose unterzogen worden war.

2. Drei dieser Patienten haben sich völlig von ihrer Zwerchfellähmung erholt, 2 sind auf dem Wege der Erholung, während ihrer kurzen Beobachtungsintervalls von weniger als 6 Monaten, und ein einziger hat jetzt eine partielle Paralysie.

3. Es wird zum ersten Mal berichtet, daß Tetanus Antitoxin eine Ursache für Zwerchfellähmungen ist.


Referencias


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HERPES ZOSTER AND PHRENIC NERVE PARALYSIS

Paralysis of the phrenic nerve is not uncommon. It may result from abnormalities or injuries of the cervical part of the spine, from compression of the nerve by tumor masses in the neck or mediastinum, or due to pressure from an aortic aneurysm, and from the neuropathy of lead poisoning. A patient is reported in whom there was no radiologic evidence of abnormality in the cervical part of the spine or of abnormal masses in the mediastinum. There were no clinical abnormalities in the neck and no features in the history or full blood examination to suggest lead poisoning. The occurrence of partial recovery is strongly against compression by a tumor. The foregoing causes being excluded, and in view of the temporal relations of the rash and the onset of diafragmatic paralysis and the localization of the eruption to the third, fourth and fifth cervical dermatomes, there seems no doubt of the diagnosis of phrenic nerve paralysis due to involvement of its segmental nucleus by zoster myelitis. Special reference is made to the less frequently reported cases of spinal segmental paralysis. The third recorded case of phrenic nerve paralysis due to herpes zoster is described.