Two cases of asymptomatic Bochdalek hernia in adults with identical roentgenographic findings are reported. Computed tomography (CT) in each case revealed a round mass with a low attenuation coefficient identical to that of adipose tissue, abutting the thoracic surface of the diaphragm and connecting with the subdiaphragmatic density through a diaphragmatic defect. A case of diaphragmatic lipoma was also presented for demonstration of the CT differentiation between lipoma and hernia of the diaphragm. The CT findings for a Bochdalek hernia are characteristic enough for making a definite diagnosis and render other diagnostic modalities unnecessary.

Posterior diaphragmatic hernia through the foramen of Bochdalek usually becomes evident in the neonatal period because of its large size. Such a large Bochdalek hernia occurs in one of every 2,500 live births and is nine times as common on the left as on the right. A recent study by Gale, however, reveals that small, asymptomatic Bochdalek hernia is, in fact, quite common among adults. Most such small Bochdalek

Figure 1. Posteroanterior (left) and lateral (right) views of chest roentgenograms in case 1 reveal a dome-shaped mass abutting the superior surface of diaphragm in the left posterior thorax (arrowhead).
hernias are asymptomatic and cannot be visualized on conventional roentgenograms, and thus, may never be discovered. Since the advent of computed tomography (CT), the small Bochdalek hernia has been detected with much greater frequency. A definite diagnosis can be made by CT alone because of its characteristic features. Demonstrated here are two cases of such asymptomatic Bochdalek hernias in adults first detected by conventional chest roentgenography as supradiaphragmatic mass lesions and later confirmed by CT. Their CT characteristics are described. Since the great majority of adult Bochdalek hernias contain fat, their differentiation from diaphragmatic lipoma is stressed and demonstrated.

CASE REPORTS

CASE 1

A 76-year-old woman with a history of hypertension for many years was admitted two years ago for evaluation of chest pain. Cardiac catheterization at that time revealed only mild coronary atherosclerosis. Two weeks prior to the present admission she developed symptoms of upper respiratory tract infection. A chest roentgenogram showed a dome-shaped nodule in the left lower thorax abutting the upper surface of the diaphragm (Fig 1). Other than occasional dry cough, the patient denied any recent history of fever, weight loss, hemoptysis, dyspnea, and pleuritic chest pain. She was admitted for evaluation of the chest mass lesion.

Findings on physical examination and laboratory data on admission were all within the normal limits except for a blood pressure of 170/90 mm Hg. The differential diagnoses of the lung lesion included tumor of the lung or pleura, diaphragmatic lipoma, neurogenic tumor, intrathoracic kidney, pulmonary sequestration, and Bochdalek hernia. CT of the lower thorax and upper abdomen was then performed. A round mass with rather low homogeneous density was found in the left lower thorax (Fig 2, upper). The mass had a CT attenuation number of −130 Hounsfield units, compatible with that of adipose tissue. On contiguous scans, the mass was found to extend through the diaphragm into the abdominal cavity in paravertebral location (Fig 2, lower).

CASE 2

A 47-year-old man developed chronic renal failure secondary to

FIGURE 2. The CT in case 1 shows a round mass with CT number of −130 HU in the left lower thorax (upper), extending to the abdominal cavity through an area of interruption of diaphragmatic musculature (lower).

FIGURE 3. Posteroanterior (left) and lateral (right) views of chest roentgenograms in case 2 reveal a fairly large-sized, dome-shaped mass (arrows) in the left posterior thorax above the diaphragm.
polycystic kidney disease. He was incidentally found to have a fairly large sized, dome-shaped, supradiaphragmatic mass in the left lower thorax on chest roentgenogram (Fig 3). The CT showed a large paravertebral round mass with a homogeneous low density of −120 Hounsfield units (Fig 4, upper). The mass extended through the diaphragm into the retroperitoneum (Fig 4 lower). Discontinuity of the soft tissue line of the diaphragm adjacent to the mass with a characteristic V-shaped line at the point of discontinuity is clearly shown in Figure 4, lower.

CASE 3

A 63-year-old man was admitted for coronary artery bypass grafting for severe ischemic heart disease. A chest roentgenogram revealed, in addition to cardiomegaly, a large dome-shaped mass with smooth surface abutting the upper surface of the diaphragm in the right posterior thorax (Fig 5). The CT showed a round mass with smooth outline and a homogeneous low density of −130 Hounsfield units indicating fatty content of the mass (Fig 6, upper). On contiguous scans the soft tissue line of the diaphragmatic musculature adjacent to the mass remained intact and no V-shaped line was observed (Fig 6, lower). The lesion was therefore a lipoma rather than a Bochdalek hernia of the diaphragm. The tumor was not removed because of its benign nature. The patient recovered from coronary artery bypass grafting uneventfully.

DISCUSSION

It has been generally believed that diaphragmatic hernia through the foramen of Bochdalek is much more commonly encountered in newborn infants than in adults. Small asymptomatic Bochdalek hernias are, however, by no means uncommon in adults. By reviewing the thoracic and abdominal CT of 940 patients, Gale3 has detected 60 Bochdalek hernias in 52 patients, an overall prevalence of 6 percent which is more than 100 times more frequent than previously reported. The discrepancy is primarily due to the

FIGURE 4. The CT in case 2 shows a round mass with a homogeneous low density of −120 HU in the left posterior thorax (upper), extending to the abdominal cavity with interruption of the soft tissue line of diaphragmatic musculature (lower). Note V-shaped line at the point of discontinuity of the diaphragm (lower) (arrowhead).

FIGURE 5. Posteroanterior (left) and lateral (right) views of chest roentgenograms in case 3 reveal a dome-shaped mass in the right posterior thorax above the diaphragm (arrow) in addition to cardiomegaly.

Bochdalek Hernia in the Adult (Shin et al)
FIGURE 6. The CT in case 3 shows a mass with a homogeneous low density of −130 HU with smooth outline in the right posterior thorax (upper). The soft tissue line of the diaphragm was not interrupted (lower).

ability of CT to detect small asymptomatic Bochdalek hernias, the great majority of them could be missed on conventional radiography. The two cases presented here are somewhat exceptional because of their large size; yet, they are relatively small when compared with the usual Bochdalek hernia found in newborn infants. Unlike the large, symptomatic Bochdalek hernias which are about nine times more common on the left hemidiaphragm than on the right, small, asymptomatic Bochdalek hernia is only twice as common on the left as on the right.1,3

Cases 1 and 2 are typical examples of the asymptomatic Bochdalek hernia of adulthood. The diagnoses were made based on the following characteristic CT findings (Fig 2 and 4): (a) a round mass with a low attenuation coefficient (−130 to −120 HU) identical to that of adipose tissue abutting the thoracic surface of the diaphragm; (b) location of the mass in the posteromedial aspect of the hemidiaphragm; (c) discontinuity of the soft tissue line of the diaphragmatic musculature adjacent to the mass with a V-shaped diaphragmatic musculature at the point of discontinuity which is quite characteristic for a Bochdalek hernia; and (d) continuity of the subdiaphragmatic and supradiaphragmatic densities through the diaphragmatic defect. Since a definite diagnosis of Bochdalek hernia could be made by CT, no other invasive investigative measure is carried out.

Since almost all these small Bochdalek hernias are composed of fat, they should be differentiated from lipoma of the diaphragm.4 Because the diaphragmatic muscle is interrupted in hernia but is intact in lipoma, the CT findings of discontinuity of the soft tissue line of the diaphragmatic musculature with V-shaped line at the point of discontinuity is characteristic for a hernia but not for a lipoma. A diagnosis of lipoma was made in case 3 for the integrity of the diaphragm demonstrated by CT (Fig 6, lower). The same rule can be applied for distinction between a hernia and an eventration of the diaphragm.3,4

Small, asymptomatic Bochdalek hernia does not require surgical intervention. Our patients were, therefore, discharged without further evaluation and treatment.

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