Invited Commentary

Epipericardial fat necrosis: a unique clinicoradiologic disease

In 1957, Jackson and colleagues (1) provided the first report on what they and subsequent authors called pericardial fat necrosis. In 2005, however, Pineda and associates (2) pointed out that the necrosis occurs in the mediastinal fat adjacent to the parietal pericardium and not between the two pericardial layers. Accordingly, they believed that the term "pericardial fat" is a misnomer and that it should be replaced by "epipericardial fat." In 2013, Bhatt and coauthors (3) proposed "mediastinal fat," because the lesion characteristically occurs in the mediastinum outside the pericardium. They also noted that mediastinal fat extends at times into the adjacent interlobar fissures, which explained the location of the necrosis in one of their two patients. In this commentary, I will use the term epipericardial fat necrosis (EPFN).

FREQUENCY

My painstaking search of the English-language medical literature yielded 57 cases of EPFN (1–18), including the case in this issue from Shah and associates (4). At first blush, this small number of reported cases supports the widely held concept that EPFN is infrequent to rare. In my view, however, it would be more appropriate to consider EPFN as infrequently or rarely recognized—and for good reason. Textbooks of internal medicine and cardiology do not acknowledge EPFN (5), and only one of three books devoted solely to the pericardium mentions it (19). Consequently, EPFN remains little known and poorly appreciated.

The first estimate of EPFN's frequency is now available (6). Investigators in Brazil retrospectively reviewed 7263 computed tomographic (CT) examinations of the chest performed in the emergency department of a private hospital during a 42-month span. Of all the scans reviewed, 926 had been performed to evaluate acute chest pain. From that group, the investigators found 20 patients with EPFN—a frequency of 2.15%, or approximately one diagnosis every 2 months. They also concluded that EPFN is frequently overlooked by emergency room physicians and radiologists.

CLINICAL FEATURES

Classically, EPFN strikes suddenly and without warning. The victims—39 men, 17 women, and 1 patient whose sex was not reported (9)—ranged in age from 23 to 80 years. All were in good health when attacked by EPFN.

Excruciating chest pain, characteristically pleuritic and usually left-sided, is the initial manifestation. The pain is located anteriorly near the diaphragm and radiates at times to the neck, shoulder, upper arm, axilla, or back. It ordinarily subsides within a week or so, but it can recur with less intensity for up to a year. Fever and cough are not features of EPFN (5).

Early in the condition, the patient is dyspneic, with tachypnea, tachycardia, and diaphoresis. Several patients have had a pericardial friction rub (5, 10); others have shown marked tenderness to palpation over or near the precordium (5). After a few days, the physical examination yields normal results.

RADIOLOGIC AND IMAGING RESULTS

Radiographs of the chest obtained during the first day or two of illness might show no abnormality. Thereafter, an ovoid mass invariably develops in or near the cardiophrenic angle on the side of the chest pain. The mass is located anteriorly and almost always is contiguous with the cardiac silhouette. In one case, however, it extended between the lingula and left lower lobe (11); in another, it overlay the left hemidiaphragm in the area of the interlobar fissure (1); and in another, it was distinctly separate from the heart (12). Finding such a mass on the chest radiograph always raised concern for a pericardial cyst or a pericardial or pulmonary neoplasm.

Detailed descriptions of the CT findings are presented elsewhere (3, 6). Suffice it to say, CT determines the exact location and nature of the mass. The lesion itself can be precordial, diaphragmatic, or adherent to the anterior chest wall. It typically appears as an ovoid, encapsulated, fat-containing mass with varying degrees of stranding in and around the mass. Pericardial thickening and a small ipsilateral pleural effusion are frequent. In contrast to EPFN, other mediastinal fat-containing lesions such as lipoma, liposarcoma, and lipothymoma do not develop rapidly, do not have a characteristic clinical course, and do not resolve with conservative care.

Magnetic resonance imaging has been used infrequently in these cases but confirms the CT findings (5, 8, 13).

DIAGNOSIS

Awareness of EPFN and knowledge of its natural history can speed its recognition and avert unnecessary or inappropriate diagnostic and therapeutic actions. During the first 24 to 48 hours, the patient's symptoms characteristically suggest myocardial infarction, pulmonary embolism, or acute pericarditis (6). Tests for these disorders are indicated but will give normal results. Even though the clinical picture improves, the imaging picture worsens as a new paracardiac lesion forms.

The lack of cross-sectional imaging before the 1970s necessitated surgical exploration to establish the correct diagnosis and to

exclude the suspicion of neoplasm, especially liposarcoma (10). The typical intraoperative finding was an inflammatory mass involving the parietal pericardial fat pad. The masses varied in size from 1.5 cm to $10 \times 7.5 \times 3$ cm. Their pathologic features bore close resemblance to those of infarcted epiploic appendices and to fat necrosis in the breast. Lesions removed early in the clinical course showed a central focus of necrotic fat cells encompassed by macrophages with intense neutrophilic infiltration. Later in the clinical course, the specimen showed considerable fibrosis. Resection of the diseased tissue effected a cure in every case, with follow-up periods of as long as 19 years (5).

In 2005, Pineda and associates made a tentative diagnosis of EPFN purely on the basis of the patient's clinicoradiologic picture (2). After 2 months of conservative care, and without tissue proof, the patient's paracardiac density disappeared from the chest radiograph and decreased markedly in size upon CT examination. Since then, only one reported patient with EPFN has needed surgical intervention for diagnosis (3). In all the other cases, the diagnosis has rested on the CT findings in conjunction with the typical clinical features. Follow-up chest radiographs and CT scans in these patients have uniformly shown substantial shrinkage or total resolution of the paracardiac mass, always within several months.

PATHOGENESIS

Despite almost 60 years of study, the cause of EPFN remains speculative. In two patients, the mass was attached to the heart by a pedicle, torsion of which might have triggered the necrosis (1, 14). Existing structural abnormalities of the involved adipose tissue, such as lipoma or hamartoma, might render the tissue vulnerable to the trauma of a beating heart and moving diaphragm (15, 16). Associated obesity—thought originally to be a probable prerequisite for the disease (1)—has been an inconsistent finding in subsequent cases. Extreme lifting efforts just before or during onset of the chest pain might raise intravascular pressure markedly, causing hemorrhage into and subsequent necrosis of the loosely supported pericardial adipose tissue (17, 18). Recent or concomitant infection, trauma, and acute pancreatitis have been absent in all cases.

TAKE-HOME MESSAGE

Epipericardial fat necrosis is the only disease known to cause sudden, excruciating, low anterior chest pain—typically pleuritic and without fever or cough—followed in a few days by a rapidly developing ovoid mass in or near the cardiophrenic angle. This sequence of events sets up the differential diagnosis: cardiopulmonary emergency early, neoplasm later.

Given the unique clinicoradiologic picture and benignity of EPFN, coupled with CT's ability to verify the fatty nature of the paracardiac mass, a clinical diagnosis will suffice in most cases, and symptomatic conservative care is the recommended practice. Only when serious diagnostic questions persist, or the patient has intractable pain, should operative intervention be considered.

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