

ENCAPSULATED FAT NECROSIS WITH LIPOMEMBRANOUS CHANGES

Agustin Chong-Lopez

Bahram Azadeh

***Mohammed Mohy El-Din Selim**

Departments of Pathology and *Dermatology
Hamad Medical Corporation

Abstract

Multiple well-circumscribed cystic fatty nodules were obtained by liposuction from the left arm of a 24-year-old obese female who had been admitted to the hospital with the clinical diagnosis of lipoma. Microscopically, the encapsulated adipose tissue nodules showed cystic spaces and fat necrosis with lipomembranous changes. Adipose tissue of the left arm resected by a complementary surgical procedure also revealed lipomembranous panniculitis with thrombosis of small vessels associated with phagocytic reactions. In the absence of systemic diseases such as diabetes, vasculitis, lupus erythematosus or morphea, we assume that fat necrosis with lipomembranous changes present in our patient are probably caused by trauma.

Introduction

Fat necrosis is common. It is caused by a variety of etiological conditions classified into traumatic, ischemic, enzymatic (e.g. due to pancreatitis), metabolic and infectious. In this article we report a unique form of panniculitis characterized by multiple well-circumscribed subcutaneous fatty nodules showing the distinctive microscopic changes of lipomembranous panniculitis. This entity, termed encapsulated fat necrosis, characteristically appears as solitary or multiple well-circumscribed subcutaneous nodules, and is associated with an antecedent history of trauma in about 30% of cases. 1

CASE REPORT

A 24-year-old obese (143 Kg weight) Qatari female was admitted to Hamad General Hospital in April 2000 because of a swelling of her left arm of 10 months duration slowly increasing in size. The mass was soft, deep, ill defined and fixed, but without any pain or tenderness. Clinically, it was considered to be a very large subcutaneous lipoma. Chest X-ray was normal. Laboratory investigations were within normal limits except for a mild degree of leukocytosis.

Correspondence:

Dr Bahram Azadeh,
PO Box 3050,
Doha, Qatar.

Her past history revealed admission on 15.10.1997 for post-traumatic pain of the left ankle, but X-ray showed no abnormality of the bones or joints. She had been investigated for abdominal pain on 4.6.1998. Abdominal and pelvic sonography showed no significant abnormality. An appendectomy was performed on 5.6.1998. Histopathology showed acute appendicitis.

On 3.4.2000 liposuction of the arm mass was attempted but complete removal was unsuccessful due to "the obstruction of the cannula by multiple whitish round nodules"; A complementary surgical excision of the remaining adipose tissue was performed. Both specimens were submitted for histopathological examination.

Pathological Findings

The specimen submitted consisted of multiple well circumscribed yellowish white nodules obtained by liposuction procedure ranging 5 to 20 mm in greatest diameter (Fig. 1). On cut sections some nodules had a cystic space in the center partially filled with a yellowish fluid and fatty tissue. Also



Fig. 1: Gross appearance of multiple nodules of encapsulated fat necrosis taken by liposuction from the left arm of a 24-year-old obese woman.

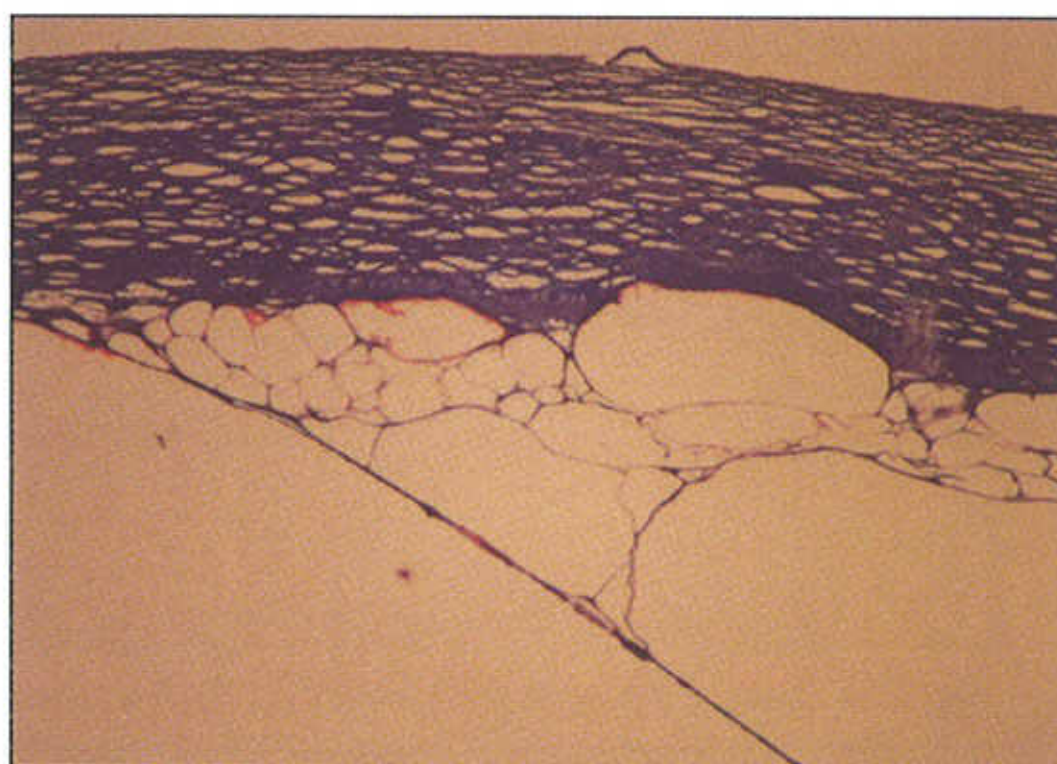


Fig. 2: Necrotic adipose tissue contains microcystic and macrocystic spaces. A connective tissue capsule surrounds the nodule. (Trichrome)

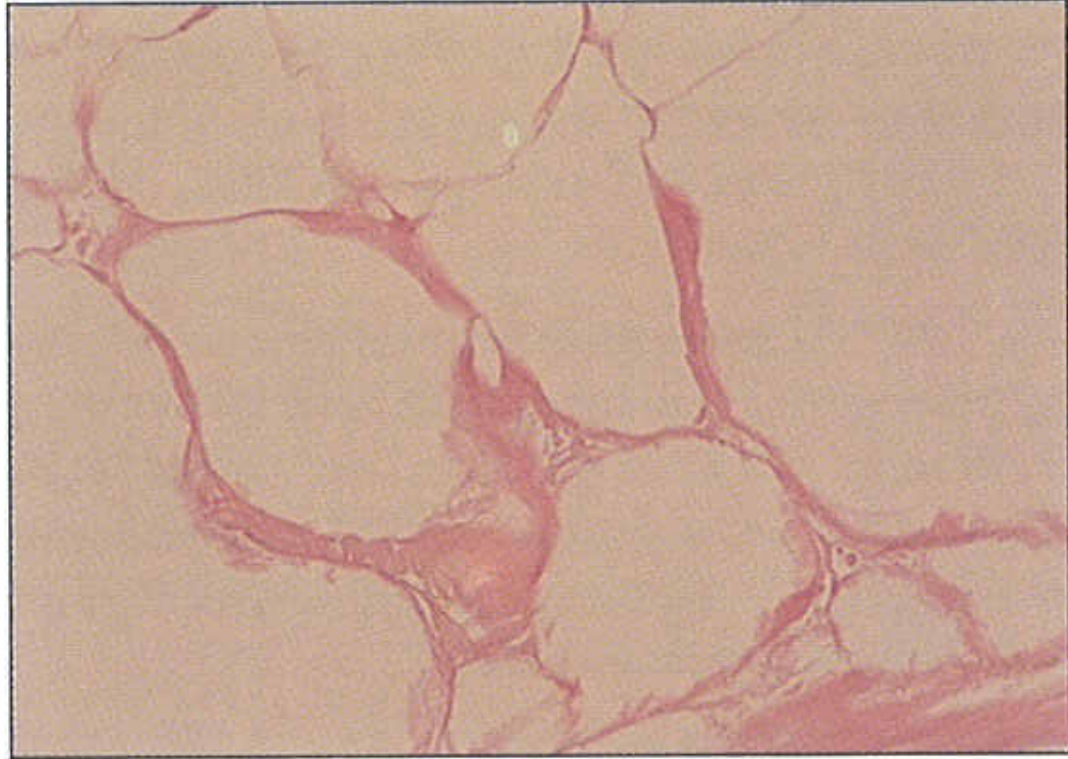


Fig. 3: Cystic spaces and lipomembranous change are present in encapsulated fat necrosis. (H&E)

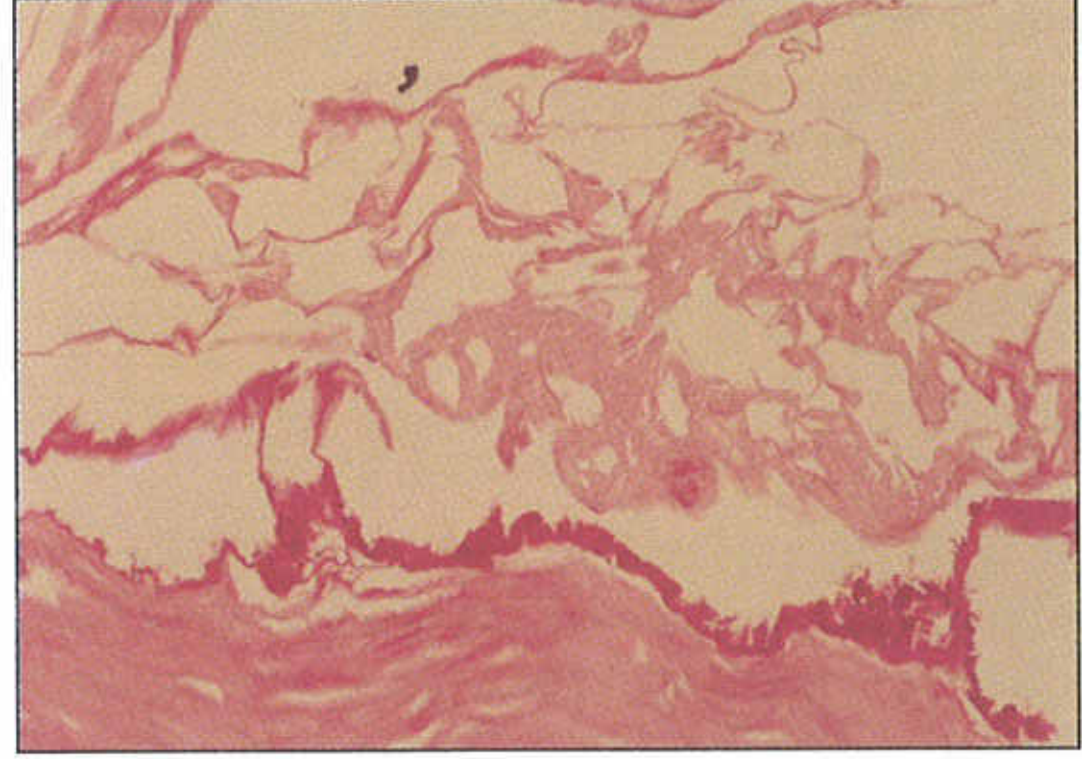


Fig. 4: Distinctive lipomembranous lesion has retained magenta stain by PAS after diastase digestion. (DPAS)

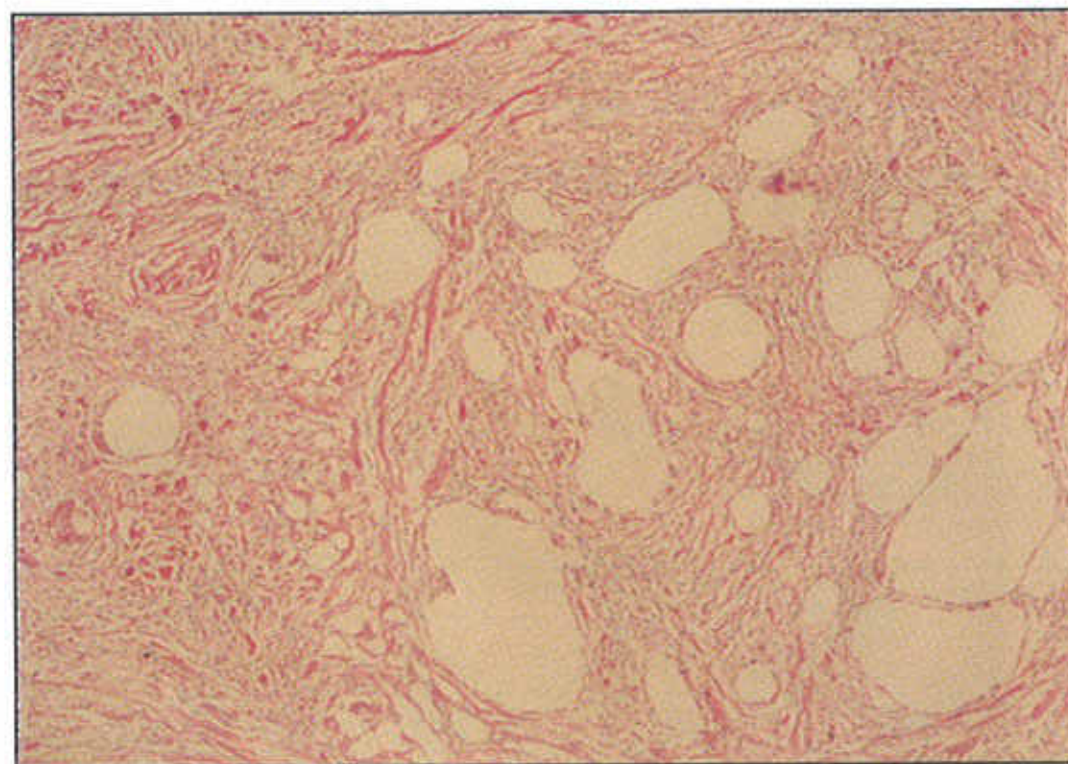


Fig. 5: Panniculitis of the left arm showing fat necrosis, fibrosis and inflammatory cellular infiltrates. (H&E)



Fig. 6: Small spaces surrounded by concentric connective tissue fibers believed to be the precursor to encapsulated fat necrosis. (Trichrome)

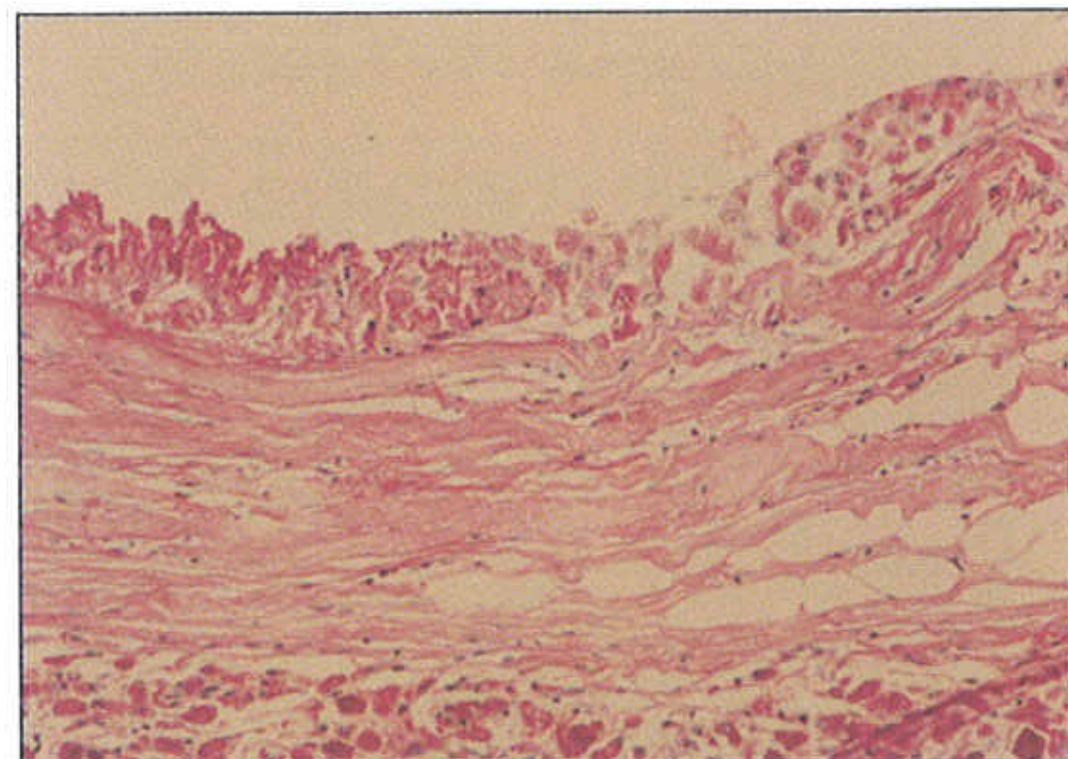


Fig. 7: A rim of macrophages with PAS-positive, diastase-resistant cytoplasmic granules are noted in transition to lipomembranous lesion. (DPAS)

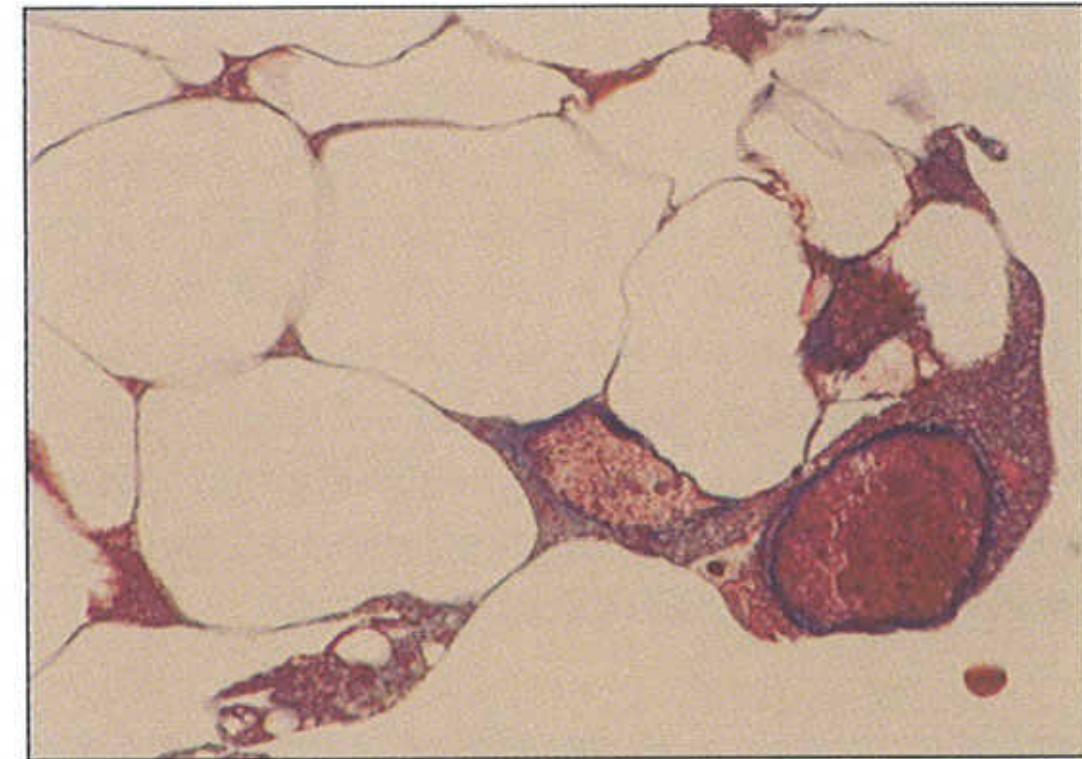


Fig. 8: Fibrin thrombi in vessels are seen adjacent to necrotic adipose tissue. (Trichrome)

submitted was a surgically excised specimen consisting of multiple fragments of lobulated adipose tissue together measuring 22 by 8 by 7 cm, which on cut section showed scattered ill-defined yellowish white fibrous areas.

Sections of the nodules obtained by liposuction showed degenerated and necrotic fatty tissue forming microcystic and macrocystic spaces (Fig. 2) with areas of distinctive lipomembranous changes (Fig. 3) which are PAS-positive, diastase-resistant (Fig. 4). A collagenous fibrous capsule surrounded each nodule (Fig. 2). Inflammatory cellular infiltrates were generally minimal. The surgically excised specimen consisted of lobulated adipose tissue. Sections from the whitish fibrous areas showed lobular and septal panniculitis with inflammatory cellular infiltrates mainly of lymphocytes and abundant foamy macrophages as well as areas of fibrosis (Fig. 5). Well-circumscribed encapsulated necrotic adipose tissue nodules similar to those removed by liposuction were present adherent to the mature adipose tissue. Also present were small cystic spaces surrounded by concentric connective tissue fibers believed to be precursors of the nodules of encapsulated fat necrosis (Fig. 6) Rims of foamy macrophages with abundant PAS-positive diastase-resistant cytoplasmic granules were surrounding the necrotic areas in the centers of the nodules. A gradual transition to a PAS-positive diastase-resistant lipomembranous structure was observed in some areas (Fig. 7). Recent fibrin thrombi were present in some of the small blood vessels in the necrotic adipose tissue (Fig. 8). Fibrous septa and focal calcification were noted in the panniculitic area.

DISCUSSION

Encapsulated fat necrosis has appeared in the literature under a variety of names. Schmidt-Hermes and Loskant first reported it in the German literature as multiple calcified nodules in the breasts of a 52-year-old woman². In 1977, Przyjemski and Schuster described this entity in the English literature as "nodular cystic fat necrosis"³. Other nomenclatures used include "mobile encapsulated lipoma"⁴, "nodular fat necrosis"⁵, "post-traumatic fat degeneration and herniation"⁵ and encapsulated necrosis⁶. This entity characteristically presents as solitary or multiple well-circumscribed subcutaneous nodules, usually in the legs of young boys or middle-aged women; but has occasionally been reported on the arms or trunk^{1,7}. The lesions are subcutaneous, often mobile, nodules with preoperative clinical diagnosis of lipoma, keratinous cyst, adnexal tumor, foreign body reaction, or calcinosis cutis⁸. History of trauma is recorded in 30% of patients. At the time of surgical excision, freely mobile, yellowish white, encapsulated solitary or multiples nodules are observed. Trauma and subsequent interruption of blood supply are said to be the main pathogenetic factors^{1,8}.

The differential diagnosis of encapsulated fat necrosis includes lipoma, angioliipoma, enzymatic fat necrosis, alpha-1-antitrypsin-deficiency-associated panniculitis and lipomembranous fat necrosis⁸. In 1995, Pujol et al described lipomembranous changes in nodular-cystic fat necrosis⁷. The lesions are defined microscopically by the presence of lipomembranes around fatty deposits or cystic spaces. Lipomembranous change is not considered to be a very specific lesion. It has been found in patients with severe stasis, diabetes, and other causes of arterial vascular insufficiency to the lower legs⁹. Lipomembranous changes have also been reported in lupus erythematosus panniculitis and in morphea¹⁰. In our case, typical lipomembranous changes are present probably related to thrombosis of small subcutaneous vessels. The exact mechanism causing these histological changes in the adipose tissue is unknown but the intimate relationship between disrupted adipocytes, free and phagocytosed granules and lipomembranous material suggest that these structures are probably formed from degenerated adipocytes caused by trauma or ischemia⁷.

REFERENCES:

1. Kiryu H, Rikihisa W and Furue M. Encapsulated fat necrosis-A clinicopathological study of 8 cases and a literature review. *J Cutan Pathol* 2000; 27: 19-23.
2. Schmidt-Hermes HJ, Loskant G. Verkalkte Feetgewebsnekrose der weiblichen Brust. *Med Welt* 1975; 26: 1179.
3. Przyjemski CJ, Schuster SR. Nodular-cystic fat necrosis. *J Pediatr* 1977; 91:605-607.
4. Sahl WJ Jr. Mobile encapsulated lipomas. Formerly called encapsulated angioliipomas. *Arch Dermatol* 1978; 114: 1684.
5. Suenaga Y, Katayama N, Nishio K. Three cases of subcutaneous fatty tissue disease. *Nishinohon Hifuka* 1982; 44: 126.
6. Kikuchi I. Encapsulated necrosis on the legs showing a changing number of nodules. A special type of encapsulated adiponecrosis? *J Dermatol* 1984; 11: 413.
7. Pujol RM, Wang C-Y, Gibson LE, Su WPD. Lipomembranous changes in nodular-cystic fat necrosis. *J Cutan Pathol* 1995; 22:551.
8. Hurt MA, Santa Cruz DJ. Nodular-Cystic fat necrosis. A reevaluation of the so called mobile encapsulated lipoma. *J Am Acad Dermatol* 1989; 21: 493.
9. Machinami R. Incidence of membranous lipodystrophy-like change among patients with limb necrosis caused by chronic arterial obstruction. *Arch Pathol Lab Med* 1984;108:823.
10. McNutt N S, Moreno A, Contreras F. Inflammatory Diseases of the subcutaneous Fat. In Elder D et al, Eds. *Lever's Histopathology of the Skin*. Philadelphia - New York: Lippincott - Raven. Eighth Edition, 1997; 448.