PANNICULITIS

Edouard Grosshans, M.D.,
Professor of Dermatology, Clinique Dermatologique, Universite Louis Pasteur, Strassburg, France

The cutaneous fat layer or hypodermis is constituted by fat lobules separated by interlobular septa. Blood and lymph vessels and nerves are associated with the septa. Each fat lobule is a functional unit with its own terminal blood supply. This explains why so many inflammatory lesions begin in the center of the lobules.

In the French terminology the denomination of "panniculitis" is exclusively reserved for inflammatory diseases involving specifically the fat lobules. The other inflammatory diseases of the hypodermis are denominated "hypodermitis". An erythema nodosum is not considered as a panniculitis: it involves the septa and does not provoke any specific lesion of the fat cells.

Panniculitis-Terminology

In English literature	In French literature
Septal panniculitis	. Septal hypodermitis
- without vasculitis (erythema nodosum)	- without vasculitis (erythema nodosum)
- with vasculitis (nodular vasculitis)	- with vasculitis (nodular vasculitis)
. Lobular panniculitis (Weber-Christian's disease)	. Lobular hypodermitis = Panniculitis

We shall only present the clinico-pathological aspects of the panniculites according to the French terminology.

1. Enzymatic panniculites

The most typical is the nodular cytosteatonecrosis (adiponecrosis) related to a pancreatic disorder, either an eccrine carcinoma or an acute pancreatitis associated with elevated levels of blood lipase. In patients with α 1-antitrypsin deficiency or elevated lipase level without pancreas disease necrotizing panniculites may also occur.

Histopathology

The biopsy of a fresh nodular lesion shows a centrolobular necrosis of the fat cells whose membranes remain floating in the necrotic area as "ghost cells". If the necrosis is extensive it may involve the interlobular septa and lead to a secondary necrosis of the dermis and to the discharge of the necrotic fat (liquefying panniculitis). Such an extension is more common in panniculitis related to an α 1-antitrypsin deficiency. The biopsy of a late lesion shows a lipophagic granuloma with calcium deposits and a diffuse fibrosis progressively replacing the granuloma and the involved fat lobules.

2. Idiopathic panniculites

. The relapsing panniculitis of Weber-Christian occurs in women from 30 to 60 years. Each attack is associated with high fever, arthralgias and neutrophilia. In severe forms, the fat around the kidneys, of the peritoneum and the brain may be involved.

Histopathology

According to the age of the nodule submitted to biopsy, following stages may be observed

-in the early stage, a neutrophilic infiltration of the center of some fat lobules and often thromboses of the capillaries and small

hemorrhagic foci are observed. The septa are not involved by the neutrophilic inflammation;
- in a full developed nodule, a lipophagic granuloma invades the lobules previously infiltrated by the neutrophilic leucocytes. The histiocytes with foamy cytoplasms are diffusely distributed in the lobules, sometimes arranged as endothelial cells around small holes. Calcium deposits are not observed in the lipophagic stage of the Weber-Christian's disease, probably because the triglycerides are not hydrolased in free fatty acids which selectively induce calcium deposits in other fat necroses;
- in the late stage, a fibrotic scar replaces the lipophagic granuloma; the destroyed fat lobules do not regenerate.

.The subcutaneous lipogranulomatosis of Rothman- Makai is a controversed entity. It is sometimes considered as a variant of the Weber-Christian's disease.

Histopathology

Numerous round nodular granulomas develop inside the fat lobules: they are built up by lymphocytes, epithelioid cells and lipophages.
Pseudocysts surrounded by flat lipophages and a fibrotic capsule are another histologic hallmark.

3. Physical panniculites

. The nodular fat necrosis of newborn presents as nodules and indurated plaques occurring soon after birth and related to prematureness hypoxy, cold exposure and microtrauma.

Histopathology

Crystals of fatty acids develop inside the adipocytes and provoke their disruption and a giant cell rich lipophagic granuloma. Calcium deposits are quite common and are related to the risk of a secondary hypercalcemia.

. The cold panniculitis (panniculitis a frigore) occurs on thighs and ankles in patients exposed to cold and insufficiently protected by their clothes: equestrians, motor-cyclists, skiers... Such lesions have also been observed on the cheeks in ice-sucking children, in skin areas exposed to ice-bladders for a therapeutical purpose.

Histopathology

A lipophagic diffuse granuloma develops in the upper part of the cutaneous fat along the dermo-hypodermal junction.

. The traumatic panniculitis (traumatic cytosteatonecrosis) is quite common on breast, buttocks and any other fat rich body areas.

Histopathology

Cytosteatonecrotic foci are surrounded by lipophagic granulomas. Relapsing lesions correspond most often to self-inflicted traumatic panniculites: hemorrhagic and cytosteatonecrotic foci are intermingled and the granulomas are polymorphous with foreign body giant cells, hemosiderin deposits, scarring fibrosis.
A special aspect is the nodular cystic fat necrosis presenting as mobile capsulated lesions of the legs or fore-arms, looking like small lipomas. Chronic microtraumatic panniculitis may leave a definitive depressed skin atrophy (annular atrophic panniculitis of the thighs or ankles).

4. Panniculitis in systemic diseases

. The lupus panniculitis is a rare event occurring in 1 to 3 p. 100 of lupus erythematosus patients. It leaves retracted atrophic scars on cheeks, arms, thighs and even abdomen.

Histopathology

Large areas of hyaline necrosis destroy the fat lobules and the septa. They occur together with a dense lymphocytic infiltration: perivascular lymphocytic sleeves and lymphocytic nodules disclosing sometimes clear centers. Despite the fat necrosis, lipophagic granulomas do not occur. A dense fibrosis finally replaces the fat necrosis.
The direct immunofluorescence shows inconstantly a lupus band on the dermo-epidermal junction above the

hypodermal nodules.

. The cytophagic histiocytic panniculitis is a rare severe condition with frequent lethal outcome, associated with clinical and biological signs of a macrophage activation syndrome. It is a complication or a monitory syndrome of malignant lymphomas or severe infections (cytomegalovirus, EBV, bacteria).

Histopathology

The fat lobules are infiltrated by CD68 positive histiocytes and T lymphocytes, intermingled with hemorrhagic foci. The histiocytes show a strong phagocytic activity: cytophagocytosis, erythrophagocytosis. The hemorrhagic necrosis extends to the dermis and provokes large ulcers.

. The membranocystic lipodystrophy or panniculitis presents as non - specific plaques of the legs in diabetic patients or in patients with a poor peripheric arterial circulation.

Histopathology

The histologic aspect is quite specific: in the fat layer large irregular empty holes are surrounded by thick undulated PAS+membranes.

. The calcifying panniculitis is a complication of the secundary hyperparathyroidism in chronic renal failure.

Histopathology

The necrotic adipocytes are surrounded by calcium deposits forming frame-figures. The calcinosis involves also the small arteial vessels of the dermis and hypodermis.

5. Miscellaneous panniculites

. A trophic panniculitis secondary to hypodermal long-acting corticoid injection: the adipocytes are small and round and the capillary network of the artophic fat lobules is very apparent;

. Infectious panniculitis due to inoculated mycobacteria; some mycobacteria provoke primary infection of the cutaneous fat (Mycobacterium ulcerans, Mycobacterium fortuitum-chelonae): the fat necrosis looks coagulated and is surrounded either by a non specific neutrophilic inflammation or by a tuberculoid granuloma. The Ziehl's stain easily shows the acido-fast bacteria;

. Infectious hypodermal abscesses due to yeasts, moulds or parasites are observed in immunodeficient patients: in any suppurative panniculitis, especially in HIV-patients or in patients on chemotherapy, special stains (Gram. PAS. Gomori-Grocott, Ziehl...) are systematically requested.

Reference

Grosshans E. Les panniculites de l,adulte. Ann Pathol 1992; 12:250-4.