

# TRAUMATIC FAT NECROSIS OF THE FEMALE BREAST AND ITS DIFFERENTIATION FROM CARCINOMA\*

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A THIRD REPORT FROM THE MEMORIAL HOSPITAL

IN May, 1920,<sup>7</sup> we presented before the American Surgical Association our first report upon Traumatic Fat Necrosis of the Female Breast. The object of this communication was to establish the condition as a new clinical entity and to point out the striking similarity of this hitherto unrecognized tumor to carcinoma of the breast. In May, 1921,<sup>8</sup> we had collected three additional cases from the Breast Clinic of the Memorial Hospital, and a further report was made. Since that time four additional cases have appeared in the Clinic, and Bloodgood, of Baltimore, Kilgore, of San Francisco, and Hyman and Berg, of New York, have kindly permitted us to include unpublished cases of their own in the present series. Meanwhile, Cohen and Parsons in America and Stulz and Fontaine in France have each published an additional case. The present paper represents an effort to place on record all authentic cases, with some additional considerations concerning the clinical and pathological features of this disease.

*Nature of the Process.*—Fat necrosis is a disintegration of fat cells with the associated tissue reactions of new connective tissue formation and the production of foreign body giant cells. For many years, fat necrosis has been most frequently encountered as the acute necrosis of fat in the omentum and mesentery secondary to acute pancreatitis. These changes in fat tissue have been produced by the pancreatic fat-splitting ferment, and the lesions may be easily reproduced experimentally as Opie,<sup>9</sup> Wells,<sup>13</sup> and Langerhans<sup>5</sup> have shown.

Similarly, we have all recognized that fat necrosis may appear in subcutaneous tissue following trauma. In new-born babies the trauma of a difficult instrumental delivery sometimes produces a tumor having the identical microscopic picture of fat necrosis of the breast. Occasionally surgeons encounter fat necrosis of subcutaneous tissue secondary to a hypodermic injection, or some other form of trauma, and a similar appearance may be found at times along an old healed suture line. Farr<sup>2</sup> reported several such cases and further produced these lesions experimentally in fat pigs.

Although the gross and microscopic picture of traumatic fat necrosis occurring in subcutaneous tissue in other parts of the body closely resembles that occurring in and about the breast, these lesions are far less important clinically than the particular condition we are describing. The clinical prob-

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lem of traumatic fat necrosis of the breast is an important one, for this condition must be considered in properly differentiating tumors of the mammary gland. The process often seems progressive for a time, resembling a true tumor growth, and the close simulation to carcinoma of the breast makes it additionally important from the clinical standpoint. In the breast the great bulk of fatty tissue permits after trauma the formation of a tumor of some size, the largest mass encountered in the present series being 7 cm. in diameter.

Stulz and Fontaine<sup>12</sup> in September, 1923, in reporting a personal case, also included in their paper, cases reported by Lanz in 1882, Berner quoted by Heyde in 1911, and Kuttner in 1913.

In the Lanz and Kuttner cases the masses of fat necrosis were situated in the subcutaneous tissue overlying the breast, and Case IX of our own series, as well as Case XIII, also showed a similar involvement of subcutaneous tissue. The clinical appearance of these subcutaneous tumors overlying the breast is practically identical with the signs elicited when the fat necrosis is more deeply placed within the breast tissue. The cases of traumatic fat necrosis occurring in and about the breast may therefore be classified in one of two groups, namely:

Group A.—Tumors actually occurring within the breast.

Group B.—Tumors occurring in subcutaneous tissue overlying the breast.

In Group A, from our personal series and the literature, there are sixteen cases, namely:

Cases 1 to 8 (personal series) .....	8
Cases 9 to 12 (personal series) .....	3
Case 14 (personal series) .....	1
Case of Berner, quoted by Heyde .....	1
Case of Cohen .....	1
Case of Stulz and Fontaine .....	1
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Total of Group A cases .....	15

In Group B, there are five cases, namely:

Cases 9 and 13 (personal series) .....	2
Case of Lanz .....	1
Case of Kuttner .....	1
Case of Parsons <sup>11</sup> .....	1
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Total of Group B cases .....	5

The French authors mentioned object to our term "traumatic fat necrosis," proposing as a substitute "granulome lipophagique traumatique." We believe this term is a poor one, for the word "granuloma" is associated with the idea of infection, which apparently has no part in the production of this lesion. Upon the other hand, traumatic fat necrosis of the female breast is a disintegration of fat cells caused by trauma, with resultant necrosis and associated connective tissue reaction and the production of foreign body giant cells. Therefore, the term "traumatic fat necrosis of the breast" appears to be the proper one and more truly descriptive of the disease.

The difficulty in differentiating this tumor grossly and microscopically has been described below by Dr. James Ewing.

DIFFICULTIES OF PATHOLOGICAL DIAGNOSIS IN THE DIFFERENTIATION OF  
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"The gross appearance of the lesions in fat necrosis resemble in many respects that of carcinoma, and in some cases it is difficult to distinguish between the two conditions. In both there is often the same firm induration which is readily explicable because the induration is caused by growth of new connective tissue which is progressively cicatrized.

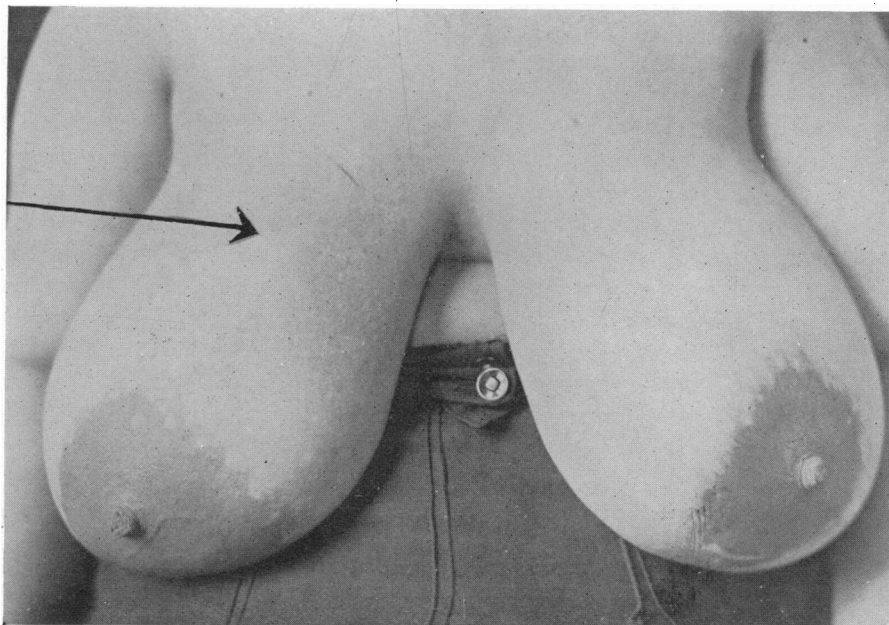


FIG. 1.—Case III. Breast lipomatosis. Breast reaches to umbilicus. Patient's weight 191 pounds.

From a consideration of microscopic structure the induration should be greater in infiltrating carcinoma. The outline of the gross lesion in carcinoma is generally much sharper than in fat necrosis, which may fade off gradually into surrounding areas. Chalky points and streaks of fatty epithelium lying in firm translucent connective tissue are characteristic of infiltrating carcinoma. The same whitish points are present in necrotic or inflamed fat tissue, but they are generally much broader and more irregular. Occasionally one finds a whole fat lobule as large as a bean, chalky and opaque from the proliferation of fat cells, in inflamed fat tissue. Carcinomatous nodules in the breast are nearly always single, whereas traumatized fat is often very irregularly distributed and cicatrization appears in multiple points. In fat necrosis the new connective tissue is much more translucent than in carcinoma and often it is of a faint reddish color from the presence of fine capillaries, which are absent in carcinoma. Later, cicatrization obliterates these capillaries and the connective tissue of fat necrosis becomes as dense and opaque as in carcinoma.

"In a recent case of supposed fat necrosis, a firm resistant area 2 cm. wide was encountered in a lipoma of the breast. The opacity and chalky streaks of carcinoma were missing, but a correct diagnosis of carcinoma was made on the very firm induration, rather sharp borders, and on transmitted light, the marked opacity of the lesion. In

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another very puzzling case, fat necrosis was recognized by the presence of two outlying fat lobules which presented broad opaque spots of proliferating fat cells. The central position of the lesion strongly resembled carcinoma. However, one must be prepared to meet both carcinoma and traumatized fat tissue in the same breast. But why not resort at once to frozen sections? The reasons are that one must previously choose on gross examination the tissue to be sectioned, and when frozen sections are made the diagnosis may still be difficult.

"The microscopic structure of inflamed fat tissue in the breast strongly resembles alveolar carcinoma, especially in the later fibrous stages, when one encounters proliferating fat cells almost exactly reproducing the small alveoli of carcinoma lying in cicatricial

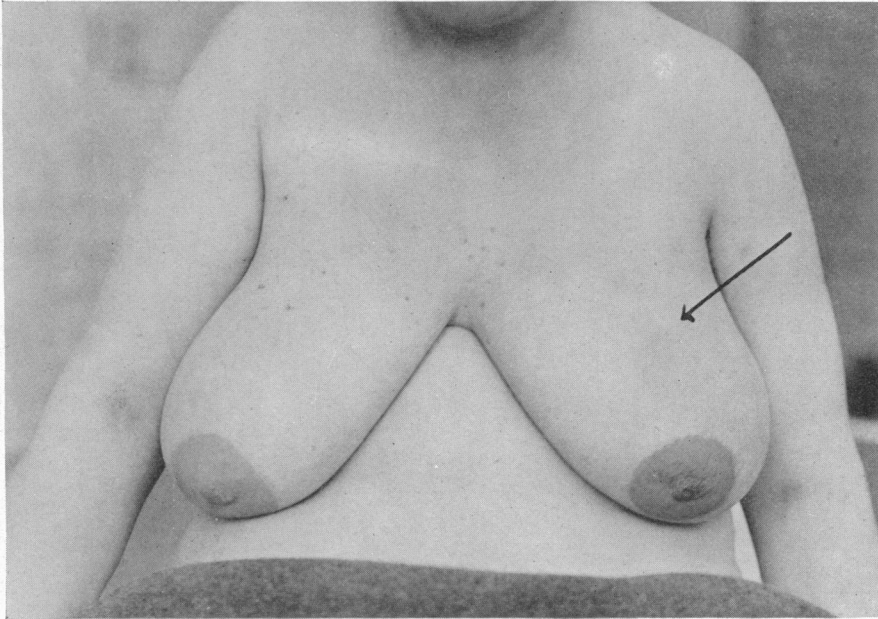


FIG. 2.—Case VI. Arrow points to discoloration, (duskiness) of the left breast. Patient's weight 196 pounds.

connective tissue. So complete is this resemblance that an expert microscopist may have difficulty in distinguishing between the two conditions. In frozen sections this difficulty may be practically insuperable, and there is little doubt that errors in the diagnosis of mammary cancer have occurred from this source. Usually the microscopic section furnishes a correct interpretation at once from the presence of much cellular overgrowth, fibroblasts mingled with lymphocytes, empty spaces once filled with fluid fat (oil cysts), formation of many phagocytic giant cells (Figs. 13 and 15), and wide areas of proliferating fat cells.

"In fibrous stages more reliance may be placed on the general lack of activity and lack of hyperchromatism in the cells. From some forms of cellular carcinoma with secondary degeneration and rich infiltration by lymphocytes, fat necrosis may be distinguished only by the exercise of great care. Wide sheets of polyhedral proliferating fat cells may almost exactly reproduce portions of cellular so-called "Medullary" carcinoma. The best paraffin sections are called for in this work."

The clinical history, physical findings and pathology of Cases I, II, III, IV and V have been described in previous communications of the authors.<sup>7, 8</sup>

The following four cases have entered the Breast Clinic at the Memorial Hospital during the past two years:

CASE VI.—I. H., married, female of forty-eight years. Was admitted April 23, 1923, complaining of a lump in the left breast. (See Fig. 2.)

*Mammary History.*—Five months before admission, while carrying a picture frame under her left arm, she fell headlong down a flight of stairs, landing eight steps below. As she struck the stairs, there was an impact of the corner of the frame against her left breast, causing a pain of such severity that she fainted. Almost immediately swelling and ecchymosis appeared at the site of the injury. The patient consulted her physician who

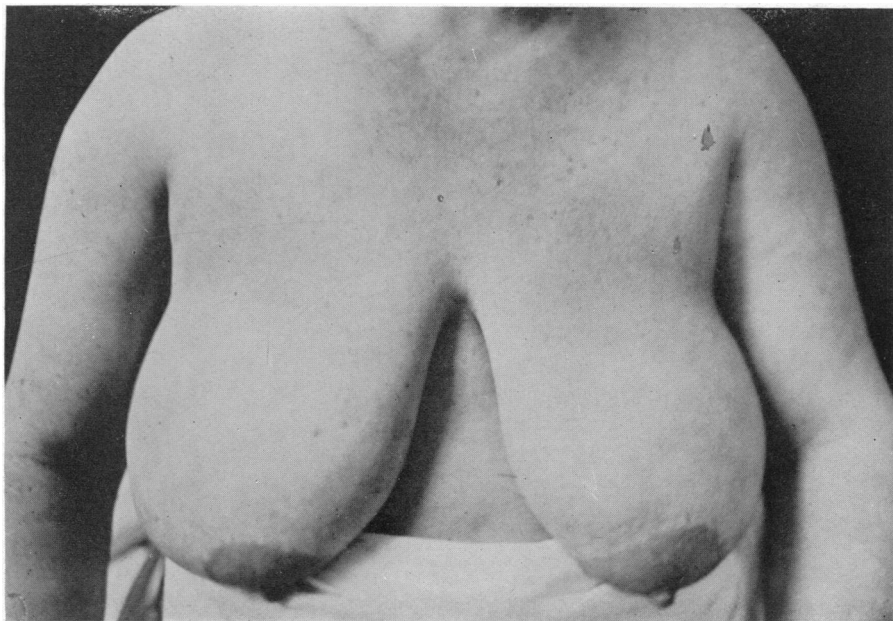


FIG. 3.—Case VIII. Short heavy woman of 160 pounds.

told her "a blood-vessel had burst." The major part of the swelling was present for a month, with gradual diminution in size, leaving a lump in the breast that had persisted to the time of admission. The "black and blue" area gradually increased in size until it involved the entire breast and a portion of the adjacent lateral chest wall below the axilla.

*Physical Examination.*—The patient was an obese woman in good general condition. Her weight was 196 pounds. General examination was negative.

*Breasts.*—Over an area 7 cm. in diameter, the skin of the upper inner quadrant of the left breast had a slightly brownish discoloration. The skin was definitely attached to a deep-lying tumor situated 15 cm. above the nipple level and measuring 6 x 8 cm. The entire breast and tumor moved freely on deeper structures. The tumor was hard though somewhat resilient and in two portions the edges were sharply defined. There was no retraction of the nipple. In both axillæ large moderately firm nodes could be palpated. No supraclavicular nodes were palpable.

*Provisional Diagnosis.*—Attention was directed especially to diagnosis of traumatic fat necrosis because of the type of breast and the accurate history of trauma.

*Operation.*—Under one-half per cent. novocaine, the tumor was excised, going well beyond its circumference. On section there was no evidence of malignancy. The wound was closed save for a small split within tube.

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*Pathology.*—Report by Dr. James Ewing. "Area 3.5 x 1.5 x 1.5 cm. (See Fig. 7) beneath the skin which is adherent by fibrous strands, is opaque yellowish and brown, with small cysts fading into fat tissue, and showing some whitish new tissue about parts of the lesion. Sections (No. 6859) show a great variety of processes connected with fluidification and necrosis and absorption of fat; and the reactive productive inflammation which accompanies them. Giant cells of very large size are very numerous and form large sheets lying between streaks of new connective tissue. There are many small oil cysts surrounded by lenticular giant cells. Some areas show beginning liquefaction and necrosis of fat. The amount of new connective tissue is moderate. Everywhere there is infiltration with hemorrhagic detritus, and about the periphery of the lesion are many very heavily pigmented cells. Areas of proliferating fat cells give an appearance not unlike carcinoma."

### *Post-operative Course.*—

The post-operative course was uneventful, the patient being discharged from the hospital one week after operation.

CASE VII.—J. N. (See Fig. 5) married, female of forty-four years, was admitted to Memorial Hospital, July 3, 1923, complaining of a lump in the right breast.

### *Mammary History.*—

Patient had had a painful sensation in the right breast appearing intermittently over a period of many years. About eight years previously she was under observation in the Memorial Hospital for a time on account of these breast symptoms, but no tumor was then present. Two weeks before admission she noticed

some retraction of the right nipple and upon palpation felt a lump in the right breast. There was no history of trauma to the right breast.

*Physical Examination.*—Patient was an obese woman in good general condition. Her weight was 181 pounds. There was slight systolic murmur over the precordium. At the basis of the lungs occasional crackling râles could be heard.

*Breasts.*—The breasts were very large and fat. Above the right breast near the third costal sternal junction was a scar of a former burn. The right nipple was elevated and retracted. There was no skin adherence. Situated in the mid-portion of the right breast slightly above the nipple level, was a hard mass measuring 5 cm. in diameter. There was no attachment to chest wall. Neither axillary nor supraclavicular nodes were palpable. The opposite breast was negative.

*Provisional Diagnosis.*—Because of the stony hardness of the tumor, and the elevation and retraction of the nipple, we felt that we were dealing with an early carcinoma of the breast. The chest plate was negative for metastasis to the lungs. A pre-operative, low

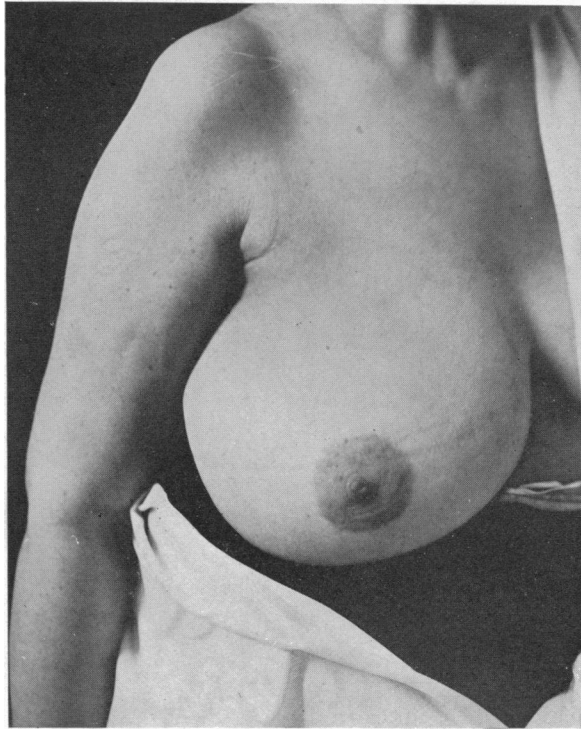


FIG. 4.—Case IX. Breasts unusually heavy in comparison to remainder of body. Weight 186 pounds.

voltage X-ray cycle of five treatments was given over the breast, axilla and supra-clavicular regions.

*Operation.*—We were so certain that the case was one of mammary cancer that a radical breast amputation with removal of muscles and axillary contents was performed.

*Pathology.*—Report by Dr. James Ewing. "The process consists of a chronic inflammation in fat tissue, but no signs of carcinoma can be found. The tissue shows small areas of partly liquefied and saponified fat, which is granular, amorphous and bluish staining. About these areas there is very active growth of cellular connective tissue and granulation tissue in which many rather hyperchromatic spindle cells are found.

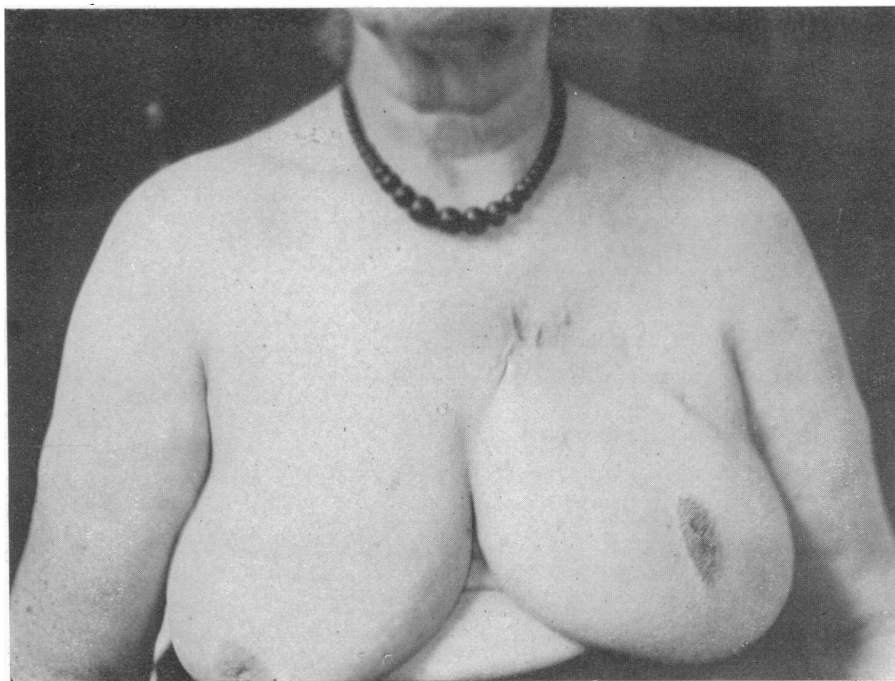


FIG. 5.—Case VII. Weight 181 pounds.

Among these are many giant cells of small and large size, some inclosing small masses of fat. Just about the areas of fluid fat the cells are large and polymorphonuclear. There are no signs of carcinoma. The whole area of fat necrosis covers about 3 cm."

*Post-operative Course.*—The post-operative course was tragic. During the operation the patient had taken the ether poorly, as shown by frequent obstruction to air passage with consequent cyanosis. However, she left the operating room in good condition. Three hours later the patient was again cyanosed, had Cheyne-Stokes respiration and could not be aroused. Stimulation was strenuously applied and artificial respiration kept up for an hour and a quarter, but without avail. Death was probably due to cardiac decompensation. No autopsy was permitted.

CASE VIII.—S. S., married, female of thirty years, came to the Memorial Hospital, July 9, 1923, complaining of a lump in the right breast.

*Mammary History.*—(See Fig. 3) Had had three lactations, each lasting almost seventeen months, the last one occurring two years before admission to the hospital. Approximately three months previously the patient first noted a small lump in the inner aspect of the right breast. The mass increased in size and was slightly painful. There was no history of trauma and lues was denied.

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*Physical Examination.*—The patient was a short corpulent woman. The chest examination was negative except for a systolic apical murmur which was not transmitted. Her weight was 160 pounds.

*Breasts.*—The breasts were large, soft, fat and pendulous. The nipples protruded and were on the same level. Along the mesial portion of the right breast there was a tumor 5 x 3 cm., which was firm, but not as hard as carcinoma. Skin was not attached to the tumor. There was no nipple retraction. One small node could be palpated in right axilla.

*Provisional Diagnosis.*—We believed that we were dealing with a benign tumor, but on account of its firmness malignancy could not be excluded. Therefore, we decided to do



FIG. 6.—Case IV. Shows the adherence of the tumor to the overlying skin. In this case the nipple was pulled downward toward the chest wall. The skin adherence and pulling of the nipple exactly simulated carcinoma.

a local excision of the tumor including a wide surrounding zone, basing further procedure upon the gross appearance of the section.

*Operation.*—July 20, 1923. Ether anæsthesia. A wide excision of the tumor was made. The mass was partly composed of a smoothly lined cyst 7 x 5 cm. In one portion there was a projection of necrotic brown tissue into the cyst. From the cut lactiferous ducts there exuded a thick yellow creamy material. Gross examination revealed no evidence of malignancy.

*Pathology.*—By Dr. James Ewing. "Section shows a very active inflammatory reaction about liquefied fat. There is very extensive proliferation of fat cells producing areas in which these polyhedral cells, resembling cancer cells, are found in solid diffuse sheets. There are some points of liquefied fat about which giant cells form. On the periphery of the lesion there is much new growth of connective tissue. There is no sign of carcinoma."

*Post-operative Course.*—The patient made an uneventful convalescence.

CASE IX.—A. G., married, female of forty-five years, was admitted to Memorial Hospital, November 23, 1923, her only complaint being the presence of a lump in the left breast.



*Mammary History.*—(See Fig. 4) Patient stated that about four weeks before she accidentally noticed a lump in her left breast. It had remained stationary in size and was entirely painless. She had never received a severe trauma to the breast.

*Physical Examination.*—Patient was a corpulent woman in good general condition. Her weight was 186 pounds. Except for the breast tumor her examination was negative.

*Breasts.*—Situated 2.5 cm. from edge of areola in the direction of five o'clock from the nipple, was a stony hard tumor measuring 1.5 x 1 cm. The mass was just beneath the skin to which it was distinctly attached. The nipple was slightly retracted and definitely elevated. Throughout the entire breast there was a condition of chronic mastitis.

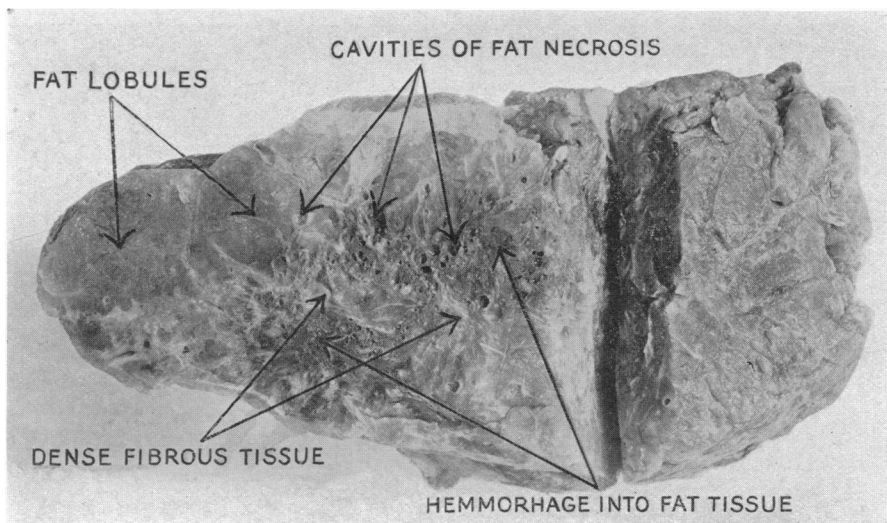


FIG. 7.—Case VI. Gross specimen four months after the injury. There is an extensive area of hemorrhagic products in the fat tissue. Numerous small cysts of fluid fat are scattered throughout.

Some years ago the patient had an abscess in the breast, which may account partially for the nipple retraction and elevation. There was an enlarged firm node in the left axilla.

*Provisional Diagnosis.*—Because of the tumor hardness, nipple elevation and retraction and the firm axillary node, we felt that we were dealing with a carcinoma of the breast, but the mass seemed so superficial that a definite diagnosis seemed impossible. X-ray examination of the lungs was negative for metastasis. A pre-operative cycle of X-ray treatments over the breast and drainage areas was given prior to operation.

*Operation.*—Under ether anæsthetic, a wide excision of the tumor was carefully made. Upon section the tumor was as hard as the average carcinoma, but contained two small cystic areas lying in dense fat tissue. (See Fig. 8.) Throughout the glandular tissue lying outside the tumor area were numerous small bluish cysts. We believed we were not dealing with carcinoma, but probably with a fat necrosis. The wound was completely closed save for a small split rubber tube drain.

*Pathology.*—Report by Dr. James Ewing. "The nodule shows chronic inflammation about a small area of liquefied fat. There is active growth of fat cells and fibroblasts with englobment of fluid fat. Formation of a few giant cells and infiltration of lymphocytes. There are a few minute cysts evidently containing fluid fat. There is no sign of carcinoma."

*Post-operative Course.*—The post-operative course of this case was entirely uneventful. The following case report has been furnished us through the kindness of Dr. A. R. Kilgore, of San Francisco.

CASE X.—B. A., single, female of fifty-nine years. History was negative, except at

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the age of forty-five years she had an artificial menopause following hysterectomy for fibroids.

*Mammary History.*—Four days before her admission to the hospital she accidentally noticed a small lump in the upper outer quadrant of the left breast. Since discovering the mass she had been conscious of a slight tingling or burning sensation.

*Physical Examination.*—Breasts were symmetrical, large, fatty but not pendulous. There was no nipple retraction. In the upper outer quadrant of the left breast, there was a pea-sized subcutaneous nodule which was very hard. This mass was freely movable in the subcutaneous tissue. Immediately beneath it and apparently within the breast tissue

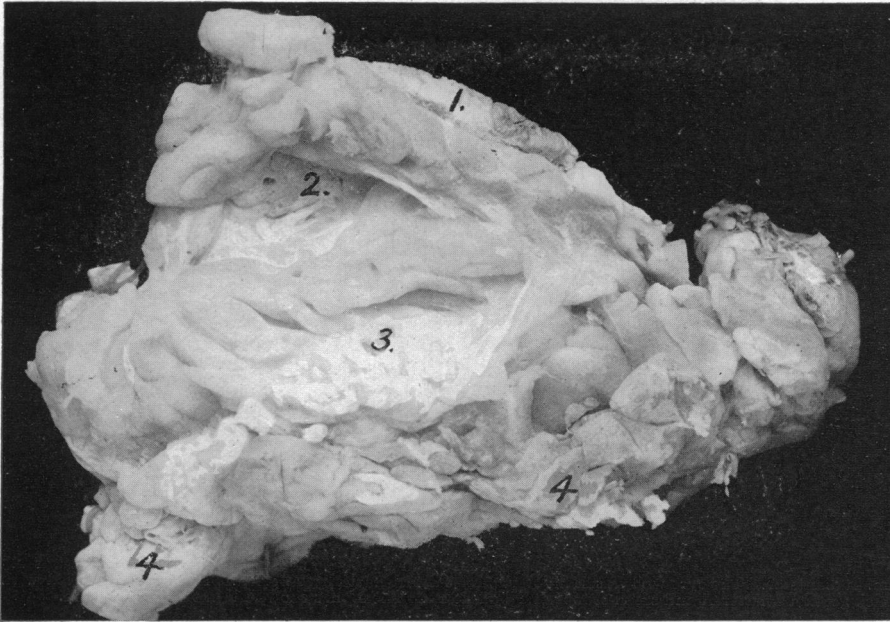


FIG. 8.—Case IX. Gross specimen. 1. Skin of breast. 2. Area of fat necrosis 1.5x1 cm. It is stony hard. There are a few cysts of fluid fat. 3. Fat lobules. 4. Breast tissue.

itself, was a lump the size of a lima bean, also freely movable. Upon pushing the breast toward the midline, a definite and well-marked skin retraction could be demonstrated. This was markedly limited to an area 1 cm. square over the nodule. No axillary nodes could be palpated.

*Operation.*—August 10, 1921. Novocain anæsthesia. The nodules were completely excised, together with a good zone of surrounding tissue. Cross-section of the specimen showed that the superficial nodule was composed of whiter fat than the normal yellow fat tissue surrounding it, the color resembling that of beef suet. The larger deeper nodule was not connected with the first. Upon section it had a similar appearance, except that it presented minute broken down areas, one of which was 2 mm. in diameter and contained degenerated material. This large second nodule seemed to be fat tissue, but of very much harder consistence than the surrounding normal fat. It was well circumscribed but not encapsulated.

*Pathology.*—Report by Dr. G. Y. Rusk. (Fig. 15.) "Microscopic examination of breast tissue shows a relatively large amount of fat and only occasionally traces of parenchyma. The few islands of breast tissue observed show a slight periductile infiltration with lymphocytes and occasional plasma cells. The main mass of tissue consists of fat with connective tissue septa. In the latter, one again finds evidence of old inflammatory reactions. The principal reaction occurs in the fat itself and consists of a marked

infiltration of the fat tissue with cellular fibrous tissue, mononuclear cells varying greatly in size, and larger ones having a pale, very finely reticulated cytoplasm suggesting developing fat cells, and other structures varying from cells with two or three nuclei, up to large nucleated syncytial masses. In going over the sections a single mitotic figure was observed. In a few places small slits are seen in the tissue, suggesting slight cholesterol deposit. The cytoplasm of the giant cells varies, sometimes appearing like that described in the mononuclear cells, and again being more eosinophilic and compact. The giant cells are distinctly of the foreign body type. Occasionally groups of eosinophiles are seen

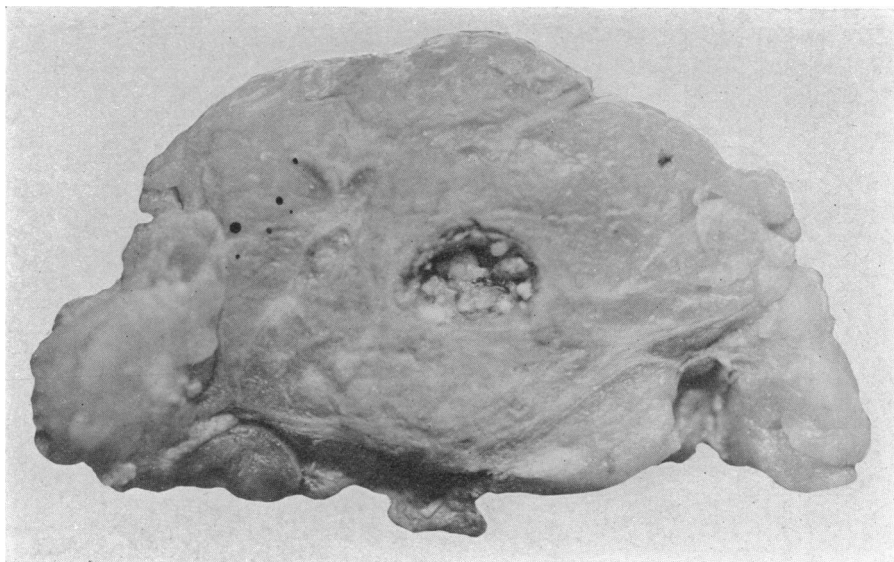


FIG. 9.—Case V. Shows appearance of gross specimen eight years after the injury. The cyst was 2.5 cm. in diameter. The cyst wall was stony hard and seemed partially calcified. The cyst was filled with thick grumous material and small stones of calcification. The stones show well in this photograph.

among the smaller mononuclear cells and also a few polymorphonuclear neutrophiles, being apparently a more acute stage of the process.

*“Diagnosis.*—Reparative reaction following either infection or trauma in fat tissue.”

*Pathological report* by Dr. James Ewing. “The sections show a chronic productive inflammation of fat tissue which is characteristic of the reaction of fat tissue to trauma. The fat in many cells is being absorbed by a proliferation of clear polyhedral cells within the fat cell membrane. This proliferation results in gradual replacement of the fat by the new cells. There is also considerable growth of new spindle fibroblasts, in the more advanced stages of the process. At several points there are small cysts, originally filled with fluid fat, about which many giant cells of various sizes are forming.”

The following case report has been furnished us through the kindness of Dr. A. Hyman of New York City.

CASE XI.—A. M., married, German female, fifty-three years of age, was admitted to Mount Sinai Hospital on December 12, 1922. She had had three children and one miscarriage, and four years before admission a hysterectomy for complete uterine prolapse. Otherwise her past history was negative.

*Mammary History.*—There had been no previous history of abscesses of the breast, of caked breast or cracked nipples. Her chief complaint upon admission was the presence of a lump in the left breast. One month before admission, in attempting to close a window, it suddenly gave way and struck her in the left breast. The site of the injury was painful and a few days later the patient noticed a lump where the injury had been

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received, over which the skin was ecchymotic. This mass in the breast had persisted up to the time of admission, but had not increased in size and had been painless.

*Physical Examination.*—The patient was a well nourished adult female of stocky frame. Approximate weight was 170 pounds. General examination was negative.

*Breasts.*—The breasts were large, pendulous and contained much adipose tissue. In the upper middle quadrant of the left breast about 6 cm. above the nipple, there was a small irregular hard mass, about 3 cm. in diameter. This mass was not tender, skin over it was not attached and the growth itself was fairly movable. There was an enlarged lymph-node which was not hard in the left axilla. Wassermann examination was negative.

*Provisional Diagnosis.*—A pre-operative diagnosis of a non-malignant breast tumor was made and the possibility of its being traumatic fat necrosis was noted on the chart.

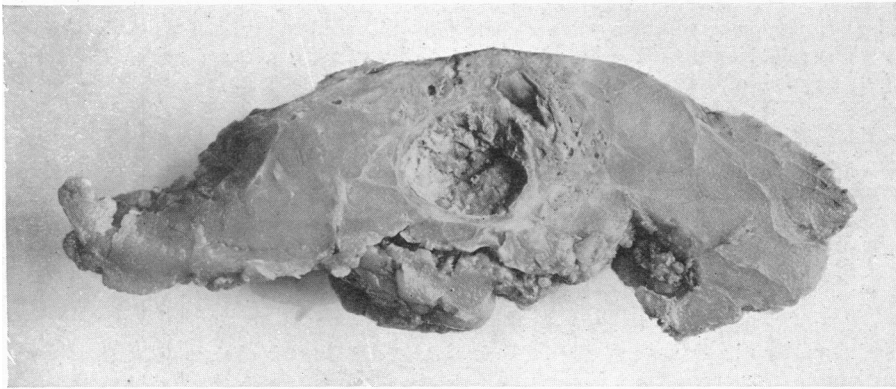


FIG. 10.—Case III. Gross specimen ten years after hypodermoclysis. There are numerous cysts, the largest 2.5 cm. in diameter. Walls of the cyst are thick and hard. Cyst contents, sand sediment of calcification.

*Operation.*—December 9, 1922. Dr. A. Hyman. The tumor was excised through a small radial excision. Frozen sections showed areas of fat necrosis. The wound was immediately closed.

*Pathology.*—By Doctor Mandlebaum, of Mount Sinai Hospital. "Specimen consists of a mass of breast tissue, apparently fat, received in formalin. Microscopical examination shows adipose tissue with considerable increase in the amount of fibrillar connective tissue between the fat cells. In addition, there are numerous foci of lymphocytes present, which represent areas of inflammation of a chronic type, and many giant-cells of inflammatory character. (December 11, 1922.)"

Patient was again operated upon June 8, 1923. Pathological report by Doctor Mandlebaum.

"Specimen consists of adipose tissue received in formalin. The microscopical picture is quite similar to that noted in the former examination, excepting that the process is considerably more advanced. The interstitial connective tissue is quite dense and compact, the giant-cells are more numerous, and in addition, many fat cells are seen presenting the typical picture of necrosis. Some of these fat cells are filled with a granular detritus, while others show fine needle-like crystals. The diagnosis of fat necrosis can therefore be established. (June 8, 1923)."

The following case report has been furnished through the courtesy of Dr. A. A. Berg, of New York City.

CASE XII.—M. D., married, female, sixty years of age, was admitted to Mount Sinai Hospital early in March, 1923. She had had two children; her past history otherwise was negative.

*Mammary History.*—About three months before admission the patient suffered an injury to the right breast, followed by the development of a large hæmatoma. The hæmatoma finally disappeared after a period of several weeks. About six weeks after the disappearance of the hæmatoma, a swelling appeared in the right breast over the same area.

*Physical Examination.*—The patient was of moderate adiposity.

*Breasts.*—There was a tumor in the right breast, smooth on its surface, pure, tense but not fixed to the skin or pectoral muscle. No palpable axillary nodes.

*Provisional Diagnosis.*—A provisional diagnosis of traumatic cyst of the breast was made, and consent given for operation.

*Operation.*—March 14, 1923. Dr. A. A. Berg. The tumor was excised.

*Pathology.*—By Doctor Mandelbaum, of Mount Sinai Hospital.

“Microscopical examination of specimen removed from the breast of Mrs. D. shows small cysts containing red blood cells, fatty crystals and giant cells. (Phagocytes.) There is nothing present of malignant character. Diagnosis: Fat necrosis due to trauma.”

The following two cases have been furnished us through the courtesy of Dr. Joseph C. Bloodgood, of Baltimore.

CASE XIII.—M. B., married, female of about fifty-six years of age, was admitted to the hospital March 31, 1920, under the care of Dr. J. M. T. Finney. She had suffered cardiac palpitations for years. A hysterectomy had been done in 1917 for irregular uterine bleeding.

*Mammary History.*—Patient had had pain in both breasts for seven years, but the masses in the breasts had been noted but for two weeks.

*Physical Examination.*—Breasts were symmetrical and large. There were no palpable axillary nodes. There was a lump in the left breast in the upper outer quadrant 2.5 x 1.5 cm. The skin over it was slightly reddened with definite skin retraction and dimpling, was tender and was hard in consistency. There were two masses in the right breast, the first in the upper outer quadrant just beneath the skin, which was 1 cm. in diameter. The skin over it was slightly reddened. In the lower outer quadrant was a mass 3 cm. in diameter, the skin over it somewhat reddened. The mass itself was tender, irregular in outline and hard. Both masses showed skin retraction and dimpling.

*Provisional Diagnosis.*—Benign tumors of the breast. The following note by Doctor Finney is of interest. “This case was a most interesting one from a diagnostic standpoint. I have never seen anything quite like this condition. I was sure it was not malignant, although many of the characteristics of malignancy were present. It was simply a localized area of inflammation of fat in the breast. This inflammation involved the skin, producing retraction and dimpling, together with the pig-skinned appearance so often seen in connection with cancer.”

*Operation.*—April 9, 1920. Doctor Finney. Exploratory incision. Excision of tumor from both breasts.

*Pathology.*—Report by Dr. Joseph C. Bloodgood. “Grossly the masses have not the appearance of cancer. From the left breast is an area of skin 7 x 4 cm. removed with a mass of fat. Just beneath the nipple you can see a little irregular non-encapsulated area, distinct from the surrounding fat, which palpates like cancer, but has no other gross markings of cancer.

“The area removed from the right breast is 1 cm. in diameter, irregular, no capsule, feels hard like cancer, but has not the appearance of cancer.

“Frozen section shows tumor composed of fat with a good deal of cellular fibrous tissue. No gland parenchyma. No histological evidence of cancer. There is a cellular granulation tissue in fat, numerous leucocytes, larger cells which might be called epithelial cells, which suggest to me plasma cells or endothelial lymph vessels. I even find here and there areas of fat necrosis. The tumor is apparently due to a chronic inflammatory reaction in the fat, with production of connective tissue and fibrous tissue.”

*Post-operative Course.*—Patient well four years after operation.

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CASE XIV.—L. M., White female, thirty-nine years of age, was admitted to St. Agnes' Hospital in June, 1923.

*Mammary History.*—Two weeks before admission, woman observed a tumor in the breast, outside the nipple zone. Patient had very large breasts which were very fatty.

*Physical Examination.*—By Dr. Joseph C. Bloodgood. "Inspection was negative. Breasts very large. Well developed nipple. No warts on nipples. No varicocele beneath nipples. Not the shotty breasts. As I pushed both breasts toward the sternum I saw three dimples in the nipple zone of the upper hemisphere, and right beneath this area I could palpate a mass that extended to the areola. It was superficial as if it were in

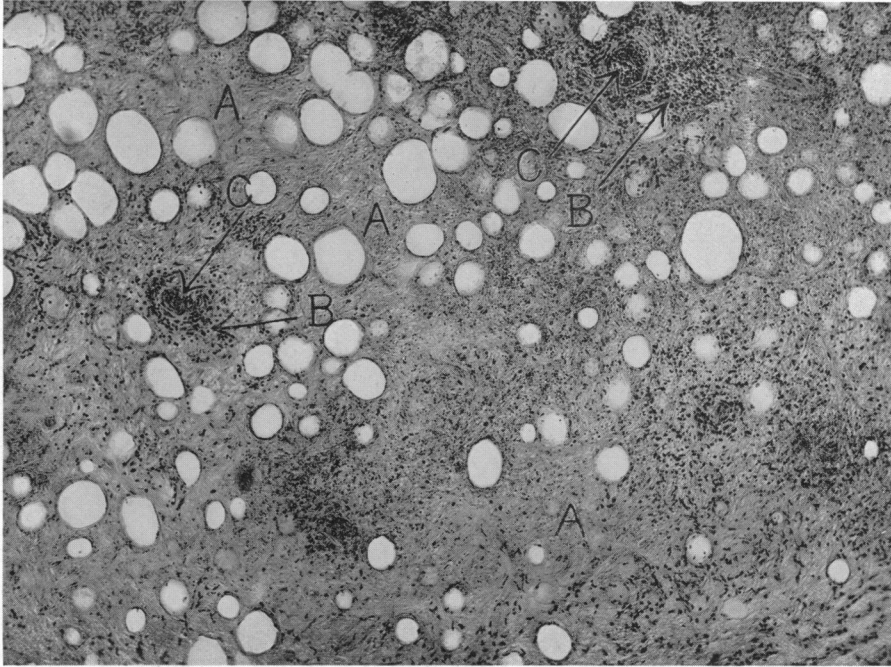


FIG. 11.—Photomicrograph. A. Necrosis. B. Lymphocytic infiltration. C. Obliterating endarteritis.

subcutaneous tissue. Felt like a bunch of worms. Leathery. It was irregular in outline. Nothing to be palpated in the axilla. Little tenderness."

*Provisional Diagnosis.*—"Breast benign tumor. Subcutaneous calcified and inflammatory lipoma. Tumor felt like dilatation of ducts outside of nipple area and was clinically malignant because of dimpling of skin."

*Operation.*—June 7, 1923. Doctor Bloodgood. Excision of area with dimpled skin, thinking it was dilated ducts. The mass was then bisected and diagnosed as calcified lipoma.

*Pathology.*—Report by Doctor Bloodgood. "On exploration, proved to be fat stroma with a number of subcutaneous areas but no calcification.

"*Microscopic.*—Section 2, subcutaneous fat, we have fat and in the fat irregular areas of lymphoid reaction apparently surrounding fat necrosis, perhaps the next stage to the necrosis would be the calcification. Beneath this are what we have originally diagnosed: dilatation of ducts, so the clinical diagnosis was part right and the gross diagnosis was part right. I did not see dilatation of ducts in the gross. Section 3, fat beneath, 2, largely breast with lymphoid areas and fat necrosis as in 2, and dilatation of ducts and lobules of breast. Section 4, fibrous tissue beneath skin, same fat, same lymphoid areas. Section 5, breast tissue and fat, same fat, same lymphoid areas fat necrosis. Here and there dilatation of ducts, fibrous tissue."

*Life History.*—A severe trauma to the breast produces a rupture of fat cells, and at the same time a rupture of small blood-vessels, with extravasation of blood into the tissues. If this hemorrhage occurs near the surface, ecchymosis may be apparent beneath the skin; however, if a hemorrhage occurs in deeper tissues, as in the hypodermoclysis cases, no ecchymosis may be observed. Necrosis of the fat tissue appears soon after the injury, and giant cells have been found in the tumors at the end of five weeks. An obliterating endarteritis may appear a few months after the injury. See Case I,

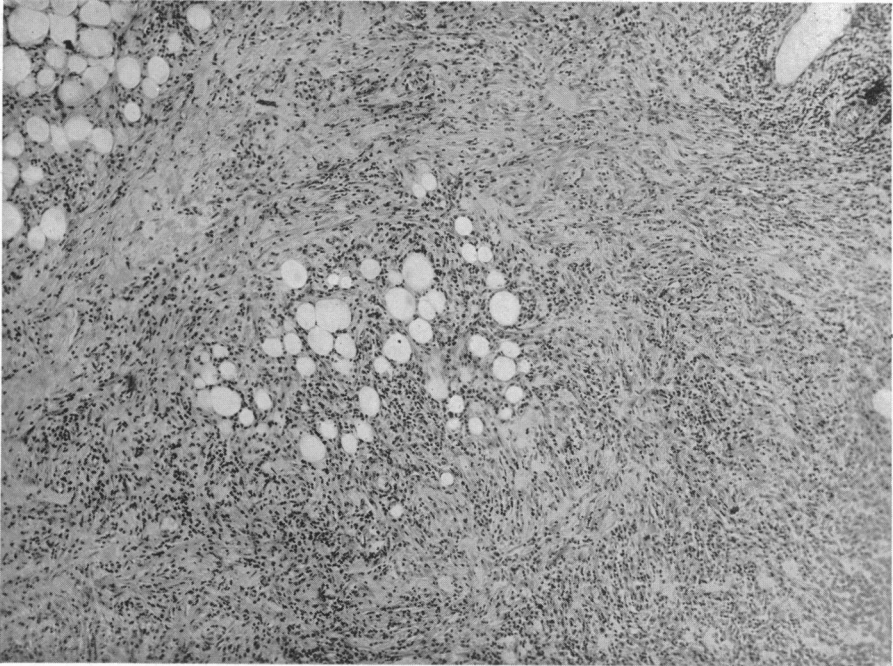


FIG. 12.—Case I. Photomicrograph showing about fat cells, an inflammatory infiltration with a marked productive reaction of the fibrous tissue.

showing marked changes of this character three months after receipt of the trauma. (Fig. 11.) In no early case was there an oil cyst of any large size. Several years after the beginning of the process, as seen in Cases III and V (Figs. 9 and 10), definite large cysts 2.5 cm. in diameter, with a thick laminated fibrous wall, may be expected. (Fig. 14.) Therefore, multiple cysts of small size are usually seen early, but a small number of larger cysts are to be expected later in the course of the disease. After several years these cystic cavities may contain a mixture of small and large calcareous masses, sometimes as fine as sand, other times as large as 5 mm. in diameter, mixed with a thick, brownish, sticky detritus. Had these tumors been left undisturbed, it seems possible that the entire cyst contents and cyst wall would have become a solid calcareous mass.

*Incidence.*—Our former study gave an incidence of traumatic fat necrosis of the breast in comparison with primary carcinoma of the breast of 1.8 per

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cent. The additional cases occurring in the clinic have now raised this percentage figure to 2.5 per cent. Our own experience with this disease, coupled with the reports of other observers, proves that it is not uncommonly encountered in dealing with tumors of the mammary gland.

*Age.*—The youngest patient of the twenty under report was thirty years of age, the oldest sixty-three. Therefore, the lesion is encountered in the so-called cancer decades and most often in mid-life. The reason for its occur-

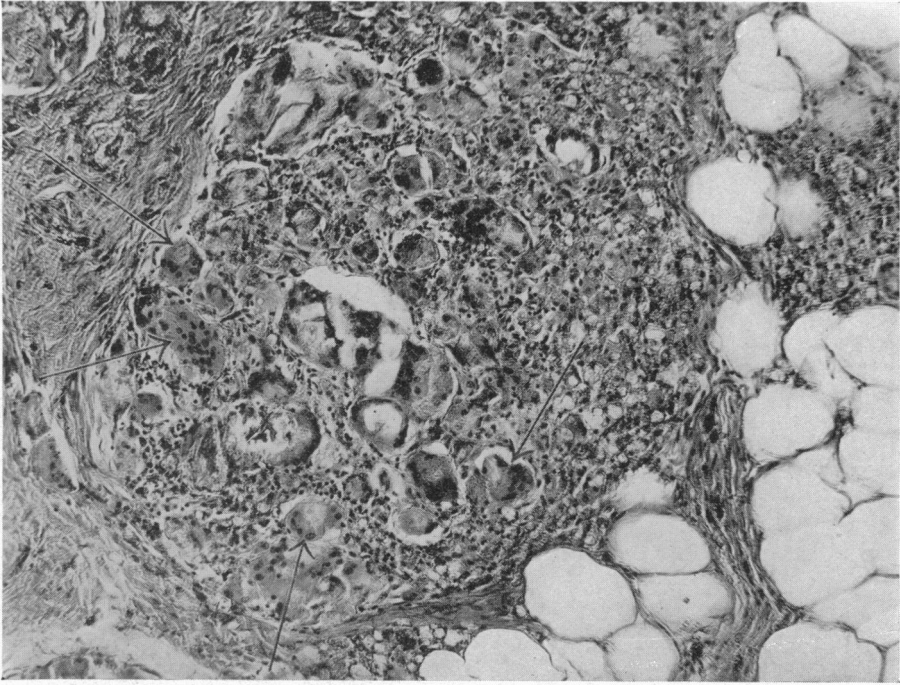


FIG. 13.—Case VI. Photomicrograph showing nests of large and small giant cells.

rence in mid-life is probably due to the fact that in youth and old age an excess of fat deposit in the breast is much more rare.

*Weight.*—In practically every incidence the patient was far beyond the normal weight. The importance of this factor is illustrated by the following table:

*Weight Chart*

1 Case .....	211 pounds
3 Cases .....	190 to 200 pounds
3 Cases .....	180 to 190 pounds
1 Case .....	170 to 180 pounds
1 Case .....	160 to 170 pounds
3 Cases (short in stature) .....	150 to 160 pounds

In the cases in which it was recorded the average weight was 176 pounds.

*Type of Breast.*—Nineteen of the twenty cases had definitely obese breasts. As the disease occurs in unusually adipose individuals, one would expect to



encounter in such patients abnormally fat breasts. The breasts vary in type from those which are large and pendulous (Figs. 1, 2 and 3), reaching almost to the umbilicus, to those which are protruding and massive. (Figs. 4 and 5.) Such breasts are more readily subject to trauma and contain far more fat tissue than the average mammary gland.

*Trauma.*—The degree of trauma is usually severe. In one instance the

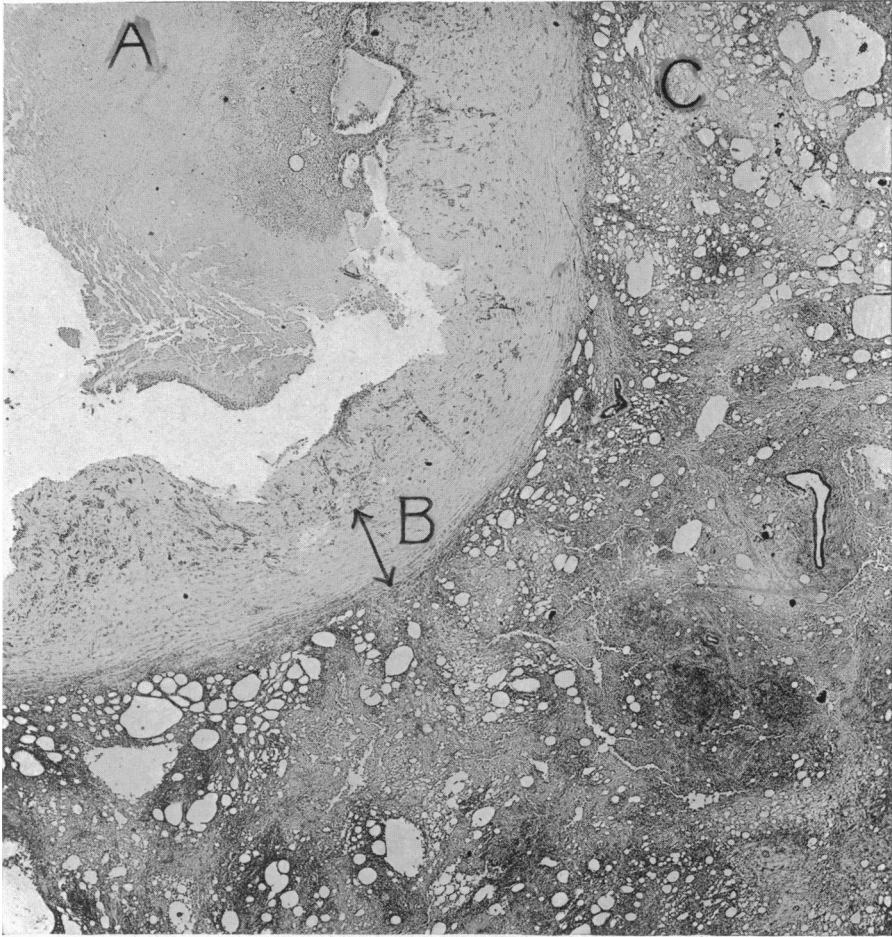


FIG. 14.—Case III. Photomicrograph of portion of 2.5 cm. cyst. A. Represents the fatty necrotic material which fills the cyst. B. Represents the cyst walls showing the laminated connective tissue structures. C. The outlying necrosis in that tissue.

patient fell downstairs with a picture frame under her arm, the corner of the frame striking the breast. Another patient fell thirteen steps, a trauma being inflicted upon the breast by the sharp corner of a pedestal at the bottom of the stairs. A third patient was struck violently in the breast by the point of an elbow. These instances illustrate the production of the lesion by a mechanical injury of marked degree. In three of the patients the trauma was furnished by a preceding hypodermoclysis, and we feel that a tumor

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developing in the breast following hypodermoclysis, is more likely to be due to fat necrosis than to any other type of lesion. However, in four of the cases in our series no definite history of trauma could be elicited, while in two other instances no statement was made as to presence or absence of trauma. In fourteen of the cases, or 70 per cent., the traumatic history was definite. As we have pointed out in a former contribution, the surgeon should assure himself that the site of trauma is identical with the location of the tumor.

*Absence of Pain.*—Traumatic fat necrosis of the breast is characterized by its painlessness. In but three instances was there any complaint of definite pain. However, there is a certain amount of tenderness in and about the breast following the receipt of the injury, but this symptom generally disappears in a short time.

*Hardness.*—This important symptom was present in fifteen of the twenty cases, and the stony hardness of fat necrosis is largely responsible for the difficulty of clinically distinguishing the lesion

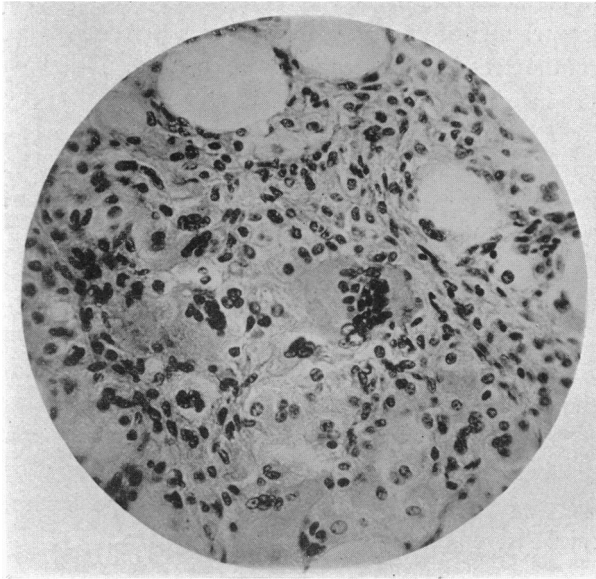


FIG. 15.—Case X. Photomicrograph showing large and small giant cells.

from carcinoma. One of the cases under report, Case XII, was elastic in consistency, while Case XIV was described as of "leathery" feel.

*Fixation to the Skin.*—Skin adherence was present in fourteen cases, or 70 per cent. of the total number. The appearance presented by the skin attachment over the tumor may be identical with that seen in cases of mammary carcinoma, as is illustrated by Fig. 6, in which the appearance of the tumor followed a hypodermoclysis.

*Nipple Retraction.*—This sign is rarely present, occurring in but four of the cases, or but 20 per cent. In a tumor of long standing the absence of nipple retraction is of considerable importance in a differentiation from carcinoma, in which disease it is quite uniformly to be expected.

*Attachment to Deeper Parts.*—It seems probable that this sign is produced by the inflammatory reaction and subsequent fibrosis following a hemorrhage deep in the breast with the formation of adhesions to the pectoral fascia. This symptom was elicited but four times in the entire series, or but 20 per cent. It must be regarded a fairly inconstant symptom.

*Axillary Nodes.*—In the palpation of any axilla, and especially in the axilla of a fat woman, it may be impossible by the most painstaking examination to make out the presence or absence of lymph-nodes, or to determine their size and consistency. In no instance of the cases in this series were any nodes of hard consistence palpated prior to operation. In five instances small soft nodes were to be felt, but in the remaining fifteen cases palpation of the axilla was negative.

*Size of the Tumor.*—The tumor varied in size from a small nodule 1 cm. in diameter to a mass 6 x 8 cm. Therefore, the nodule of fat necrosis following trauma of the breast shows no constancy as to size. A nodule of a few centimetres in diameter is to be expected. We have never seen a large tumor produced by this lesion.

*Period of Development following the Trauma.*—Of the fourteen cases in whom a definite history of trauma was obtained, but one gave a history of an immediate appearance of the tumor following the trauma. In Case XI a tumor was recognized a few days after the injury, while in Case IV a month had elapsed following the receipt of the trauma. Upon the other hand, in Cases III and V there was a period of ten years and eight years, respectively, from the time of injury to the appearance of the mass in the breast. Therefore, no rule can be laid down as to the period of time between trauma and the recognition of the tumor.

*Ecchymosis.*—In eighteen cases a statement was made as to the presence or absence of ecchymosis, and in nine instances, or 50 per cent., the findings were positive. It is possible that in some instances a transient ecchymosis might have been unobserved by the patient.

#### *Graphic Chart of Symptoms and Diagnosis*

19 cases showed	fatty breast
15 cases showed	stony hardness
15 cases were	painless
14 cases gave history of	severe trauma
14 cases showed	skin fixation
13 cases were diagnosed	non-malignant
9 cases gave history of	ecchymosis
7 cases were diagnosed	cancer
5 cases had	soft axillary nodes
4 cases showed	nipple retraction
4 cases showed	deep attachment

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TABLE I.  
Summary of Cases.

Case	Authors	Age	Weight lbs.	Trauma	Pain	Tumor hardness	Obese	Nipple retraction	Skin fixation	Deep attachment	Axillary nodes	Ecdy-mosis	Duration	Pre-operative diagnosis
Case I.		52	190	+	0	++	++	0	++	+	0	0	3 mo.	Ca.
Case II.		36	211	+	0	++	++	0	+	+	+	0	7 mo.	Ca.
Case III.		40	191	+	0	++	++	0	++	+	+	+	1 mo.	Non-Mal.
Case IV.	Lee and Adair.....	47	152	+	+	+	+	+	+	0	0	+	10 mo.	Non-Mal.
Case V.		54	180	+	0	+	+	+	+	0	0	+	3 wks.	Non-Mal.
Case VI.		48	196	+	0	+	+	0	+	0	+	+	5 mo.	Non-Mal.
Case VII.		44	181	0	0	++	++	+	0	0	0	0	2 wks.	Mal.
Case VIII.		30	160	0	+	++	++	+	0	0	0	0	3 mo.	Non-Mal.
Case IX.		45	186	0	0	+	+	+	+	0	+	+	4 wks.	Non-Mal.
Case X.	Kilgore.....	59		0	0	+	+	+	+	0	0	0	4 days	Non-Mal.
Case XI.	Hyman.....	53	170	+	0	+	+	0	0	0	+	+	1 mo.	Non-Mal.
Case XII.	Berg.....	60		+			+		0	0	0	+	3 mo.	Non-Mal.
Case XIII.	Bloodgood.....	56			+	+		+	+		0		2 wks.	Non-Mal.
Case XIV.	Bloodgood.....	39					+		+		0			Non-Mal.
Case XV.	Parsons.....	42	150?	+	0		+	0	+			+	5 days	Non-Mal.
Case XVI.	Cohen.....	35	150	+	0	+	+	0	+	0	+	0	4 wks.	Non-Mal.
Case XVII.	Lanz.....	36		+	0	0	+	0	+	0	+	0	3 wks.	Mal.
Case XVIII.	Kuttner.....	63		+	0	+	+	0	+	+	0	+	6 wks.	Mal.
Case XIX.	Berner.....	34		+	0	+	+	0	+	+	0	+		Mal.
Case XX.	Stutz and Fontaine.....	53		+	0	+	+	0	+	+	0	+	1 mo.	Mal.

*Diagnosis.*—The clinical diagnosis of traumatic fat necrosis of the breast is often difficult, but in certain cases a correct diagnosis can be rendered before operation. The most important factors in the diagnosis of this condition are:

1. It always occurs in a fat breast.
2. It usually occurs in a corpulent subject.
3. A definite history of severe trauma can usually be obtained.
4. The tumor is painless.
5. In the vast majority of cases the consistency of the tumor is one of stony hardness.
6. Skin adherence is present in a large number of cases.

The differentiation from carcinoma is at times difficult. In those patients in whom the lesion has existed for several years carcinoma may readily be excluded. In more recent cases, extending over months or years, it may be impossible to distinguish the two conditions. Of the twenty cases, a diagnosis of non-malignancy was rendered before operation thirteen times. In seven instances a pre-operative diagnosis of carcinoma was made. The diagnosis of malignancy was therefore incorrectly rendered in 35 per cent. of the cases.

*Treatment.*—A non-traumatizing excision of the tumor, together with a reasonably wide zone of surrounding tissue, will yield a satisfactory result. It seems wise to emphasize the necessity of a non-traumatizing operation, for in a fat breast, injury to the adipose tissue may reproduce the lesion. We have seen one instance of traumatic fat tissue appearing in a scar following an excision of a benign tumor. In cases of long standing, if the surgeon feels fairly certain that he has correctly diagnosed the condition, no excision or treatment of any sort need be strongly urged. Especially is such an attitude justified if the patient is a little worried because of the tumor in the breast. In general, however, we feel that the wisest course is excision.

#### CONCLUSIONS

1. Traumatic fat necrosis of the female breast is a definite clinical disease.
2. Its importance lies mainly in its striking similarity to carcinoma of the breast, not only as to its clinical appearance, but also as to its gross and microscopical picture.
3. A correct diagnosis of the condition prior to operation can sometimes be made.
4. Surgeons should recognize this lesion and constantly be on the look-out for it.

## TRAUMATIC FAT NECROSIS OF THE FEMALE BREAST

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