

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

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THE object of this report is briefly to set forth the clinical, operative, and pathological findings of two cases of traumatic fat necrosis of the breast, recently encountered at the Memorial Hospital. Although much has been written concerning the differentiation between the benign lesions and mammary carcinomata, a careful search of surgical and pathological literature has failed to reveal any reference to this subject, for it has apparently hitherto been unrecognized.

We have the hope that the data presented and the discussion stimulated by the study of these two cases may result in a better understanding of the clinical and pathological aspects of this subject and lead to its more accurate diagnosis in the future.

Clinically the simulation to carcinoma is very startling, and we desire to place special emphasis upon this point. In one of the cases, a radical amputation of the breast, muscles and axillary contents was performed, the operator believing that the tumor was malignant. In the other patient only local removal of the mass was practised, at first, but gross examination of the cross-section, in the operating room, led one of the writers to a diagnosis of carcinoma, which was confirmed by another surgeon, but not concurred in by a third. The breast was removed, but the muscles were not sacrificed. A more careful analysis of the gross and microscopic appearances made the real character of the lesion apparent.

CASE I.—E. B. The woman was a white, native-born American, aged fifty-two years, and was a widow. She was admitted to the Memorial Hospital August 29, 1919.

Chief Complaint.—A growing mass of considerable size in the right breast.

Family History.—Negative for carcinoma.

Past History.—Previous illnesses: She was operated upon at the Memorial Hospital, six years previously, for an abscess of the right side of the neck. She had had several miscarriages. Her past history was otherwise negative.

Breast History.—She had had no lactations and there had never been any ailment with either breast.

Present Illness.—In May, 1919 (three months before her admission

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to the hospital), she received a definite trauma to the right breast. This occurred while she was sitting in a street car. A woman carrying a child fell heavily against the patient, delivering a severe blow with her elbow against the right breast. This incident was not followed by tenderness or pain. Three months later (three days before her admission to the hospital) the patient noticed a lump, about the size of a lime, at the site of the former injury, in the upper outer quadrant of the right breast. This mass has been unassociated with pain.

Physical Examination.—The patient was a well-developed, well-nourished white woman, weighing about 190 pounds. Her general physical examination was negative, with the exception of the lungs, which showed on percussion slightly increased dulness between the scapulæ, together with a few scattered sibilant râles. Röntgen-ray examination of the chest showed no evidence of tuberculosis or metastasis. The Wassermann was twice reported negative.

Breasts: The mammary glands were of large type. A tumor was present in the upper outer quadrant of the right breast, measuring about 5 by 4 cm. There was no retraction of the nipple, nor was there any discharge from it. The mass showed moderate fixation to the skin, with some slight surface dimpling. There was some attachment to deeper structures. No axillary or supraclavicular nodes were palpable. The left breast was normal.

Provisional Diagnosis.—Primary carcinoma of the right breast.

Operation.—On September 23, 1919, the right breast, muscles, and axillary contents were removed by Doctor Bolling.

Pathological Examination. Gross Examination.—Three centimetres above and outside of the nipple situated in the breast was a tumor mass 2 cm. in diameter, irregular, circumscribed, but not encapsulated. It merged along one border with the fat tissue and elsewhere with the breast tissue. The tumor was opaque, brownish yellow, as in a xanthoma, and there was irregular hyperæmia along the upper edge. The growth lacked definite cicatricial character and chalky streaks.

The whole breast was uniformly fibrosed and contained no cysts. The axillary nodes were slightly enlarged and apparently not cancerous.

Microscopic Examination.—Sections showed broad areas of fat necrosis, surrounded by a broad zone of new cellular connective tissue, in which large vessels showed active obliterating endarteritis. Along certain segments of necrotic areas there was granulation tissue containing several large giant-cells. A search for spirochæte in the tissues was negative.

The patient was discharged from the hospital October 1, 1919, eight days after operation, having had an uneventful convalescence.

Subsequent Notes.—The patient was readmitted on November 10, 1919, because of persistent hemorrhage from the vagina. Examination revealed a small bleeding-point on an otherwise normal cervix. On either side of the vaginal vault were fungoid epithelial growths and half way down the posterior wall was another small tumor.

Sections taken from the vaginal growths were reported to be basal-celled carcinoma.

The patient was treated with radium by Doctor Bailey, and is still under his observation.

March 31, 1920, no evidence of disease in the vagina and cervix was apparent. The final outcome of the vaginal tumor will have to be subsequently reported.

Doctor Ewing has stated that the vaginal growth bears no relation of any sort to the traumatic fat necrosis of the breast, but these data are included as a part of the follow-up history of the case.

CASE II.—R. R. The woman was a Roumanian, aged thirty-six years and was married. She was admitted to the Memorial Hospital January 15, 1920.

Chief Complaint.—A lump in the right breast, which was steadily increasing in size.

Family History.—Negative for carcinoma and tuberculosis.

Past History.—Occupation: housework. Habits: abstemious. Weight: her usual weight was 211 pounds, and this was approximately her weight at admission.

Previous Illnesses.—She had always been well, with the exception of two extra-uterine gestations, both of which necessitated operative procedure.

She had never had any miscarriages.

Her past history was otherwise negative.

Breast History.—There had been three lactations: the first one fifteen years ago, the last one four years later, the duration of each having been about a year.

The nipples had always protruded.

There had never been any unusual breast incident during her nursing period.

Present Illness.—June 22, 1919 (about seven months before her admission to the hospital), her last operation for ectopic pregnancy was performed. Pleurisy and pneumonia developed and she became dangerously ill. She was given a hypodermoclysis under the right breast, three quarts of saline being introduced. No unusual pain was associated with this administration. One month later (six months before admission) she first accidentally noticed a small lump, the size of a walnut, in the upper and inner part of the right breast at the site of the previous injection. This mass had caused no pain whatever, but had been steadily increasing in size.

Physical Examination.—The patient was a robust, middle-aged woman, of unusually large build. Her appearance indicated perfect health. The general physical examination was negative. The lungs were clear throughout and fluoroscopy of the chest was negative.

Breasts: Large and pendulous. The left breast was normal.

The right breast showed no retraction of the nipple, nor was there any elevation of it. About 3 cm. to the inner side of the right nipple was a mass, 3 by 2 cm. in diameter, making it approximately the size of a small hen's egg. The tumor was roughly cylindrical, fairly sharply circumscribed, and had a distinct firm edge. The mass was hard in consistency. It lay just beneath the skin on the

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upper inner aspect of the breast, near its posterior surface. The tumor showed slight skin adherence, but was, however, movable in the breast and not attached to deeper structures. There was one small soft lymph-node in the right axilla.

Provisional Diagnosis.—The provisional diagnosis was carcinoma of the breast, although the circumscribed character of the mass suggested the possibility of a benign adenoma.

Pre-operative Treatment.—The patient received the usual pre-operative Röntgen-ray cycle for the chest, breast, axillary and supra-clavicular regions, the cycle being completed on January 21st. Operation was performed nine days later.

Operation.—Under ether anæsthesia a local excision of the tumor was made through the anterior aspect of the breast, going well wide of the involved area. This local excision was done because the mass was so sharply defined that it seemed possible that malignancy might not be encountered. The tumor was immediately sectioned after its removal, and was found to consist of two sharply outlined solid areas, while between them lay a small cavity containing thick, oily fluid. As the knife passed through the solid tumor tissue one had the same impression of cutting a hard, granular substance that one experiences in sectioning a carcinoma. Although none of the minute yellow points so frequently seen in carcinoma could be distinguished, its extreme hardness made me feel fairly certain that the case was one of cancer of the breast. Another surgeon present concurred in this gross diagnosis. However, Doctor Stone did not believe the tumor was carcinomatous.

An amputation of the breast was then performed down to and including the fascia covering the pectoralis major muscle. The muscles themselves and the axilla were not disturbed. Further operative procedure was to depend upon the report of the pathologist.

Post-operative Diagnosis (by the Operator).—Carcinoma of the breast: Following the operation the operator was considerably concerned about the outcome of the case, having a fairly definite conviction that a more radical operation should have been performed. He was therefore very anxious to learn the result of the gross examination, anticipating criticism of the incompleteness of the operation. He was greatly surprised, however, to be told that the breast itself should not have been removed, that local excision of the tumor was all that had been indicated and that the lesion had no malignant features.

Pathological Examination. Gross Examination.—There was an indurated area, 2 by 1 by 4 cm., slightly cicatricial, not quite hard enough for carcinoma; well circumscribed, almost entirely encapsulated, apparently a fat lobule, which suggested a tumor process. On cross-section the texture was opaque, xanthematous and light yellow in color, not translucent, without definite chalky or silvery points. Adjoining was a smaller fat lobule, with a few similar slightly opaque points. Adjoining also was a cyst, 1 cm. wide, containing creamy contents, having a smooth blood-stained wall.

Gross Diagnosis.—Chronic inflammation in fat tissue. The remainder of the breast was normal.

Microscopic Examination.—The structure of the lesion showed chronic productive inflammation in fat tissue. There were no evidences of carcinoma. The fat-cells were proliferating, replacing fat, and many small giant-cells were present. There was much diffuse new fibrous tissue, which accounted for the opacity. In places there were collections of lymphocytes and occasionally a few cysts. The large cyst was lined by large epithelial cells of the sweat-gland type. A few accompanying breast alveoli showed round-cell infiltration.

There was no unusual incident in the patient's convalescence.

Incidence.—At the Memorial Hospital the ratio of traumatic fat necrosis of the breast to mammary carcinoma is as 2 to 330, or 0.6 per cent.

Pathology.—In our study of the pathology presented in these two cases we are greatly indebted to Dr. James Ewing, pathologist at Memorial Hospital, and he has outlined the following points in the gross examination of traumatic fat necrosis of the breast.

Gross Appearances.—The differential diagnosis of the gross lesions in these two cases presented an interesting problem. A careful study of the details of the naked-eye appearance led to the conclusion that in neither case was the lesion carcinomatous.

In the case of E. B. the presence of a rather large area of opaque discolored fat tissue, nearly diffuent in the centre, was satisfactory evidence that the chief material was necrotic fat. This area along one side was sharply demarcated from normal fat tissue, as is infiltrating mammary cancer; but this zone failed to show the positive signs of carcinoma, such as cicatricial contraction, grayish lustre, and fatty and chalky points and streaks. Likewise the rather broad zone 2 to 3 cm. of cellular granulation tissue did not present the form, outline, or texture of carcinoma. Accordingly, a gross diagnosis against a neoplastic process was rendered.

In the case of R. R. the gross diagnosis was more exacting, but was accomplished by careful adherence to the criteria of gross anatomical diagnosis of mammary cancer. Here there was one separate area, 2 by 2 cm., of necrotic fat, which was readily recognized. A second area presented greater difficulties. This was an oval area of 2 by 1 cm., firm and cicatricial in appearance, with exanthematous texture and considerably resembling carcinoma. However, it was observed that this area was fairly well encapsulated; that in size and form it was exactly similar to the adjoining fat lobules; and that it did not present the smooth opaque texture of carcinoma nor the chalky points or streaks. On these data the diagnosis of chronic inflammation of fat tissue was given. Paraffin sections revealed a productive inflammatory process with multiplication of many cuboidal fat-cells lying in alveoli, which would have been difficult to distinguish from alveolar carcinoma in a frozen section.

Microscopical Appearances.—Areas of necrosis in fat tissues were to be

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seen with new connective-tissue cells, growing in and about these areas of necrosis. This growth of new tissue was very abundant, and with the giant-cells which one saw scattered throughout the tissue a luetic granuloma might superficially be suggested. Many of the giant-cells were markedly flattened, the syncytial tissue being closely applied along the borders of huge vacuoles, which corresponded to large tissue spaces containing diffuent fat. These giant-cells were, therefore, of the so-called foreign-body type. Certain portions of the sections show proliferation of the nuclei of fat-cells, these same cells showing also an opaque zone close to the periphery of the cell, probably representing certain changes in fat saponification.

The blood-vessels show an obliterating endarteritis which was apparently of recent origin and a perivascular infiltration with lymphocytes.

Diagnosis.—Trauma appears to be an essential and distinctive etiological factor in connection with fat necrosis of the breast. A history of the appearance of a mammary tumor with no preceding definite trauma would practically eliminate fat necrosis as a possible diagnosis. Although trauma is not infrequently encountered in the history of a mammary cancer, it is often indefinite and frequently absent. A recent exception to this rule was met in a young woman, aged twenty-six years, who received a terrific blow upon the breast by a hard-hit baseball. Six months later she developed, at the exact site of the injury, an encapsulated papillary cystadenocarcinoma of the breast. It is well known that this particular type of cancer is one of the less malignant varieties. In general, however, the surgeon should weigh carefully the evidence of distinct trauma to the breast and remember the possibility of a fat necrosis and the secondary chronic inflammatory changes attending it.

Clinically, traumatic fat necrosis of the breast very closely simulates mammary carcinoma and the differentiation may be very difficult. The symptoms of fat necrosis which strongly suggest malignancy may be enumerated as follows:

1. *Rapid Increase in Size.*—The mass of traumatized fat increases rapidly because of the proliferation of new connective tissue associated with the chronic inflammatory process. A period of several weeks or months may elapse from the time of the receipt of the injury to the appearance of the tumor; and from that time on the increase in size strongly suggests the possibility of malignancy.

2. *Skin Adhesions.*—Both the patients under report exhibited the same skin adherence which one sees in many cases of malignant disease of the breast. The tumor mass seemed held to the skin by several lines of adhesion and gave the impression of a solid tumor with superficial surface closely adherent to overlying skin. This feature so often regarded as pathognomonic for malignancy was striking in both instances.

3. *Consistency.*—The consistency of the tumor in each instance was as hard as in the average case of malignancy. Although some of the benign

fibro-adenomata are very hard, the two characteristics above mentioned are lacking in this type of growth. Upon the other hand, one must bear in mind the exceedingly soft, brain-like encapsulated carcinomata which are the most malignant of all types of mammary cancer. In general, hardness in a breast tumor suggests malignant possibilities, and traumatic fat necrosis with the reaction attending it produces a distinctly hard mass.

4. *Lack of Pain.*—No pain was experienced in the cases of fat necrosis. This gave an exact parallel to malignancy, because tumors of the latter type in their early stages exhibit an entire absence of pain. Only in the later, more advanced periods does a cancer of the breast cause pain.

5. *Adhesion to Deeper Structures.*—One of the patients showed definite fixity of the tumor to the underlying muscles. This symptom is almost invariably regarded as a sign of malignancy, and its presence, therefore, strongly influenced the surgeon in reaching a diagnosis of malignancy.

The points of differentiation from malignant disease may be outlined as follows:

1. The history of trauma is more exact and definite than with the average carcinoma.

2. The tumor in fat necrosis is fairly well circumscribed, while the mass in carcinoma is usually more diffuse.

3. The tumor is rather more movable in the breast than is usual with carcinoma.

4. Axillary nodes, if present, have not the hard consistency of those associated with cancer. This differential point would, of course, be of no value in a very early mammary cancer without metastasis in the nodes.

5. The characteristic gross appearances of fat necrosis upon cross-section of the tumor have already been outlined under the paragraph on pathology.

DISCUSSION.—Several points worthy of discussion may briefly be referred to:

In connecting the appearance of a tumor with a history of trauma one should bear in mind the four medicolegal points usually required:

1. The history of trauma must be sufficiently definite and of a severity adequate to produce the tissue damage.

2. The site of the trauma and the location of the lesion must be identical.

3. A proper time relationship must exist from the receipt of the trauma to the appearance of the tissue changes.

4. Proof should be at hand that the tissue was normal before the receipt of the trauma.

All of these requirements, save the fourth, are met in the cases of fat necrosis, and it is obviously impossible to fulfill the fourth requirement.

When the wide distribution of subcutaneous fat is considered, one may well ask the question, Does fat necrosis from traumatism ever occur in the tissue? Our colleague, Doctor Farr, of the New York Hospital,

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has completed a paper, about to be published, in which several cases of traumatic fat necrosis in subcutaneous tissues are reported. Boxers and wrestlers must be subject to a tremendous number of traumatisms to the superficial fat. It seems probable that some defensive mechanism must exist to prevent the development of necrosis in fat tissue following trauma. In the cases in this report it seems fair to assume that some peculiar conditions may have been present, permitting the trauma to bring about the lesions described.

In the first case lues might be thought of as a possible etiological factor, on account of the miscarriages, the granulomatous appearance of the tissue and the obliteration of endarteritis. However, two Wassermanns in expert hands were negative, and a careful search for spirochætes failed to reveal any organism.

The second patient showed nothing in the tissues quite comparable to the extensive granulomatous changes found in the first patient, and here syphilis could be dismissed at once.

We feel, therefore, that a leucic element in these cases may be positively dismissed as having no bearing upon the pathology of this disease.

CONCLUSIONS

1. Traumatic fat necrosis of the female breast is a definite clinical entity.
2. It must always be included with the benign lesions of the breast.
3. Clinically, it more closely resembles carcinoma of the breast than any other tumor, and must be differentiated from it.
4. A distinct history of trauma to the breast and a well-circumscribed, firm mass, showing rapid increase in size, unassociated with pain and without axillary nodes that are firm, suggest the possibility of fat necrosis.
5. Local removal of such a mass is justifiable if a proper gross diagnosis can be made in the operating room. Should the gross examination reveal carcinoma, complete amputation may then be performed.
6. The diagnosis of traumatic fat necrosis of the breast by gross examination is possible. The gross features of this lesion should, therefore, be clearly understood by every surgeon.
7. Further lines of research, along chemical as well as along morphological lines, may throw additional light upon the real nature of this process.