

Fat Necrosis Following Breast – Cancer Surgery and Radiotherapy

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Background: Local recurrence is the most devastating complication post breast cancer surgery and radiotherapy. It is difficult to differentiate it from fat necrosis, which has higher incidence.

Objective: Investigate the incidence of fat necrosis after breast cancer surgery with radiotherapy.

Design: Retrospective review study.

Setting: Surgical department, Salmaniya Medical Centre, Kingdom of Bahrain.

Method: Between August 1999 and September 2007, eighty-seven patients of breast cancer patients were diagnosed in our firm. Patients with recurrent masses in the treated breasts or scars were 17.

Data was collected mainly from the histopathology department and medical files. It included: the number of patients involved, the stage of the disease, the details of the original surgery and if radiotherapy was administered or not, the method of diagnosing fat necrosis and the method of management.

Result: Analysis of these 17 patients showed that their breast mass was diagnosed to be secondary to fat necrosis and radiation changes in 15 and recurrence of malignancy in 2 patients. The diagnosis was reached either by fine needle aspiration cytology or biopsy either true-cut or excisional.

The TNM classification of these 15 patients at presentation, was T2 (13 patients), No (9 patients), and all the patients were M0. The original surgery was mainly breast conserving surgery in 10 patients. All patients except one received radiotherapy. These masses were diagnosed after one year. The diagnosis was suspected clinically in 10 patients.

In 15 patients, fine needle aspiration cytology was done. True-cut biopsy was needed in two patients. Excisional biopsy was done in 6 patients, one had mastectomy and 8 patients were kept on observation (i.e. regular clinical, radiological and cyto-or histopathological evaluation / 6 weeks-3 months).

Conclusion: Fat necrosis following breast cancer surgery and radiotherapy is a common complication that could be expected more than local recurrence of cancer.

Fat necrosis differential diagnosis necessitates improvement in the radiological and pathological investigation to reach the diagnosis and to avoid unnecessary surgery.

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Over the past two decades, breast-conservation surgery of lumpectomy and whole-breast radiotherapy has become a standard option for the majority of newly diagnosed breast cancer in women¹. Long-term local control is achieved in approximately 85% of patients, and the therapy is generally well tolerated¹. There can, however, be long-term effects on the breast and other nearby tissues that may range from asymptomatic findings on examination to severe, debilitating problems.

Infection, fat necrosis, and severe musculoskeletal problems such as osteoradionecrosis or soft-tissue necrosis are uncommon, affecting less than 5% of patients¹. However, changes in the range of motion, mild-to-moderate musculoskeletal pain, arm edema and breast edema are much more common.

As more women choose breast-conservation therapy for management of their breast cancer, physicians will encounter these problems, as well as local recurrence, with greater frequency.

Fat necrosis is most likely caused by a combination of surgical and radiation factors². The difficulty in management is differentiation between tumor recurrence and benign condition such as fat necrosis.

The aim of the study is to confirm that fat necrosis was seen more frequently than local recurrence in post breast cancer surgery and radiotherapy.

METHOD

Between August 1999 and September 2007, eighty-seven patients with breast cancer were diagnosed in our firm. Seventeen patients had recurrent masses in the treated breasts or mastectomy scars.

Their data were collected retrospectively mainly from the histopathology department and medical files. The data included the TNM stage of the disease, type of the original surgery (breast conserving surgery or mastectomy), radiotherapy, the method of diagnosis (clinical, radiological, or by cytology or biopsy), cytology findings, true-cut biopsy findings, duration to develop these changes, and method of management.

RESULT

Seventeen patients had recurrent masses in the treated breasts or in the mastectomy scars. These masses were secondary to fat necrosis and radiation changes in 15 (17%) and local recurrence of malignancy in two patients (2.3%).

TNM classification of the 15 patients at presentation was as follows: 2 patients were T1, 13 patients were T2, 9 patients were No, and 6 were N1, and all were M0. They were treated with breast conserving surgery in 10 patients, (lumpectomy with free margin), axillary dissection and radiotherapy to the remaining breast tissue, and mastectomy with axillary dissection and radiotherapy in 4 patients (1 patient had mastectomy, chemotherapy, but no radiation was given to the scar).

Postoperative masses were diagnosed after a median follow-up of one year in 7 patients, 2 years in 3, 3 years in 2 and 5 years in 2 patients. One patient underwent breast reconstruction post mastectomy and fat necrosis (nodule like) developed in the reconstructed breast with a FNA of C4. This was managed by excision with free margin.

The diagnosis was first suspected by clinical examination in 10 patients (palpable lump at the site of previous surgery), and by mammographic findings in 5 patients.

The cytology finding was C2* in 9 patients. Their mammogram was normal in 2, suspicious (indeterminate, or microcalcification) in 4, and was not done in the rest. Ultrasound finding was normal in 5, suspicious in 1, and was not done in the rest. All 9 patients were managed by observation with repeated FNAC and radiological investigation except 2 who underwent excision with free margin; the histopathology was fat necrosis with radiation changes.

The cytology was C3 in 3 patients. Their mammogram was normal in one, suspicious in one, and was not done in one of the patients; Ultrasound finding was the same as the mammogram. One of the patients with C3 suspicious mammogram and ultrasound had a true-cut biopsy. The other 2 patients had excision with free margin. The histopathology in all 3 was fat necrosis with radiation changes.

The cytology in the rest (3 patients) was C4. Mammogram was suspicious in the three patients. Ultrasound findings were suspicious in two. Two patients underwent excision with free margin. One had true-cut biopsy followed by mastectomy in another hospital. The histopathology in all was fat necrosis with radiation changes.

True-cut biopsy as mentioned before was done in two patients. One patient had C3 cytology and the result of the true-cut biopsy was benign (fat necrosis with radiation changes) and was kept under observation. The second patient had C4 cytology, patient sought treatment in another hospital. Her True-cut biopsy result in the other hospital was malignant and the patient had mastectomy but the final histopathology was only fat necrosis with radiation changes. The last 2 patients (2/17) who had recurrence, their cytology was C5.

In general the management ranged between observation (8 patients), excision with free margin (6 patients), and mastectomy (1 patient). The patients who had excision ended up with deformed small breasts with mild lymphedema. Two patients had excision of nodules at their scars three times.

The other two patients who had local recurrence were both locally advanced breast cancer at presentation with positive axillary lymph nodes. The first had recurrence in a mastectomy scar and was treated with local radiation and chemotherapy. The second had local recurrence in the remaining breast tissue and systemic metastasis in the lungs. She was treated with local radiation and chemotherapy. Both patients died, see Table 1.

* The cytology findings means as follows:

- C1: Inadequate sample.
- C2: Benign.
- C3: Equivocal more towards benign.
- C4: Equivocal more towards malignant.
- C5: Malignant.

Table 1: Investigation and Management

No of patient	Cytology C	Mammography Not done	Mammography Normal	Mammography suspected	U.S. Not done	U.S. Normal	U.S. suspected	True-cut	True-cut Histology	Management OBS	Management EXC	Management Mastectomy
0	Not done	-	-	-	-	-	-	-	-	-	-	-
0	1	-	-	-	-	-	-	-	-	-	-	-
9	2	3	2	4	3	5	1	0		7	2	0
3	3	1	1	1	1	1	1	1	benign	1	2	0
3	4	0	0	3	1	0	2	1	malig	0	2	1
2	5	Follow up	protocol	for	recurrent	breast	cancer					

DISCUSSION

This study has shown that breast cancer surgeries and radiotherapy were associated with high incidence of a late complication such as fat necrosis or fibrosis (17%). It was particularly more frequent in patients who received radiation therapy to remaining tissue of breast. (10 patients), and the ones who received radiotherapy to the scar of mastectomy (4 patients).

In 1989, Stotter et al reported the results of breast conservation in 536 patients³. In that study, moderate to severe fibrosis occurred in 10% and it was claimed that it was mainly secondary to the old radiotherapy techniques. This study still shows higher incidence which needs to be investigated more particularly regarding its relation to radiotherapy.

In another study breast fibrosis was more frequent in patients with larger tumors, in patients treated with additional radiation fields, and in patients who received a boost of radiotherapy⁴.

In another study, showed that recurrent masses after lumpectomy with radiation developed in 14/121 patients after a median follow-up of 26 months; in four it was recurrent carcinoma⁵. In the remaining 10 patients, developed a tender nodule at the site of primary tumor, which and developed within 4-43 months after treatment. Excision biopsy was done in 8/10 and in one partial mastectomy. Histopathology in all was fat necrosis and fibrosis. That study claimed that this complication is most likely to be due to combination of surgical and radiation factors⁵.

In our study, the lump appeared within one year of the original operation in almost half of the patients (7/15).

Another study showed that the incidence of fat necrosis was 15.3%². The meantime to first diagnosis was 26 months. The study concluded that asymptomatic fat necrosis is a common finding after both percutaneous and interstitial irradiation after breast conserving surgery².

Most of the commonly used radiological methods (such as mammogram, or ultrasound) to investigate these problems are inconclusive⁶. In our group of patients, the radiological methods for investigation (mammogram and ultrasound) were suspicious in 8/17 (47 %). That is why it is important for radiologists to understand and be trained on the usual alterations in the mammogram that result from surgery and radiation to be able to differentiate these from findings that may indicate a new breast cancer⁷. Scar formation, skin changes, increased breast density, and coarse calcifications are normal findings after breast conserving treatment.

Microcalcifications and new masses may indicate recurrent tumor⁷. Appropriate follow-up with mammography should help in early diagnosis of recurrent breast cancer⁷.

MR imaging with fat suppression technique appears to be a promising method for identification of postoperative mass lesions of the breast⁷.

Breast MRI is considered an objective tool for evaluating the side effects of postoperative radiotherapy^{7,8,9}. MRI is more objective than physical examination and mammography to detect the real extent and quantity of skin thickening and fibrosis^{7,8,9}.

CONCLUSION

Fat necrosis following breast cancer surgeries and radiotherapy is one of the complications seen in our institute. This could be related to our oncology department and their radiotherapy technique.

In our study, fat necrosis had higher incidence, than local recurrence.

The difficulty of differential diagnosis necessitates improvement in the awareness of postoperative and or post radiation changes and radiological findings. In addition, the pathologist should be aware of these changes to be able to reach the final diagnosis.

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