

Detailed Analysis of In-Breast Failure after MammoSite™ Brachytherapy

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Purpose:

Intracavitary balloon brachytherapy is a method of delivering partial breast irradiation as part of breast conserving therapy. Data involving failures have been fairly limited. We present our single institution results of a detailed analysis of in-breast failures after treatment with the MammoSite™ brachytherapy applicator.

Methods:

Data from 70 patients treated with intracavitary balloon brachytherapy at Rush University Medical Center between 10/14/02 and 4/3/06 were reviewed. In all cases, an intracavitary brachytherapy balloon catheter (MammoSite™) was implanted. A high dose rate (HDR) Iridium-192 afterloading technique was utilized. Plans prescribed 34 Gy in 10 fractions BID (with ≥ 6 hrs between AM/PM fractions) at one cm from the balloon surface

Ipsilateral breast failures were identified as follows:

Lumpectomy bed failure (LBF) = recurrence at the site of lumpectomy bed (or within 2 cm).

Elsewhere failure (EF) = recurrence located ore than 2 cm from the lumpectomy bed.

Radiotherapeutic, pathologic, and radiographic data were reviewed. The sites of recurrence were plotted onto the original planning CT scans and the dose to the areas of the in-breast failures were calculated.

Results:

At a median follow up of 26.1 months, the in-breast failure rate was 4% (3/70). There were 2 EFs and one LBF. The case characteristics and summary follow:

Case Details:

Case 1: 50 year-old with palpable R OQ mass; presented 6/04. Core biopsy → mixed ductal and lobular invasive carcinoma. Lumpectomy 6/25/04 → 1cm infiltrating lobular carcinoma, tubular variant, margin = 3mm, 0/3 LN+. Brachytherapy initiated on 7/12/04 .

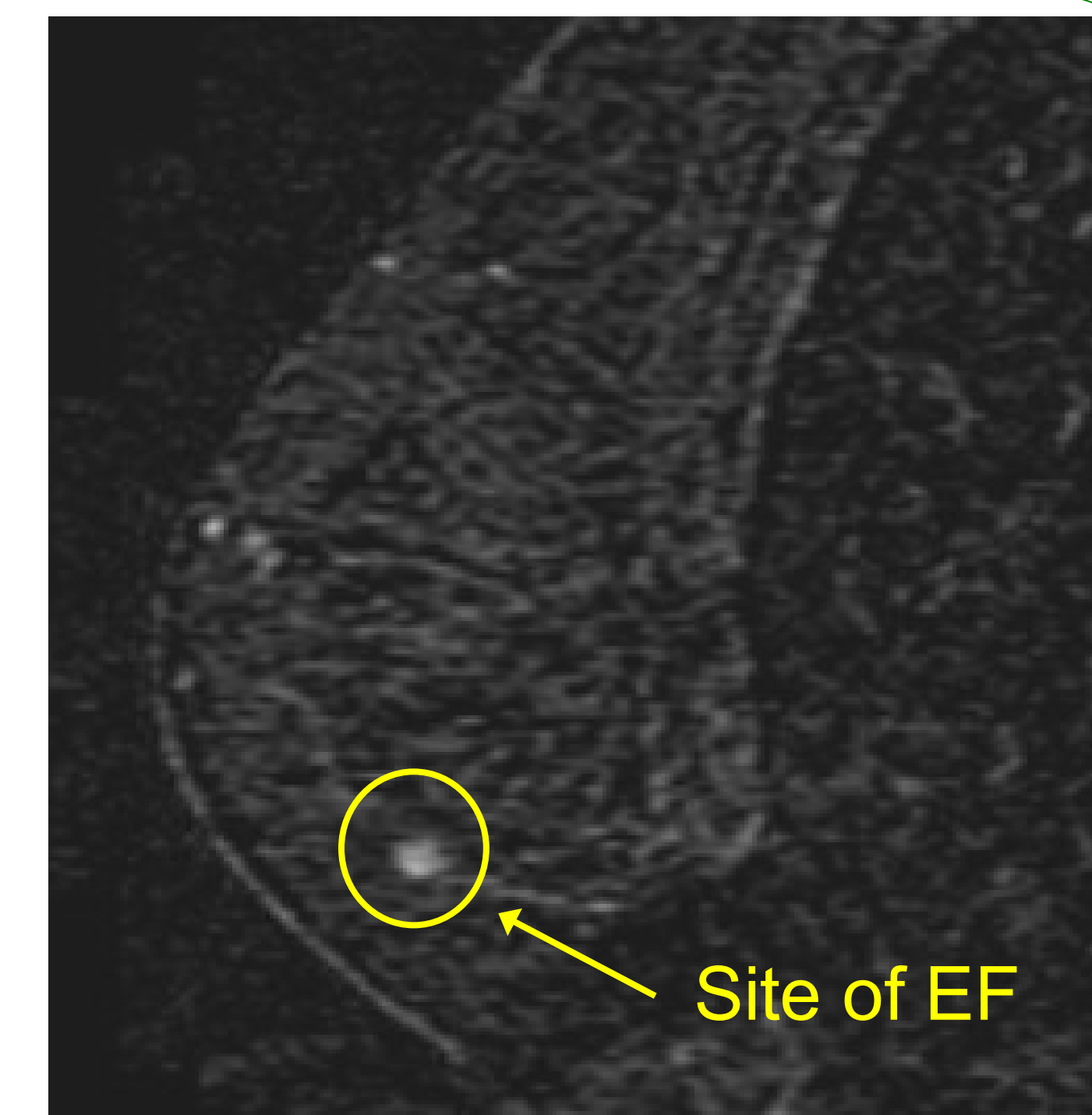


Figure 1: Digital subtraction MRI of right breast for Case 1

EF: MRI 7/05 → new 3mm nodule in inferiomedial right breast. Repeat MRI 12/20/05 → nodule increased to 4-5mm. Excision 12/23/05 → 5mm infiltrating lobular carcinoma.

Case 2: 75 year-old with 1.5cm nodule L LOQ on mammogram 1/03. Sterotactic core biopsy March 2003 → DCIS with necrosis. Lumpectomy 4/16/2003 → 1cm DCIS with necrosis with 5mm LCIS, margin = 1 HPF (both DCIS/LCIS). Brachytherapy started 5/12/03.

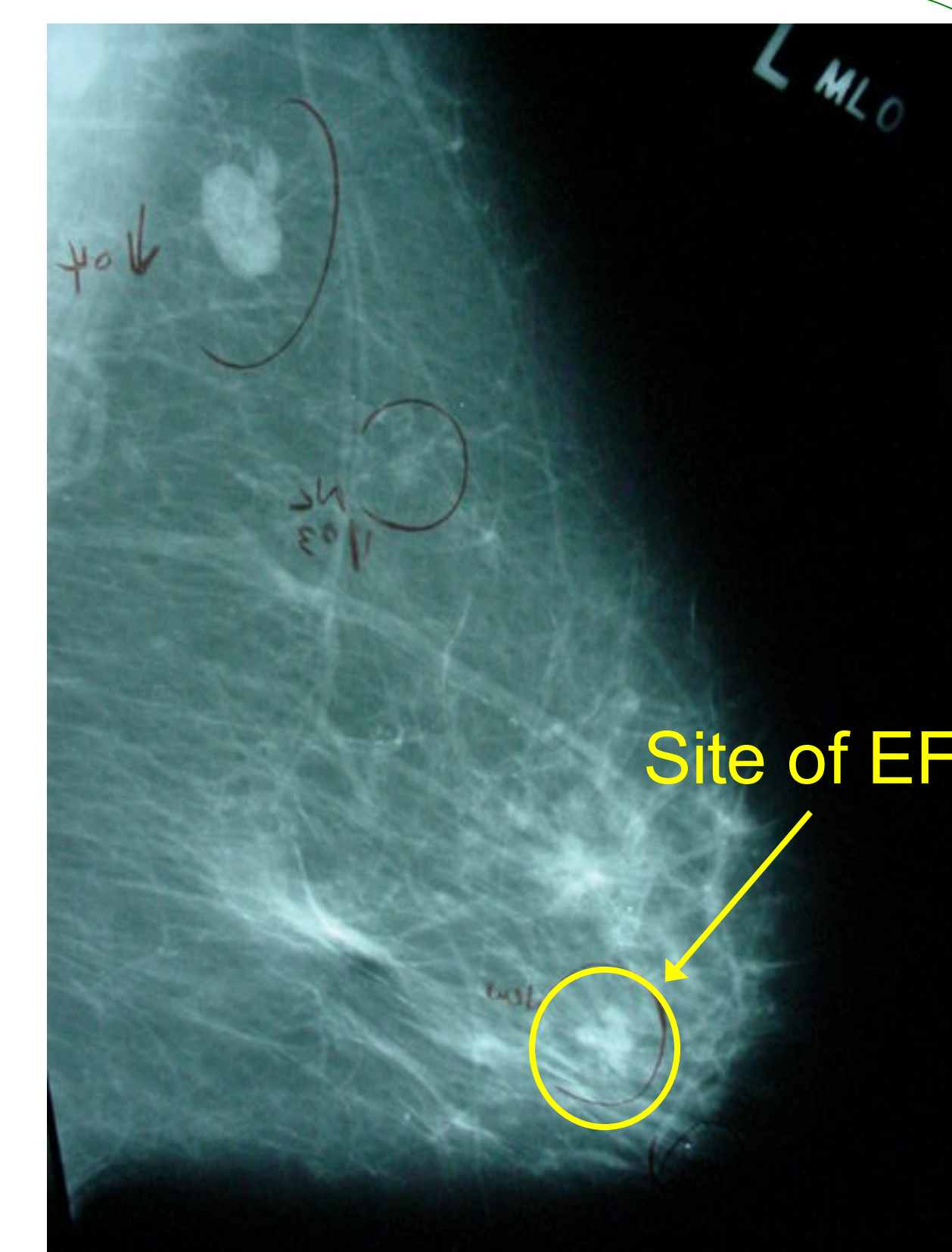


Figure 2: Mammogram for Case 2 (MLO view of left breast)

EF: Mammogram 7/05 → new solid 9 mm nodule at the 2:30 position in the left breast 5cm anterior to previous surgical site. Sterotactic core biopsy 7/22/05 → DCIS, cribriform type with necrosis.

Case 3: 48 year-old woman with R UOQ palpable mass presenting 6/03. Core biopsy → DCIS, cribriform with necrosis. Lumpectomy 7/14/03 → 0.8 cm invasive ductal carcinoma with EIC (solid and cribriform with necrosis), margin = 1mm, 0/2 LN+. Brachytherapy started 7/28/03 → stopped at 3060cGy because balloon-to-skin distance was inadequate (3mm).

LBF: Mammogram 3/04, 7mm soft tissue mass just posterior to lumpectomy. Mastectomy 3/23/04 → DCIS at lumpectomy site and also diffusely throughout entire breast with focal LCIS. (No imaging is shown)

Table 1: In-breast failure data summary

| Age | Original Histology | Size (cm) | Margins | Failure Histology | Time to failure (mos) | Distance to failure | Dose* (Gy) |
|-----|--------------------|-----------|---------|-------------------|-----------------------|---------------------|------------|
| 50 | ILC | 1.0 | neg | ILC | 12 | 5 cm | 21 |
| 75 | DCIS | 1.0 | close | DCIS | 26 | 5 cm | 21 |
| 48 | IDC | 0.8 | neg | DCIS | 7 | adjacent | >30 |

* @ point of failure

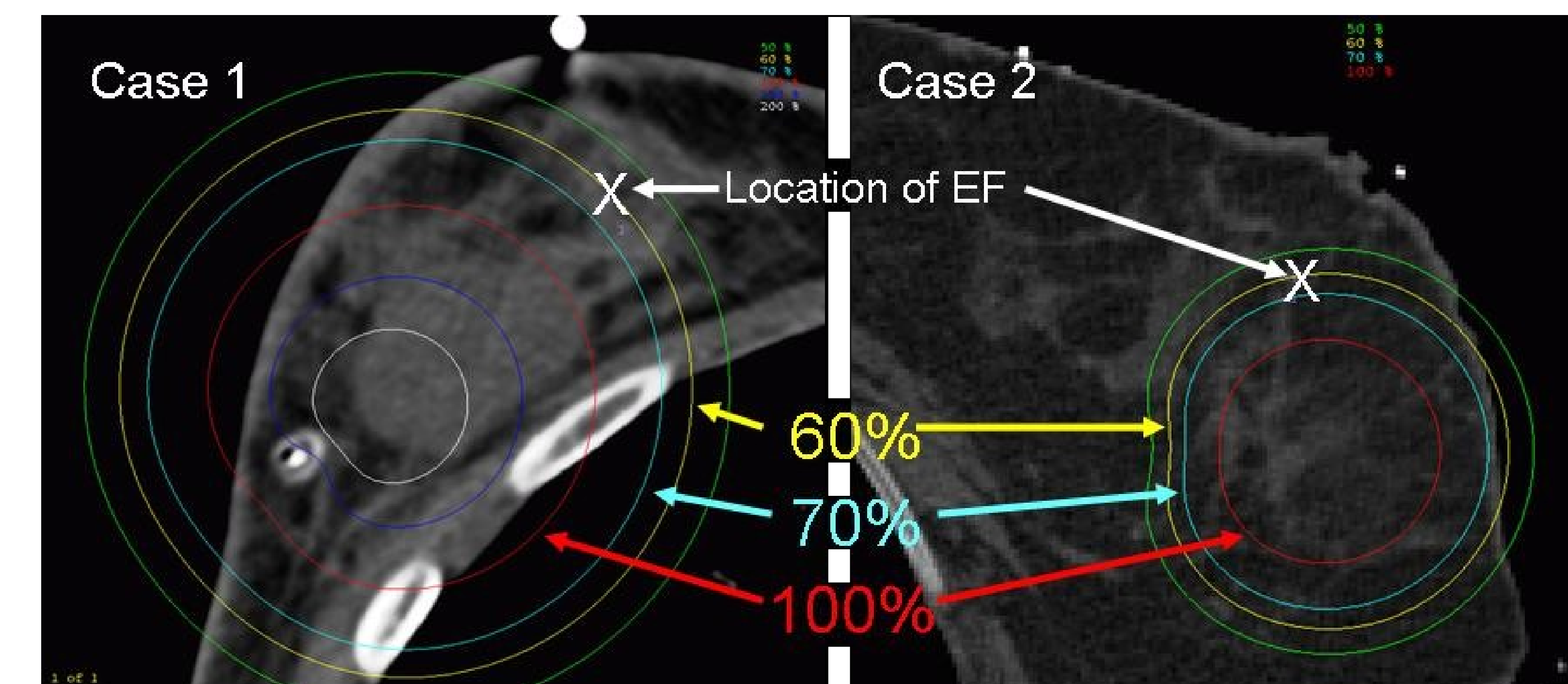


Figure 3: Isodose lines and mapped locations of the elsewhere failures in Cases 1 and 2

Conclusions:

Our in-breast failure rate of 4% (2EF/1LBF) at a median follow-up of 26.1 months after treatment with balloon-based brachytherapy is consistent with previously reported data on multi-catheter based interstitial brachytherapy. All recurrences occurred in regions of the breast which received a minimum of 21 Gy at 2.1 Gy per fraction.