Local recurrence of ductal carcinoma in situ after conservative breast surgery: mammographic appearance

M El Khoury (1, 2), B Mesurolle (2), P Cherel (1), JM Guinebretière (3), MM Plantet (1), C de Maulmont (1) and C Hagay (1)

Abstract
Objective. To review the mammographic features of local recurrences of DCIS treated conservatively.
Materials and methods. Thirty-five patients treated conservatively for a DCIS have presented subsequently a local recurrence. Three patients had double metachronous and one a bi-focal recurrence. The mammographic appearances of these 39 recurrences were analyzed retrospectively and compared to initial mammograms.
Results. Median delay to recurrence was of 47 months (interval 8-240 months). Two-thirds of the recurrent lesions were similar to the initial presentation, of which 90% occurred at the lumpectomy site. In 18/35 cases (51%), an intra-ductal component was found at histological diagnosis and among these 11/18 (61%) were strictly intra-ductal.
Conclusion. Local recurrences of DCIS are proteiform. However, the majority of which, occurring at the lumpectomy site were similar to the primary tumor, raising again the hypothesis of incomplete eradication even when the margins were considered free.

Key words: Ductal carcinoma in situ. Conservative treatment. Recurrence. Mammographic appearance.

Materials and methods
Between 1971 and 2000, 587 patients were treated conservatively for a DCIS at the René Huguenin Center in Saint Cloud, France. Forty-four of them presented a local recurrence. Nine were excluded from the study because of an initial suspicion of microinvasion. Of the 35 remaining patients, three presented a second metachronous recurrence after two conservative treatments and one presented a bifocal recurrence, for a total of 39 local recurrences. Mammographies at the time of recurrence were studied retrospectively by a radiologist and compared to the images from the initial diagnosis. The histological and clinical aspects were

Screening campaigns are detecting breast carcinomas earlier and earlier, most often at the in-situ stage. Consequently, ductal carcinomas in situ (DCIS) account for 15%-20% of all breast cancers and 25%-56% of subclinical breast cancer detected by mammography (2, 4). Most patients can be treated conservatively, but a certain number experience recurrence. The clinical and histopathological characteristics that may predict the risk of recurrence are not perfectly known (3). Recurrences are heterogeneous, either invasive or intraductal. High-grade lesions that are initially palpable are at a high risk of invasive recurrence. Five years after conservative treatment, this risk is estimated at 11.6% for lesions that are initially palpables and only 6.6% for those discovered by mammography, and 11.8% for high-grade lesions compared to 4.8% for low-grade lesions (3). Other factors have also been implicated such as excision margins, size of the initial lesion, histological subtype, and the patient’s age. We therefore decided to conduct a retrospective study of the mammographic aspect of DCIS cases recurring after conservative treatment.

Résumé
Caractéristiques mammographiques des récidives locales des carcinomes canalaire in-situ après traitement conservateur
J Radiol 2006;87:555-9

Objectif. Analyser les aspects mammographiques des récidives locales des carcinomes canalaire in-situ (CCIS) après traitement conservateur.

Matériels et Méthodes. Trente-cinq patientes ayant eu une récidive locale après traitement conservateur d’un CCIS ont été incluses dans cette étude. Trois d’entre elles ont présenté une récidive métachrone et une, une récidive bi-focale. Les aspects mammographiques de ces 39 récidives ont été revus de manière retrospective et comparés aux lésions initiales.

Résultats. Le délai médian des récidives est de 47 mois (intervalle 8-240 mois). Deux tiers présentent un aspect comparable à celui initial dont 90% se faisant au site de la tumorectomie. Dans 18/35 (51%) des récidives au site de la tumorectomie, un contingent intra-canalaire est retrouvé en histologie dont 11/18 (61%) intra-canalaire strict.

Conclusion. L’histoire naturelle des carcinomes canalaire in-situ est mal connue. Certains récidivent après traitement conservateur. Ces récidives sont protéiformes mais la majorité d’entre elles se faisant au site de la tumorectomie présentent un aspect mammographique similaire à la lésion initiale, soulvant l’hypothèse d’une eradication incomplète.


based on the information noted in the medical records, with the patients followed up annually by mammography and clinical examination. None of the patients had immediate postoperative mammography, particularly in the cases with initial microcalcifications.

Results

The median age of the patients at the time of initial diagnosis was 53 years (range, 34-77 years). At initial diagnosis, 12 of the 35 patients (35%) presented a clinical anomaly: three out of 12 (25%) had nipple discharge with no mammographic anomaly and nine out of 12 (75%) a palpable mass. Five of the nine patients with a palpable mass (55%) presented an isolated mass on mammography and four out of nine (45%) presented a mass associated with microcalcifications. Twenty-three of the 35 patients (66%) presented a subclinical lesion discovered on mammography: 21 of 23 (92%) microcalcifications, one of 23 (4%) an asymmetry with focal density alone, or associated with microcalcifications in one of 35 (4%). The initial treatment was exclusively surgical in 11 of 35 patients (31%), associated either surgery and radiotherapy in 21 patients (60%) or surgery, radiotherapy, and curietherapy in three patients (9%).

The histological type of the initial ductal carcinoma in situ was found in the medical records for 13 patients, four of which were comedocarcinomas and nine non-comedocarcinomas. The grade was low in two cases, intermediate in seven cases, and high in four cases.

The frequency of local recurrence was 6% (35/587) with a median onset of 47 months (range, 8-240 months). Excision margins at the very beginning were not measured, since a few decades ago staining of the tumorectomy pieces was not in use; however, the margins were deemed healthy in 25 of 35 cases (71%) and in contact with the tumor in 10 of 35 cases (29%). Seven out of ten cases (70%) required reoperation and three out of ten (30%) additional curietherapy.

Nineteen out of 39 recurrences (49%) were discovered clinically, 18 (95%) as a palpable mass (fig. 1), and one out of 19 (5%) as inflammation. Twenty of the 39 recurrences (51%) were microcalcifications in 15 of 20 cases (75%) (fig. 2), local density with asymmetry alone in three out of 20 cases (15%), or associated with microcalcifications in two out of 20 cases (10%).

In terms of their histological type, 25 of them (64%) contained an intraductal component: 13 of 25 (52%) had a strictly intraductal component, four of 25 (16%) an intraductal component and a microinvasive focus, seven of 25 (28%) two components, intraductal and invasive, and one of 25 (4%) intraductal and lobular in situ. Twelve of the 39 recurrences (30%) were purely invasive ductal, one out of 39 (3%) invasive lobular and in situ, and one of 39 (3%) inflammatory.

Eleven of the 13 strict intraductal recurrences (85%) were revealed by microcalcifications and ten of the 12 pure infiltrating ductal recurrences (84%) presented as masses.

Comparing the mammographic aspect of the recurrences with that of the initial lesions, while eliminating the three patients who initially presented nipple discharge without initial mammographic anomaly, 22 of the 35 recurrences (63%) were similar to the primary lesions and 20 of the 22 recurrences (90%) were found at the tumorectomy site (table I). The 22 recurrences of 35 primary lesions, initially presenting as microcalcifications, contained microcalcifications in 14 of 22 cases (64%).

Of 22 initial lesions presenting as microcalcifications, 14 (64%) contained microcalcifications and seven recurrences of the 11 (63%) initially palpable lesions were palpable (table II). Of the 27 out of 35 recurrences found at the tumorectomy site, 18 of the 27 (66%) contained an intraductal component (table III).

Discussion

DCIS is a malignant proliferation of ductal epithelial cells contained within the basal membrane, with no evidence of conjunctive tissue invasion. With wider
Local recurrence of ductal carcinoma in situ after conservative breast surgery: mammographic appearance

Fig. 2:

- **a** Mammogram in medio-lateral view showing a small mass associated to irregular microcalcifications, situated in the upper quadrants (BIRADS category V): comedo-carcinoma.
- **b** Mammogram in cranio-caudal view performed one year later showing a recurrence at the same location: isolated cluster of malignant microcalcifications (BIRADS category VI): DCIS.
- **c** Mammogram in cranio-caudal view performed 5 years later showing a spiculated mass corresponding to a second recurrence: IDC and DCIS.

**Table I**

<table>
<thead>
<tr>
<th>Mammographic aspect</th>
<th>Recurrence site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrence vs primary</td>
<td>Tumorectomy site</td>
</tr>
<tr>
<td>Comparable (n=22) 63%</td>
<td>20 (90%)</td>
</tr>
<tr>
<td>Different (n=13) 37%</td>
<td>7 (54%)</td>
</tr>
</tbody>
</table>

**Table II**

<table>
<thead>
<tr>
<th>Primary tumor</th>
<th>Tumor recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palpable mass</td>
<td>Microcalcifications</td>
</tr>
<tr>
<td>Micros (n=22) 63%</td>
<td>8 (36%)</td>
</tr>
<tr>
<td>FDA* not palpable (n=1) 3%</td>
<td>1</td>
</tr>
<tr>
<td>FDA* not palpable + microcalcifications (n=1) 3%</td>
<td>0</td>
</tr>
<tr>
<td>Palpable mass (n=11) 31%</td>
<td>7 (63%)</td>
</tr>
</tbody>
</table>

*FDA: Focal density with asymmetry.

screening practices, the frequency has passed from 0.8%-5% to 25%-56% of breast cancers discovered at the subclinical stage as small lesions, most often revealed by microcalcifications (2, 4). Therefore, conservative treatment has become the norm provided that complete excision is possible. This remains conditioned by the distribution and the mode of development of the DCIS within the mammary parenchyma (5). Consequently, although it has been demonstrated that DCIS is rarely multicentric (the distance between the tumor foci is >4 cm), it is often multifocal, in a single quadrant (the distance between tumor foci is <4 cm), or extensive (5), resulting in a risk of local recurrence most often in the same quadrant (5) in case of incomplete excision. This latter situation, estimated at 1%-2.5% per year (6, 7), would be even higher for women treated with tumorectomy without local radiotherapy. The local recurrence rate after tumorectomy alone was 16.4% after a mean of 43 months and 22% after...
Local recurrence of ductal carcinoma in situ after conservative breast surgery: mammographic appearance

Tableau III

<table>
<thead>
<tr>
<th>Histological type of recurrence</th>
<th>Tumorectomy site n=27</th>
<th>Elsewhere n=8</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDC (n=13) 38%</td>
<td>11 (85%)</td>
<td>2 (15%)</td>
</tr>
<tr>
<td>IDC/M (n=12) 34%</td>
<td>8 (66%)</td>
<td>4 (34%)</td>
</tr>
<tr>
<td>IDC &amp; IDC/M (n=4) 11%</td>
<td>4 (100%)</td>
<td>0</td>
</tr>
<tr>
<td>IDC &amp; invasion (n=3) 8%</td>
<td>2 (66%)</td>
<td>1 (34%)</td>
</tr>
<tr>
<td>IDC &amp; LCIS (n=1) 3%</td>
<td>1 (100%)</td>
<td>0</td>
</tr>
<tr>
<td>ILC &amp; LCIS (n=1) 3%</td>
<td>1 (100%)</td>
<td>0</td>
</tr>
<tr>
<td>Inflammatory (n=1) 3%</td>
<td>0</td>
<td>1 (100%)</td>
</tr>
</tbody>
</table>

LCIS lobular carcinoma in situ, IDC invasive ductal carcinoma, IDC/M invasive ductal carcinoma with microcalcifications, ILC Invasive lobular carcinoma.

M El Khoury et al.

Local recurrence of ductal carcinoma in situ after conservative breast surgery: mammographic appearance

Tableau III

<table>
<thead>
<tr>
<th>Histological type of recurrence</th>
<th>Tumorectomy site n=27</th>
<th>Elsewhere n=8</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDC (n=13) 38%</td>
<td>11 (85%)</td>
<td>2 (15%)</td>
</tr>
<tr>
<td>IDC/M (n=12) 34%</td>
<td>8 (66%)</td>
<td>4 (34%)</td>
</tr>
<tr>
<td>IDC &amp; IDC/M (n=4) 11%</td>
<td>4 (100%)</td>
<td>0</td>
</tr>
<tr>
<td>IDC &amp; invasion (n=3) 8%</td>
<td>2 (66%)</td>
<td>1 (34%)</td>
</tr>
<tr>
<td>IDC &amp; LCIS (n=1) 3%</td>
<td>1 (100%)</td>
<td>0</td>
</tr>
<tr>
<td>ILC &amp; LCIS (n=1) 3%</td>
<td>1 (100%)</td>
<td>0</td>
</tr>
<tr>
<td>Inflammatory (n=1) 3%</td>
<td>0</td>
<td>1 (100%)</td>
</tr>
</tbody>
</table>

LCIS lobular carcinoma in situ, IDC invasive ductal carcinoma, IDC/M invasive ductal carcinoma with microcalcifications, ILC Invasive lobular carcinoma.

Conclusion

DCIS is a highly heterogenous disease whose progression remains insufficiently clear. This is confirmed by the heterogeneity of local recurrences of the disease. However, in our study, the majority of the recurrences found at the tumorectomy site resembled the primary lesions, suggesting the hypothesis of incomplete eradication of the initial lesions. Mammography plays a vital role in estimating the extent of the primary lesions and therefore in the evaluation and feasibility of conservative treatment, in the confirmation of complete excision, and particularly in post-therapy monitoring. It can thus detect a local evolutive resumption early so as to provide catch-up treatment as early as possible. Any recently appearing mammographic abnormality, particularly at the tumorectomy site but also remotely, should be assessed, thus reducing the rate of recurrences detected at an advanced stage so as to improve prognosis.

63 months in two different studies (8, 9). As can be expected from the complexity of DCIS progression, these recurrences are proteiform and are able to occur uniformly in a strict intraductal form (6, 10) or in an invasive form in a variable percentage of cases, ranging from 20% to 100% (7, 11).

In our series, 33% of the recurrences were purely intraductal, 30% were purely invasive, and the remainder were associated with multiple lesions, 64% of which contained an intraductal component.

The risk factors for developing local recurrence are disputed and there is no consensus on the high risk factors, which is unacceptable and incompatible with conservative treatment. However, low age (<39 years) (12), multifocal or extensive development, defining a large volume of tumor in a small breast, as well as inexistent or limited excision margins (<2 mm) are associated with a high risk of evolutive resumption (7). High histological grade or comedocarcinoma, initially considered a risk factor, may be associated with a shorter interval to the onset of recurrence, rather than with a higher incidence of local recurrence (11).

Even though wide excision margins (>2 mm) are considered by most authors as an essential condition for complete and satisfactory excision, they are not an absolute guarantee, given the often discontinuous character of DCIS development (7). According to Faverly and Holland (5), evaluation of the margins would theoretically be more reliable in poorly differentiated cases of DCIS than in those that are well differentiated. According to these authors, the poorly differentiated lesions are characterized by continuous development, contrasting with discontinuous and therefore multifocal development of well-differentiated lesions. Even in these cases, these authors deem the error on the margins to be reliable since tumoral foci are distributed quite homogeneously, which reduces the distance between them. These are estimated in 83% of cases at less than 10 mm. Nevertheless, the greatest frequency of early recurrence at the tumorectomy site and their morphological and histological similarity found in several studies (6, 10, 13) suggests that the tumoral lesions were incompletely eradicated. The same holds true in our series, where 90% of the recurrences presenting a similar aspect to the primary tumors were found at the site of the tumorectomy, 66% of them containing an intraductal component. Similarly, 64% of the recurrences of primary lesions initially manifesting with microcalcifications also have them. This leads some authors to recommend systematic mammography after surgical excision to confirm the histological data of complete excision (10, 14). However, even though mammography detects up to 83% of the DCIS lesions, it is well known that it underestimates the extent of these lesions, in particular after surgery (8), thus requiring other more sensitive investigative methods such as MRI. Although the experience with MRI in DCIS detection is relatively limited (15), it seems promising in the search for residual disease and in evaluating multifocal disease. A negative MRI would allow exclusion of the possibility of residual DCIS lesions, of an occult invasive focus, as well as of multicentric disease (16, 17). Local invasive recurrence may develop either from a residual DCIS focus, based on the concept of a continuum between DCIS and invasive ductal carcinoma (IDC), or, according to some authors, from a poorly known microinvasive focus at the tumorectomy site (6, 7). Of the nine cases associated with the suspicion of a microinvasive focus and who were excluded from our series, only three experienced invasive recurrence at the tumorectomy site. Remote invasive recurrence may develop on a remote DCIS focus or may be a second, de novo cancer (6).

All of these hypotheses show the complexity of DCIS progression. The factors that determine the mode of recurrence as purely intraductal or invasive may be genetic on the molecular scale and remain to be elucidated (7).

References

Local recurrence of ductal carcinoma in situ after conservative breast surgery: mammographic appearance