The Breast 21 (2012) 159–164

Contents lists available at SciVerse ScienceDirect

The Breast

journal homepage: www.elsevier.com/brst

Original article

# Radial scar without associated atypical epithelial proliferation on image-guided 14-gauge needle core biopsy: Analysis of 49 cases from a single-centre and review of the literature

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ARTICLE INFO

*Article history:*
Received 27 April 2011
Received in revised form
26 July 2011
Accepted 4 September 2011

*Keywords:*
Breast
Radial scar
14-gauge needle core biopsy
Surgical excision
Associated carcinoma

ABSTRACT

The purpose of this study was to evaluate the reliability of image-guided 14-gauge needle core biopsy in the diagnosis of radial scar without associated atypical epithelial proliferation, by comparison with definitive histological diagnosis on surgical excision. The records of 8792 consecutive image-guided 14-gauge needle core biopsy of the breast performed from January 1996 to December 2009 were reviewed. Forty-nine cases of radial scar without associated atypical epithelial proliferation were identified and compared with definitive histological diagnosis on surgical excision.

The definitive histological diagnosis on surgical excision confirmed the results of image-guided 14-gauge needle core biopsy in 36 of 49 cases (73.5%), in 9 cases (18.3%) radial scar was associated with atypical epithelial proliferation, while 4 cases out of 49 cases were upgraded to carcinoma (3 cases of ductal carcinoma in situ and one case of invasive lobular carcinoma), with an underestimation rate of 8.2%.

A diagnosis of radial scar without associated atypical epithelial proliferation on image-guided 14-gauge needle core biopsy does not exclude a malignancy on surgical excision; consequently during the multidisciplinary discussion further assessment by surgical excision or vacuum-assisted excision, as recently reported, needs to be considered to obtain a definitive histological diagnosis.

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## Introduction

Image-guided 14-gauge (G) needle core biopsy (NCB) has been established as an accurate and inexpensive diagnostic technique for sampling most impalpable, screen-detected breast abnormalities, providing a reliable histological diagnosis.[1–3] The role of image-guided 14-G NCB in the preoperative diagnosis of radial scar (RS) is controversial as it is widely reported that ductal carcinoma in situ (DCIS) and/or invasive carcinoma can be associated with RS.[4]

RS is most often an incidental microscopic finding in breast surgical biopsy performed for another abnormality, some are large enough to be detected at mammography or at ultrasound examination.[5]

On mammography RS usually appears as a stellate or "spiculated" lesion with long, thin spicules radiating from a dense or often radiolucent central area corresponding to the fibroelastotic core and distinction from a spiculated-appearing invasive carcinoma is not possible. Although some radiological features of RS might indicate a benign entity, these features are not sufficient to reliably differentiate a benign lesion from a carcinoma only on the basis of mammography.[6] Like mammographic findings, also sonographic findings of RS are not definitive or specific enough to allow absolute distinction between RS and spiculated malignant nodules.[7]

RS is a benign sclerosing breast lesion characterized on microscopic examination by a central area of fibroelastosis from which ducts and lobules radiate, exhibiting various alterations such as typical epithelial proliferative changes (usual ductal hyperplasia and micropapillomas), atypical epithelial proliferations (atypical ductal hyperplasia, lobular intraepithelial neoplasia or both) and

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doi:10.1016/j.breast.2011.09.005

cysts. Within the central area of fibroelastotic stroma, small entrapped glands are present, which are often distorted or angular in appearance; these glands are typically lined by one or more layers of epithelium and, at least partly, by an outer myoepithelium cell layer. RS may be involved by DCIS or invasive carcinoma, the latter is usually present at the periphery rather than in the central area of the lesion.[4,8,9]

The management of patients with RS detected on image-guided 14-G NCB is still a matter of debate especially when it is without associated atypical epithelial proliferation (atypical ductal hyperplasia, lobular intraepithelial neoplasia or both)[10–15]; most authors agree, however, that not only RS with associated atypical epithelial proliferation but also RS without associated atypical epithelial proliferation on image-guided 14-G NCB remains an indication for surgical excision (SE)[16–28,30] or vacuum-assisted excision, as recently reported.[29–31]

The aim of our study was to evaluate the surgical outcome of a consecutive series of RS without associated atypical epithelial proliferation diagnosed on image-guided 14-G NCB in a 14-year period at a single institution.

## Materials and methods

The institutional review board (IRB) approval was obtained for this retrospective study, which was performed in a large university referral hospital for breast disease. Written informed consent of patients was not required by the IRB. Records of 8792 consecutive image-guided 14-G NCB of the breast performed at Diagnostic Senology Unit of Careggi Hospital from January 1996 to December 2009 were reviewed. Of these, 7100 (80.8%) were performed under sonographic guidance and 1692 (19.2%) were performed under stereotactic guidance. Sixty-six lesions (0.75%) diagnosed as RS at 14-G NCB were identified.

The inclusion criteria for the study were: histological diagnosis of RS without associated atypical epithelial proliferation on 14-G NCB; histological report of performed SE as our standard routine is to recommend SE whenever a diagnosis of RS on 14-G NCB is performed; absence of synchronous associated DCIS or invasive carcinoma in the same breast. All histological slides of RS diagnosed on 14-G NCB were reviewed by two pathologists (SB and VV) and cases associated with atypical epithelial proliferation were excluded. Forty-nine cases of RS without associated atypical epithelial proliferation in 49 women (age range: 25–75 years; mean age: 46.6 years) were included in the present study. The other 17 lesions were excluded: 13 cases were associated with atypical epithelial proliferation, in two cases patients refused SE, and two cases were associated with synchronous breast cancer in the same breast.

All 49 patients underwent mammographic examination. Images were obtained in two standard planes: mediolateral oblique and craniocaudal using a dedicated equipment (Mammomat 2000, Siemens, Erlangen, Germany; Mammomat 3000 Nova, Siemens, Erlangen, Germany). Whole breast sonography of all 49 cases was performed using a broadband 10–13 MHz linear transducer (Technos, Mylab 70 XS Esaote, Genoa, Italy).

Percutaneous NCB were performed under local anesthesia with a semiautomated biopsy gun (Precisa, Hospital Service, Rome, Italy) with a 14-gauge, 15 cm long needle; a mean of 4 core samples (range 3–8) were obtained per lesion. In 43 of 49 cases (88%) NCB was performed under ultrasound guidance; in six cases (12%) that were not visible on sonography, NCB was performed under stereotactic guidance.

The database of the Pathological Anatomy Unit of Careggi Hospital was searched to identify definitive histological diagnosis on SE of cases of RS diagnosed on 14-G NCB. Definitive histological diagnosis on SE for each case of RS diagnosed on 14-G NCB was reviewed and classified according to the highest-grade lesion in one of the following categories: malignant lesion (DCIS or invasive carcinoma), high-risk lesion (atypical ductal hyperplasia, lobular intraepithelial neoplasia) or benign lesion (RS without associated atypical epithelial proliferation, other benign breast lesions). Definitive histological diagnosis on SE served as the "gold" standard.

## Results

Of the 49 cases of RS without associated atypical epithelial proliferation (Fig. 1) diagnosed on 14-G NCB, 4 cases (8.2%) proved to be associated with malignancy at SE (age range 40–72 years, mean age: 52 years); 9 cases (18.3%) resulted high-risk lesions i.e. associated with atypical ductal hyperplasia and/or lobular intraepithelial neoplasia (age range: 35–51 years, mean age: 42 years) and the remaining 36 cases (73.5%) were confirmed as benign lesions (age range 25–75 years, mean age: 46 years).

The four cases of malignancy associated with RS were three cases of DCIS, one low-nuclear grade (5 mm) and two intermediate-nuclear grade (4 mm and 10 mm respectively), and one case of histological grade 1 invasive lobular carcinoma (4 mm). In the present study all underestimated cases consisted of lesions in which 14-G NCB correctly diagnosed RS, but missed the discrete foci of associated carcinoma. The cause of underestimation of 14-G NCB in our series is ascribable to sampling error.

Of the 9 cases of high-risk lesion, RS was associated with lobular intraepithelial neoplasia in 7 cases (77.8%), and in 2 cases (22.2%) there was associated atypical ductal hyperplasia. Of the 36 benign lesions, 31 cases (86.1%) were RS without associated atypical epithelial proliferation and in 5 cases (13.9%) no residual histological features of RS were found at excision and these cases were histologically diagnosed as fibrocystic change.

In our series of RS diagnosed on 14-G NCB underestimation rate of malignancy was 8.2% (4/49), in all cases associated with malignancy at SE, NCB was performed under ultrasound guidance. A summary of imaging and NCB features of four underestimated cases of RS diagnosed on image-guided 14-G NCB is reported in Table 1.

Of the 49 lesions, thirty-six cases (73.5%) were detected on mammography: 19 cases (52.8%) were reported as architectural distortion, 10 cases (27.8%) as spiculated opacity (Fig. 2), and 7 cases

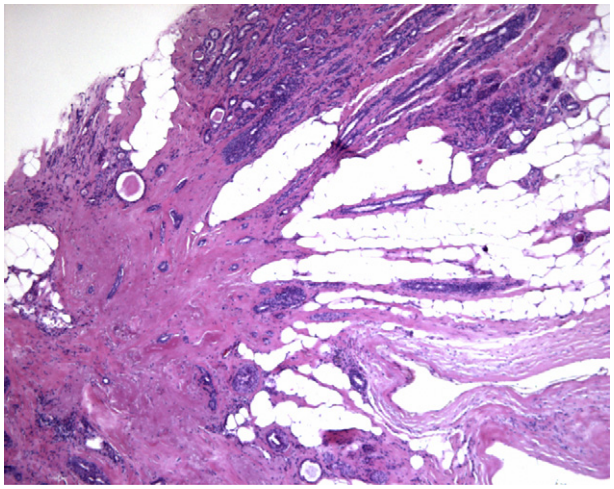

**Fig. 1.** Radial scar without associated atypical epithelial proliferation: 14-G NCB showing a central area of fibroelastosis containing entrapped benign tubules; central sclerotic zone is surrounded by radiating ducts and lobules that show varying degrees of adenosis, usual ductal hyperplasia and cysts.

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