Radial scar of the breast – a confusing lesion

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Abstract

Radial scar is a confusing lesion of the breast which represent a premalignant lesion. It looks like a tubular carcinoma but histologically we can see two rows of cells in tubules. Mammographically there are some typical but not specific signs: 1) the presence of the central radiolucency, 2) the presence of radial long thin spicules, 3) varying appearance in different projection, 4) radiolucent linear structures parallel to spicules, and 5) abscence of palpable lesion or skin changes.

All these signs make the "black star" appearance. Authors reanalyzed 21 from 26 woman with the radial scar diagnosis. Aim of our study was to investigate the different morphologic changes in view of differential diagnosis, frequency and potential prognostic importance of the different lesions. According to our findings we can conclude that the radial scar is unpalpable, subclinical lesion which can be seen on mammography but the final diagnosis is histological.

Key words: radial scar, "black star", sclerosing lesion.

Introduction

Radial scar (RS) is a breast lesion generally 10 mm or less in diameter consistnig of a central fibroelastotic zone from wich tubular structure radiate [1]. It may be two layered or exhibit intraluminal proliferation. It is also a radiological entity [2]. Radial scar, also known as sclerosing lesion has been referred to as several different terms, including sclerosing papillary proliferation, infiltrating epitheliosis and indurative mastopathy [2]. Recent investigation point out that the risk of developing carcinoma is twice higher than in the normal population. Radial scar is a true precursor of malignancy or at last an indicator of an underlying global pathologic process. Radial scars are an independent histologic risk factor for breast carcinoma [3] and in most instances they are incidental findings. It may be in the constellation of hyperplastic, dysplastic and malignant changes. Most of them are visible on sonography [4]. The diagnosis on core biopsy is uncertain [5]. There is no relationship between the presence of carcinoma within radial scars and complex sclerosing lesions [6]. The carcinomas identified in the scars were of variable type and include small and large cell ductal carcinoma in situ, lobular carcinoma in situ, tubular carcinoma and invasive ductal carcinoma (not otherwise specified). On mammographic investigation there are some signs suggestive on radial scar: 1) the presence of a central radiolucency, 2) the presence of radiating long thin spicules, 3) varying appearance in different projections, 4) radiolucent linear structures parallel to the spicules, and 5) the abscence of a palpable lesion or skin changes [2,7]. Long, thin radiating spicules against a background of radiolucent fat create a "black star" appearance [8]. The most often differential diagnosis is between radial scar and tubular carcinoma [9]. It is possible that the CD34 and alpha smooth actin help us to differentiate RS from tubular carcinoma [10].

Radial scar is most often in women between 41 and 60 years old, very rare before the 40th and after the 60th years of age [11,12]. There are central fibroelastotic zone with radial extenstion of tubular structures. These tubular formation has two rows of cells, epithelial and myoepithelial [13-15]. Sometimes epithelial hyperplasia is present. The malignant potential is 2 times greater than in the normal population without radial scar [16,17]. For today contrast enhanced magnetic resonance mammography is the most sensitive presurgical diagnostic method [18].

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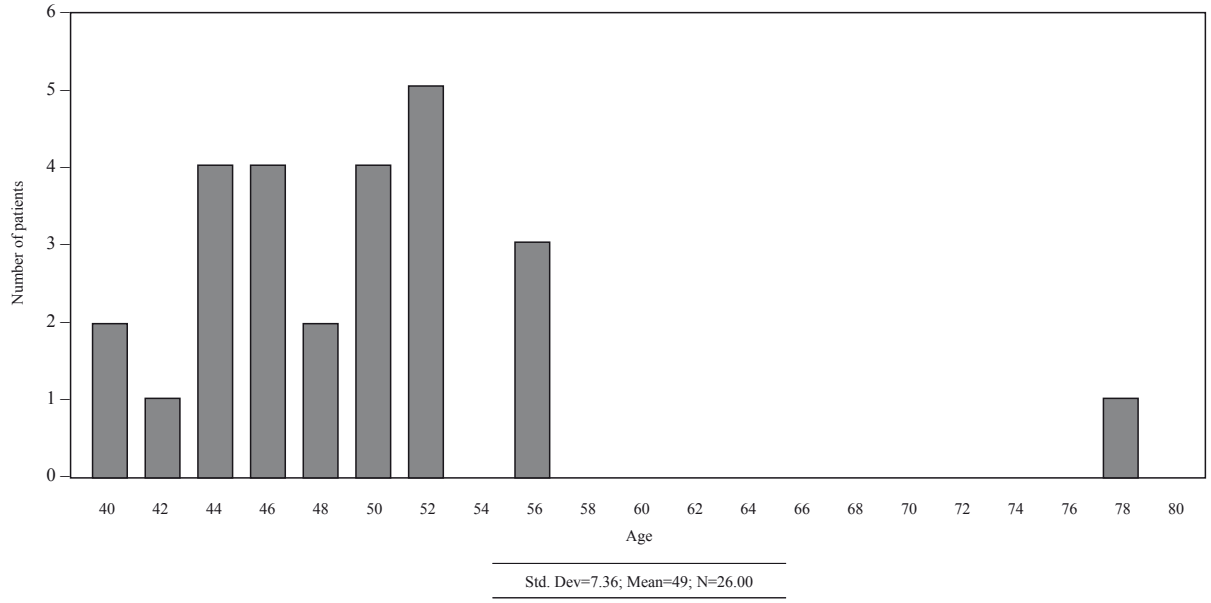
Figure 1. **Age distribution of patients**



Synonyms are: sclerosing complex lesion (bigger than 1 cm), sclerosing papillary proliferation, infiltrating epitheliosis, indurative mastopathy, benign sclerosing ductal proliferation and nonincapsulated sclerosing lesion.

Pathogenesis

Pathogenesis of radial scar is not investigated exactly yet. There are several hypothesis: 1) the lesion is the result of unknown local injury, which results in surrounding fibrosis, 2) the lesion is associate with ducteasia or ductal obliteration, 3) or the lesion is the result of chronic inflammation. A potential differential diagnosis are radiologically detectable morphologic changes due to prior exposure to radiation [19].

In the development of these lesions two phases can be observed: (I) cellular phase which is characterised with many centrally positioned myofibroblasts and (II) or "mature" phase with small number of myofibroblasts and elastic and collagen fibers and distorted parenchyma. On the periphery of a lesion, the number of microvessels is increased but in the central part of the lesion the number of microvessels is decreased. Each suspected lesion has to be investigated further histopathologically.

Radiographic characteristics

Radial scar shows the following characteristics: 1) the central radiolucency, 2) radial distributed spicules, 3) different appearance in different projections, 4) radially lucent linear structures wich are parallel with spicules, 5) the absence of palpable mass or cutaneous changes. The general consensus is that such types of lesion less than 1 cm are radial scar but bigger changes are complex sclerosing lesions.

Pathological findings

Radial scars lesions are look like breast carcinoma because the have creamy-yellow elastotic center. Histologically this is pseudoinfiltrative lesion, whose picture depends on the plane of section and the evolutive stade. Classically there is fibroelastotic center with entraped ducts, with epithelial and myoepithelial cells. Ducts radiate from fibroelastotic center. In surrounding ducts and lobules, different grades of ductal epithelial hyperplasia, ductectasia, adenosis and papillomatosis can be observed. Microcalfications are often present in adenosis and epithelial hyperplasia. Lesions can be solitary, multiple or in clusters. These changes have to be differentiate from the invasive carcinoma, especially from the tubular type. Radial scar can also be a solitary lesion or in associationd with the invasive carcinoma.

Biological characteristics

The main difficulty is the radial scar as an incidental finding. It is a malignant precursor or marker of an increased risk. The relative risk is two times greater than in women without radial scar.

Material and methods

We made retrospective mammographic analyses in 21 from 26 women with diagnosed radial scar. They were 38-77 years old (median 48 years), (*Fig. 1*).

We analysed the basic structure of the breast according to Wolf (N1/P1-predominant lipomatous condition; P1/P2-predominant glandular texture, the presence of radial scar structure – radiolucent center, radial shadow/radiolucence) and calcification. We used χ^2 test for statistic evaluation of the data ($p<0.05$).

Results

Parenchymatous structure was lipomatous, N1/P1 in 5 from 21 woman (23.8%) and glandular, P2/DY in 16 from 21

***Table 1*. Dominant and other lesions**

		All			
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	DFCnP	2	7.8	8.2	8.2
	DFcP	7	27.0	29.2	37.5
	Hyperplasia	2	7.8	8.3	45.8
	DCIS	5	19.2	20.8	66.7
	LCIS	1	3.8	4.2	70.8
	Adenoma	1	3.8	4.2	75.0
	Duktal carcinoma	1	3.8	4.2	79.2
	Lobular carcinoma	1	3.8	4.2	83.3
	Papilary carcinom	1	3.8	4.2	87.5
	Fibroadenoma	3	11.6	12.5	100.0
	Total	24	92.3	100.0	
	Pure	2	7.7		
Total		26	100.0		

***Table 2*. Microcalcifications**

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Yes	6	23.1	100.0	100.0
Missing	System	20	76.9		
Total		26	100.0		

***Table 3*. Dysplasia fibrosa cystica proliferativa**

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Yes	19	73.1	73.1	73.1
	No	7	26.9	26.9	100.0
	Total	26	100.0	100.0	

***Table 4*. Dysplasia fibrosa nonproliferativa**

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Yes	3	11.5	12.0	12.0
	No	22	84.6	88.0	100.0
	Total	25	96.2	100.0	
Missing	System	1	3.8		
Total		26	100.0		

***Table 5*. Hyperplasia**

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Yes	7	27.0	28.0	28.0
	No	18	69.2	72.0	100.0
	Total	25	96.2	100.0	
Missing	System	1	3.8		
Total		26	100.0		

***Table 6*. Adenosis**

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Yes	6	23.1	23.1	23.1
	No	20	76.9	76.9	100.0
	Total	26	100.0	100.0	

***Table 7*. Fibroadenoma**

		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Yes	6	23.1	23.1	23.1
	No	20	76.9	76.9	100.0
	Total	26	100.0	100.0	

(76.2%) woman. Mammographic signs of radial scar were: radiolucent center in 13/21 woman (61.9%), radial lucency (14/21 or 66.7%), radial shadows (16/21 or 76.2%) and planar structure in 17 from 21 woman (81%).

The mean diameter of the change on mamopgraphy was 1.37±0.52 cm. There were no statistic differences between lipomatous and glandular mammographic structure of the breast in view of radiolucent center (p=0.34), radial radiolucency (p=0.44), radial shadows (p=0.66) and planar forms (p=0.30) of radial scar.

There was a statistically important relation between mammographic radiolucent center with radial radiolucency (p=0.006), radial shadows (p=0.001) and planary outlook of the change (p=0.012).

Microcalcifications were found in three cases (14.3%), benign according to morphology (acinar–in ductal epithelial hyperplasia; microcystic/secretory in stromal hyalinisation), and radiologically suspected (pleomorphic in DCIS). All microcalcifications were seen on the periphery of the lesion.

The described results are summarized in *Tab. 1-9* and *Fig. 2-3*.

***Table 8*. In situ carcinoma**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	10	38.5	38.5	38.5
	No	16	61.5	61.5	100.0
	Total	26	100.0	100.0	

***Table 9*. Invasive carcinoma**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	5	19.2	19.2	19.2
	No	21	80.8	80.8	100.0
	Total	26	100.0	100.0	

***Figure 2*. The relation of benign and malignant findings**

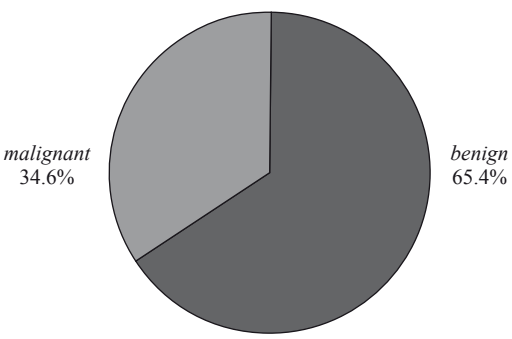
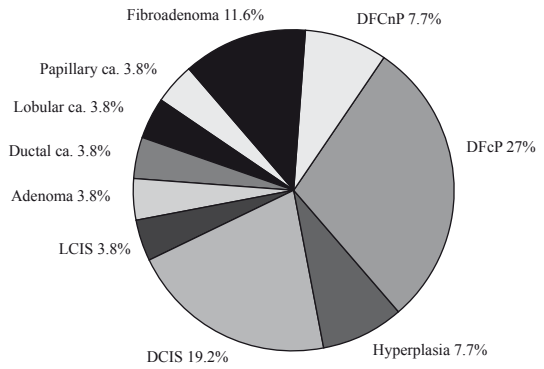


***Figure 3*. The relationship of proliferative changes**



Discussion

Radial scar lesion is usually an unpalpable, subclinical lesion, which can be seen in the mammographic investigation, which points out the importance of mammographic exploration [2].

It is observed in premenopausal women [6]. In our study it was seen almost in glandular but not in lipomatous breast. Our findings point out the sensitivity of mammographic investigation, regardless of mammographic breast structure.

Statistical significance was found in mammographic findings in view of radiolucent center, radial radiolucency, radial shadows and planar forms of radial scar.

Calcifications were found in 3 cases (14.3%) which had benign morphology (acinar with epithelial hyperplasia, microscopic secretion was observed in stromal hyalinisation) and radiological susceptible (pleomorphic with DCIS). All these lesions were found peripheral to the radial scar (mammograpic findings).

According to facts reported in the literature, mammographic findings in radial scars can be different.

For instance radiolucent center is not always present and microcalcification are described as a part of radial scar [15]. In our study, the significant elements are: planar forms, radial shadows, radiolucency and radiolucent center [7]. Calcifications were the mammographic finding in 14.3% of cases and they were found on the periphery of the radial scar.

Beside detecting radial scar on mammography, the differential diagnosis with breast cancer is also very important. The "black star" finding is also typical but not specific for radial scar lesion [8].

In our study a radiolucent center was the least present (61.9%) but statistically significant, accompanied with radial scars, radiolucency and planar forms on mammography. These indicates that the radiologist should point on thes facts beside the diagnosis of a stellate changes. Recent data show the enhanced sensitivity using magnetic resonance imaging in differential diagnosis of small-change lesions [18].

When a possibility of the radial scar lesion should be thought of, the histopathological verification should be achieved [12,14].

We conclude, that the (differential) diagnosis of radial scar by mammography needs to be followed by further investigation, such as cytology or surgical biopsy in order to potentially confirm the suspected diagnosis.

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