

# Breast cancer close to the radial scar

## Cáncer de mama cercano a cicatriz radial

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### Keywords:

breast, breast diseases, breast neoplasms.

### Palabras clave:

mama, enfermedades de la mama, neoplasias de la mama.

### ABSTRACT

**Introduction:** breast cancer is the leading cause of death worldwide. The radial scar is a high-risk lesion for cancer development; currently, there is controversy regarding treating these lesions. **Objective:** to review publications that evaluate and measure the presence of breast cancer near the percutaneous radial scar biopsy site. **Material and methods:** a systematic review in the PubMed database, with the terms *breast radial scar and neoplasms*. The search focused on articles with a single diagnosis of a radial scar by percutaneous biopsy and subsequent open biopsy with the finding of malignant breast neoplasm, separated from the site of the first biopsy and confirmed by measurement of the distance between the two lesions. **Results:** 242 publications were found. Of these, 108 were excluded from the screening by title and abstract, and 28 because they were review articles. Two articles in German, five case presentations, one letter, and one commentary were excluded. The others were excluded because they did not correspond to the research objective. From the remaining review, two articles were selected for qualitative analysis. **Conclusions:** this study reviews the occurrence of breast cancer outside the pure radial scar biopsy site. Despite the low frequency of this location, excisional biopsy is considered the appropriate approach after percutaneous biopsy because it allows the diagnosis of cancer close to this site.

### RESUMEN

**Introducción:** el cáncer de mama es la principal causa de muerte a nivel mundial, la cicatriz radial es una lesión de alto riesgo para el desarrollo de cáncer, actualmente existe controversia respecto al tratamiento de estas lesiones. **Objetivo:** revisar publicaciones que evalúen y midan la presencia de cáncer de mama en proximidad del sitio de biopsia percutánea de cicatriz radial. **Material y métodos:** revisión sistemática en la base de datos de PubMed, con los términos *breast radial scar and neoplasms*, al buscar artículos con diagnóstico único de cicatriz radial por biopsia percutánea y posterior biopsia abierta con hallazgo de neoplasia maligna de mama, separada del sitio de la primera biopsia y confirmada por medición de la distancia entre las dos lesiones. **Resultados:** se encontraron 242 publicaciones, de éstas, se excluyeron 108 en el cribado por título y resumen, 28 de ellas por tratarse de artículos de revisión. Se excluyeron dos artículos en alemán, cinco presentaciones de casos, una carta y un comentario. Las demás se excluyeron por no corresponder al objetivo de la investigación. De la revisión restante, fueron seleccionados dos artículos para análisis cualitativo. **Conclusiones:** este estudio revisa la presencia de cáncer de mama por fuera del sitio de biopsia de cicatriz radial pura. A pesar de la baja frecuencia de esta localización, se considera que la biopsia por escisión es el enfoque adecuado después de la biopsia percutánea porque permite el diagnóstico de cáncer cercano a este sitio.

## INTRODUCTION

Breast cancer is the most common cancer diagnosis in women (2.1 million new cases in 2018) and the leading cause of cancer death worldwide (627,000 women in the same year).<sup>1</sup> In the breast, high-risk lesions are associated with increased concurrence or future development of cancer, including radial scar. This lesion is considered benign but may be accompanied

by carcinoma, which may be indistinguishable on imaging.<sup>2</sup> Diagnostic biopsy is usually performed percutaneously (most frequently with a 14G trucut needle). Then, a surgical excisional biopsy is performed<sup>3,4</sup> to establish or confirm the existence of epithelial atypia and hyperplastic proliferative lesions (often associated<sup>5</sup>) or to diagnose malignant neoplasia. Given the low association with carcinoma when the radial scar is “pure” (without

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another proliferative lesion),<sup>6</sup> some services recommend, with caution, the performance of vacuum-assisted excision.<sup>7</sup> One of the risks of omitting surgical excision is that a malignant neoplasm outside the radial scar biopsy site will not be resected with this technology, leaving the cancer present undiagnosed.

**MATERIAL AND METHODS**

A systematic review of articles registered in the PubMed database, with the terms *breast radial scar and neoplasms*, without the use of filters, was performed on 28/03/2020, searching for articles with a single diagnosis of a radial scar by percutaneous core needle biopsy and subsequent open biopsy with a finding of malignant breast neoplasm, separated from the site of the first biopsy and confirmed by measurement of the distance between the two lesions. The author provided the search terms, and with another reviewer, articles relevant to the research objective were selected according to the title or by additional information in the abstract. Discrepancies were resolved by reviewing the whole article and mutual agreement. In the articles that continued in evaluation, the author reviewed the complete article to ensure the relevance of the articles with the research objective. Review articles, reports of less than five cases, letters, and

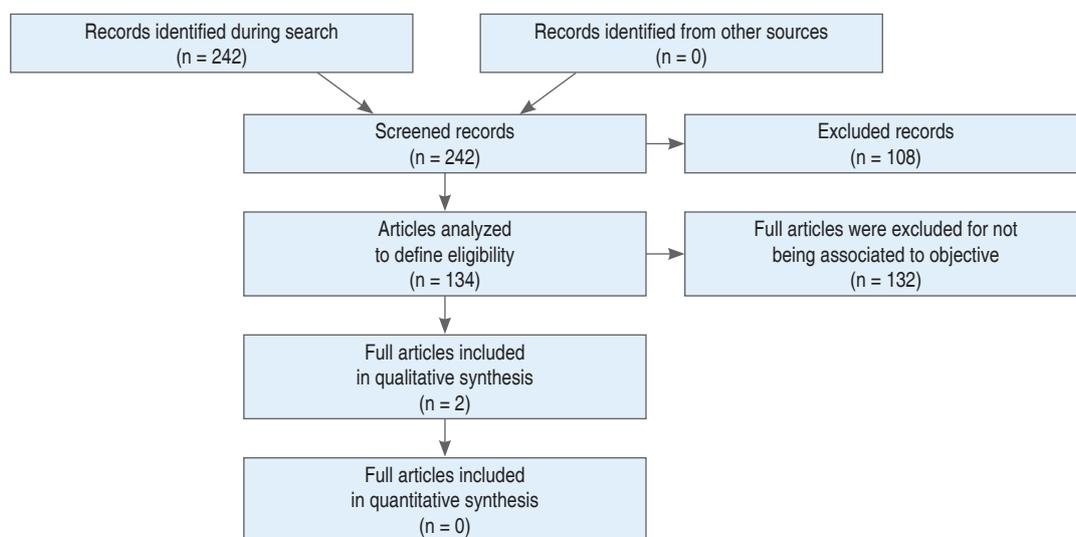
comments were excluded. *Figure 1* shows the flow of information through the different phases of the systematic review.

**RESULTS**

With the search terms, 242 publications were found. Of these, 108 were excluded from the screening by title and abstract, and 28 because they were review articles. Although there was no initial restriction by language, two articles in German, five case presentations, one letter to the editor, and one commentary were excluded. The rest were excluded because they did not correspond to the research objective. Two articles were selected from the review for qualitative analysis.

In the article by Leong et al.<sup>6</sup> of 161 pure radial scar biopsies taken by stereotactic biopsy (9 g-gauge needle vacuum-assisted biopsy with 12 samples taken) and surgical excision, only one ductal carcinoma *in situ* (0.6%) of 2 mm located 5 mm from the percutaneous biopsy cavity marked on the titanium clip biopsy sites was detected. It should be noted that in this case, residual microcalcifications were seen on post-biopsy mammography.

In the article by Li Z et al.,<sup>8</sup> of 220 14 g needle biopsies, two cases were found with carcinoma (0.9%). The first case was a 10mm invasive ductal carcinoma with



*Figure 1: Flow of information through the different phases of the systematic review.*

Table 1: Cases with carcinoma outside the radial scar biopsy site.

Author	No. of biopsies	Cancer	Type of cancer	Tumor size (mm)	Distance from radial scar (cm)
Leong, et al. <sup>6</sup>	161	1	Ductal <i>in situ</i>	2	5
Li Z, et al. <sup>8</sup>	220	2	Ductal invasive	10	8
			Ductal <i>in situ</i>	5	7

Nottingham grade 1 (5/9), nuclear grade 2, no lymphovascular invasion, and 8 mm distance from the biopsy site. The second case was a 5 mm focal ductal carcinoma *in situ* with a cribriform growth pattern, nuclear grade 2, and 7mm distance from the biopsy site (Table 1).

## DISCUSSION

The denomination of radial scar is usually used in lesions up to 1 cm (a larger one corresponds to a complex sclerosing lesion).<sup>9,10</sup> Its diagnosis was incidental in the microscopic evaluation. However, recently its suspicion has increased due to greater access to mammography<sup>11,12</sup> in which it appears as an area of architectural distortion,<sup>5</sup> accompanied by other criteria: 1) presence of a central radiolucency, 2) thin, long radiating spicules, 3) different appearance according to the projections, 4) radiolucent linear structures parallel to the spicules, and 5) absence of palpable lesions or changes in the skin.<sup>13</sup> On ultrasound, they are visible as irregular hypoechoic masses with posterior shadowing virtually identical to the appearance of breast cancer.<sup>14</sup>

They are most frequently detected in women between 40 and 60 years of age, being rare before the age of 30.<sup>15</sup> In population screening programs, their incidence is estimated between 0.03 and 0.09%.<sup>5,12,15-18</sup> In autopsy specimens, it is reported between 1.7 and 28%.<sup>15,19</sup>

The association of radial scar with malignancy is probably not an etiologic relationship.<sup>8</sup> The most frequently associated malignant tumors are low or intermediate-grade ductal carcinomas *in situ* and grade 1 or 2 invasive carcinomas<sup>18,20</sup> with favorable biological profiles (estrogen and progesterone receptor

positive and low proliferative index.<sup>21,22</sup> The foci of malignancy are usually small; in some cases, they correspond to only 5% of the lesion.<sup>23</sup> Farshid and Rush, in their study, reported that the malignancy was within the radiological area in seven of nine cases but extended beyond it in two cases.<sup>23</sup> Doyle et al.<sup>24</sup> describe 25 malignant lesions; four were in the radial scar,<sup>17</sup> at the border, and four were separated. Diagnostic omission of cancer on percutaneous core needle biopsy may occur due to inadvertent failure of the biopsy procedure<sup>18</sup> (sampling only from the radial scar in a lesion that also contains carcinoma), possibly related to needle size or a low sample count (14 g gauge needle or smaller or with sample count  $\leq 12$ ) and at higher risk of occurring in cases where mammography and histology are discordant.<sup>2,19,25</sup> It may also be due to a diagnostic error in the pathology study due to difficulty in differentiating radial scar from carcinoma, particularly of the tubular type.<sup>26</sup>

There is significant variation in the finding of malignancy in surgical excision after a core needle biopsy with reports of radial scar (0 and 40%).<sup>20,26</sup> This situation is more frequent when the radial scar is accompanied by atypical ductal hyperplasia, lobular neoplasia, or papilloma (on average 26%), compared to 7.5% when there is no associated proliferative lesion.<sup>27</sup>

Some departments replace trucut needle biopsies with vacuum-assisted biopsies favoring their larger size and proceeding as a next step after diagnosing radial scar to excision, also by vacuum, intending to remove the entire lesion as an alternative to the traditional open biopsy.<sup>7</sup> This additional procedure, in its great majority, did not find malignancy<sup>7</sup> (currently considered less than 5% when there are no atypia<sup>5,28</sup>).

In a meta-analysis, radial scar without atypia assessed by vacuum-assisted biopsies changed to carcinoma *in situ* in 1% (95% CI 0 ± 4) of excisional biopsies.<sup>28</sup> The low proportion of residual lesions on excision after an initial percutaneous radial scar biopsy obtained by conventional or vacuum-assisted core needle was supported by the UK National Health Service Breast Screening Multidisciplinary Working Group to develop guidelines for vacuum-assisted excision in this pathology (without epithelial atypia) on a case-by-case basis using a multidisciplinary approach.<sup>7</sup> However, the transition to this procedure has not been widely used<sup>7</sup> and with limited evidence in the medical literature<sup>28</sup> (studies are few, with a low number of patients and observational type), may leave without a diagnosis some lesions as previously described Fashid and Rush of two (22.2%) lesions,<sup>23</sup> that extended beyond the radiological area of the radial scar, and the four lesions described in the publication of Doyle and collaborators<sup>24</sup> (16%) and the three (0.7%) of this review.

The expectation that imaging would decrease the risks of missing cancer with percutaneous biopsies has not been confirmed. Despite its high negative predictive value, MRI missed the cancer diagnosis in 24% (95% CI 11, 39%),<sup>28</sup> and the malignancy rate at surgical excision was similar with and without digital breast tomosynthesis.<sup>29</sup>

Low sample sizes, differences in inclusion criteria, and possible selection biases of lesions for surgical excision have explained the variability in reports of concurrent carcinoma between 0 and 40%.<sup>20</sup> In addition, in some publications, the authors did not fully provide methodological, radiological, or clinical details<sup>18</sup> (which may explain the low number of cases in this review requiring measurement of the distance outside the biopsy site). These factors increase the uncertainty about the risk of leaving undiagnosed carcinoma at or near the biopsy site. In this case, both areas are amenable to resection with surgical excision.

## CONCLUSIONS

Radial scarring is associated with an increased risk of breast cancer concurrence. Surgical

excisional biopsies after diagnosis are the following standard procedure. This second biopsy allows the diagnosis of proliferative lesions or cancer. It facilitates the location of the lesion in the specimen, which has allowed the development of studies that evaluate separate lesions, but close to the radial scar. In the systematic review of this study, three lesions were found among 381 biopsies neighboring the biopsy site that measured the distance from the biopsy site. Implementation of aspiration excision is not expected to reach these types of lesions. Given the limited evidence for aspiration excision as an alternative to surgical biopsy, the latter offers greater certainty in diagnosing concurrent cancer.

## REFERENCES

1. Wild CP, Weiderpass E, Stewart BW, editors (2020). World Cancer Report: Cancer Research for Cancer Prevention. Lyon, France: International Agency for Research on Cancer. Available from: <http://publications.iarc.fr/586>. License: cc by-nc-nd3.0 igo.
2. Racz JM, Carter JM, Degnim AC. Challenging atypical breast lesions including flat epithelial atypia, radial scar, and intraductal papilloma. *Ann Surg Oncol*. 2017; 24: 2842-2847. doi: 10.1245/s10434-017-5980-6.
3. Bravo CR, Sanchotena V, Sánchez A, Raya SM. Experiencia en cicatriz radial. [Experience in radial scar]. *Rev Argent Mastología*. 2014; 33: 198-206.
4. Gonzalez MA. Diagnosis of non-palpable breast lesions. *Colombian Journal of Surgery*. 2002; 17: 224-231.
5. Dominguez A, Durando M, Mariscotti G, Angelino F, Castellano I, Bergamasco L et al. Breast cancer risk associated with the diagnosis of a microhistological radial scar (RS): retrospective analysis in 10 years of experience. *Radiol Med*. 2015; 120: 377-385. doi 10.1007/s11547-014-0456-2.
6. Leong RY, Kohli MK, Zeizafoun N, Liang A, Tartert PI. Radial scar at percutaneous breast biopsy that does not require surgery. *J Am Coll Surg*. 2016; 223: 712-716. doi 10.1016/j.jamcollsurg.2016.08.003.
7. Pinder SE, Shaaban A, Deb R, Desai A, Gandhi A, Lee AHS, et al. NHS Breast Screening multidisciplinary working group guidelines for the diagnosis and management of breast lesions of uncertain malignant potential on core biopsy (B3 lesions). *Clin Radiol*. 2018; 73: 682-692. doi: 10.1016/j.crad.2018.04.004.
8. Li Z, Ranade A, Zhao C. Pathologic findings of follow-up surgical excision for radial scar on breast core needle biopsy. *Hum Pathol*. 2016; 48: 76-80. doi 10.1016/j.humpath.2015.06.028.
9. Greenberg ML, Camaris C, Psarianos T, Ung OA, Lee WB. Is there a role for fine-needle aspiration in radial scar/complex sclerosing lesions of the breast? *Diagn Cytopathol*. 1997; 16: 537-542. doi:

- 10.1002/(sici)1097-0339(199706)16:6<537::aid-dc13>3.0.co;2-j.
10. Delgado MM; Rodríguez AJ. Diagnostic-therapeutic management of atypical breast lesions. [Diagnostic-therapeutic management of atypical breast lesions.] *Rev Argent Radiol.* 2018; 82: 114-123. Available in: <http://dx.doi.org/https://doi.org/10.1055/s-0038-1641135>
  11. Egyed Z, Péntek Z, Járay B, Kulka J, Svastics E, Kas J, László Z. Radial scar-significant diagnostic challenge. *Pathol Oncol Res.* 2008; 14: 123-129. doi 10.1007/s12253-008-9025-0.
  12. Murray M. Pathologic high-risk lesions, diagnosis and management. *Clin Obstet Gynecol.* 2016; 59: 727-732. doi: 10.1097/GRF.00000000000000234.
  13. Tabar L, Dean PB. Stellate lesions. In: Tabar L, Dean PB (eds) *Teaching atlas of mammography*, second revised edition, 1985. Georg Thieme Verlag, New York, pp. 87-136.
  14. Cohen MA, Sferlazza SJ. Role of sonography in evaluation of radial scars of the breast. *Am J Roentgenol.* 2000; 174: 1075-1078. doi: 10.2214/ajr.174.4.1741075.
  15. Lee E, Wylie E, Metcalf C. Ultrasound imaging features of radial scars of the breast. *Australas Radiol.* 2007; 51: 240-245. doi: 10.1111/j.1440-1673.2007.01719.x.
  16. Kennedy M, Masterson AV, Kerin M, Flanagan F. Pathology and clinical relevance of radial scar: a review. *Clin Pathol.* 2003; 56: 721-724. doi 10.1136/jcp.56.10.721.
  17. Cawson JN, Malara F, Kavanagh A, Hill P, Balasubramaniam G, Henderson M. Fourteen-gauge needle core biopsy of mammographically evident radial scars: is excision necessary? *Cancer* 2003; 97: 345-351. doi 10.1002/cncr.11070.
  18. Ferreira AI, Borges S, Sousa A, Ribeiro C, Mesquita A, Martins PC, et al. Radial scar of the breast: Is it possible to avoid surgery? *Eur J Surg Oncol.* 2017; 43: 1265-1272. doi: 10.1016/j.ejso.2017.01.238.
  19. Nielsen M, Jensen J, Anderson JA. An autopsy study of radial scar in the female breast. *Histopathology.* 1985; 9: 287-295. doi 10.1111/j.1365-2559.1985.tb02446.x.
  20. Rakha EA, Ho BC, Naik V, Sen S, Hamilton LJ, Hodi Z, et al. Outcome of breast lesions diagnosed as lesion of uncertain malignant potential (B3) or suspicious of malignancy (B4) on needle core biopsy, including detailed review of epithelial atypia. *Histopathology.* 2011; 58: 626-632. doi: 10.1111/j.1365-2559.2011.03786.x.
  21. Ha SM, Cha JH, Shin HJ, Chae EY, Choi WJ, Kim HH, et al. Radial scars/complex sclerosing lesions of the breast: radiologic and clinicopathologic correlation. *BMC Med Imaging.* 2018; 18: 39. doi: 10.1186/s12880-018-0279-z.
  22. Mokbel K, Price RK, Mostafa A, Williams N, Wells CA, Perry N, et al. Radial scar and carcinoma of the breast: microscopic findings in 32 cases. *Breast.* 1999; 8: 339-342. doi 10.1054/brst.1999.0081.
  23. Farshid G, Rush G. Assessment of 142 stellate lesions with imaging features suggestive of radial scar discovered during population-based screening for breast cancer. *Am J Surg Pathol.* 2004; 28: 1626-1631. doi 10.1097/00000478-200412000-00012.
  24. Doyle EM, Banville N, Quinn CM, Flanagan F, O'Doherty A, Hill AD, et al. Radial scars/complex sclerosing lesions and malignancy in a screening programme: incidence and histological features revisited. *Histopathology.* 2007; 50: 607-614. doi: 10.1111/j.1365-2559.2007.02660.x.
  25. Brenner RJ, Jackman RJ, Parker SH, Evans WP 3rd, Philpotts L, Deutch BM, et al. Percutaneous core needle biopsy of radial scars of the breast: when is excision necessary? *AJR Am J Roentgenol.* 2002; 179: 1179-1184. doi: 10.2214/ajr.179.5.1791179.
  26. Linda A, Zuiani C, Furlan A, Londero V, Girometti R, Machin P, et al. Radial scars without atypia diagnosed at imaging-guided needle biopsy: how often is associated malignancy found at subsequent surgical excision, and do mammography and sonography predict which lesions are malignant? *AJR Am J Roentgenol.* 2010; 194: 1146-1151. doi: 10.2214/AJR.09.2326.
  27. Conlon N, D'Arcy C, Kaplan JB, Bowser ZL, Cordero A, Brogi E, et al. Radial scar at image-guided needle biopsy is excision necessary? *Am J Surg Pathol.* 2015; 39: 779-785. doi: 10.1097/PAS.00000000000000393.
  28. Farshid G, Buckley E. Meta-analysis of upgrade rates in 3163 radial scars excised after needle core biopsy diagnosis. *Breast Cancer Res Treat.* 2019; 174: 165-177. doi: 10.1007/s10549-018-5040-3.
  29. Phantana-Angkool A, Forster MR, Warren YE, Livasy CA, Sobel AH, Beasley LM, Trufan SJ, Hadzikadic-Gusic L, Sarantou T, Voci AE, Sarma D, White RL Jr. Rate of radial scars by core biopsy and upgrading to malignancy or high-risk lesions before and after introduction of digital breast tomosynthesis. *Breast Cancer Res Treat.* 2019; 173: 23-29. doi: 10.1007/s10549-018-4973-x.

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