Asia-Pacific Journal of Science and Technology: Volume: 27. Issue: 05. Article ID.: APST-27-05-12. Research Article

APST

Asia-Pacific Journal of Science and Technology

https://www.tci-thaijo.org/index.php/APST/index

Published by the Research and Technology Transfer Affairs Division,
Khon Kaen University, Thailand

Correlation between fibroepithelial lesions with breast core needle biopsy and surgical excision

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Received 15 August 2021
Revised 23 March 2022
Accepted 21 April 2022

Abstract

Fibroepithelial lesions (FELs) are well known as the most commonly found in breast pathology that can be diagnosed by core needle biopsy (CNB). FELs consist of fibroadenoma (FA) lesions and phyllodes tumor (PT). FELs have overlapping histological characteristics thereby complicating the distinction between FA and PT with an initial CNB. Therefore, our study aimed to differentiate the histological characteristics of FELs on CNB, and whether there was a correlation with an upgrade of diagnosis of PT on subsequent excisional specimens. A retrospective review of all FELs diagnosed by CNB in FELs identified patients at Khon Kaen University (Srinagarind Hospital) during six years (2013-2018) was conducted by three pathologists to confirm the diagnosis of the features of CNB and subsequent excisional specimens. Of 209 patients who were diagnosed with FELs by CNB, 76 cases received subsequent excision. The excisional specimens were reviewed for FA (52 of 76), and whether they were benign PT (16 of 76) or borderline PT (8 of 76). No malignant PT was identified in our study. Overall stromal cellularity (moderate and high degrees, 58.3 and 20.8 %; $p< 0.001$), stromal pleomorphism (moderate and high atypia, 66.7 and 4.2%; $p< 0.001$), and stromal overgrowth at 100x (87.5%; $p<0.001$) on CNB correlated markedly with an upgrade of PT diagnosis on subsequent excisional specimens. Our study provided evidence for the differentiation of FELs features on associated CNB with an upgrade PT diagnosis on subsequent excisional specimens. Hence, FELs diagnosed by CNB can be used for excision with a clear margin in the future.

Keywords: Fibroepithelial lesions, Fibroadenoma, Phyllodes tumor, Breast core needle biopsy, Surgical excision, Diagnosis

1. Introduction

Fibroepithelial lesions (FELs) are the most commonly found breast pathology in women. These lesions consist of fibroadenoma (FA) and phyllodes tumor (PT) which are considered within the same spectrum of biphasic neoplasms containing a proliferation of epithelial and stromal components. FA usually occurs in younger women, aged 20 to 30 years, however, they are also found in postmenopausal age groups [1]. PT is a rare fibroepithelial neoplasm that comprises less than 1.0% of all breast tumors and approximately 3% of all FELs. They might arise most commonly in women who are aged between 35 to 55 years. PT has been identified as either benign or malignant [2,3], predominately by a combination of several histological features. The World Health Organization (WHO) tumor register of the breast 2019 proposes possible features for microscopic evaluation distinguishing between FA and PT as stromal cellularity, stromal pleomorphism, mitotic count, and stromal overgrowth. These are defined as the absence of epithelial elements in the expanded stroma within a low-power field, whether the margins are rounded or infiltrative, necrosis, and malignant heterologous elements [4-7].

The histology of FA is different from PT which are necessary for the preoperative process, as the management of surgical selection has different approaches. FA behaves in a benign fashion that can be monitored by close observation or surgical removal without excision of surrounding tissue in the breast. Conversely, PT shows variable biological behavior. For instance, benign PT may be recurrent but not metastasize; conversely, borderline, and malignant PT might both be recurrent and metastasize. For the latter, complete removal is recommended including surrounding uninvolved tissue in the breast [8-10].

The purpose of screening investigations of clinical and radiologic imaging of the breast is to find cancer and avoid overestimation of diagnosis for surgery. Core needle biopsy (CNB) is a well-utilized technique that achieves these goals with high accuracy and sensitivity [11-13]. In the case of FELs, several features have been examined and suggested for use in the identification of PT on CNB, including cellularity of stromal cells, pleomorphic stromal cells, stromal overgrowth, mitotic index, or counting of mitotic cells, fat in the stroma, and core biopsy fragmentation. Among these, cellularity and pleomorphic stromal cells, and mitotic index show the most association with diagnosis of PT [10,14,15].

However, FA and PT still have some overlapping histological features. Some of the features are subjective and have some degree of diagnosis variability between pathologists. There is still no single or standard combination of any histologic features for reliable differentiation of FA from PT in CNB. Hence, diagnosis remains challenging as it is difficult to distinguish FA from PT, especially in limited specimens with CNB [13,16]

Therefore, the purpose of this study was to review and distinguish the histological features of the FELs on CNB associated with upgraded diagnosis by PT on subsequent excision. We hypothesized that a discriminatory excision of FELs diagnosed by CNB might lead to a decreased incidence of unnecessary surgery.

2. Material and methods

2.1 Study design

A retrospective review of all FELs diagnosed by CNB (FA, PT, and FELs with any uncertain histological diagnosis between FA and PT, i.e., cellular FEL, proliferative FEL) was performed on specimens at Khon Kaen University (Srinagarind Hospital) or on specimens received from consultants during six years (2013-2018). The pathology module of the Laboratory Information System (LIS) was used to extract and develop a dataset which included all FELs of the breasts diagnosed by CNB, and subsequent excisional specimens whenever they were available. Pertinent clinical and radiologic data including age, tumor size, and Breast Imaging Reporting and Data System (BIRADs) category for each case was obtained from medical records. Pathology glass slides were independently reviewed by three pathologists. Histological features were recorded for both CNB and subsequent excisional specimens to confirm diagnosis by using a combination of histological features following the 2019 WHO classification criteria for breast cancer. For conflicting cases a multi-head microscope was used to examine and achieve a consensus diagnosis.

2.2 Histologic evaluation

The following histological features were assessed by CNB: overall cellularity of stromal cells, variability in stromal cellularity, pleomorphism of stromal, stromal overgrowth at 40x and 100x magnification, slit-like spaces, leaf-like architectures, mitotic count, fragmentation of the cores, and fat in the stroma.

For resected specimens, the following histological features were evaluated: overall cellularity of stromal cells, variance in cellularity stromal cells, pleomorphism of stromal cells, overgrowth of stromal cells at 40x and 100x magnification, slit-like spaces, leaf-like architectures, margin status, and mitotic count.

Stromal cellularity was categorized into four levels namely, very low, low, moderate, and high which represents scores of 0, 1, 2, and 3 respectively. All the areas of the CNB slide area were evaluated. Very low cellularity was observed as less than twofold of normal perilobular stroma. Low cellularity appeared as twofold of normal perilobular stromal and was flatly spaced between nuclei. Moderate stromal cellularity appeared as intermediate during low and high stromal cellularity and presented in the zone together with slight overlapping of nuclei of the stroma. High stromal cellularity was characterized by the distribution of massive stromal cells with zone overlapping of stromal nuclei (Figure 1).

Variable cellularity of stroma denoted the level of periepithelial stromal cell accentuation when compared with the interepithelial zone. It was categorized as having no variation (score 0) when the cellularity of the stroma was homogeneous in every zone. A high (score 3) was assigned when the cellularity of the periepithelial was greater than the interepithelial areas. The variability was scored as low (score 1) or moderate (score 2) when the cellularity differences were low or moderate, respectively (Figure 2).

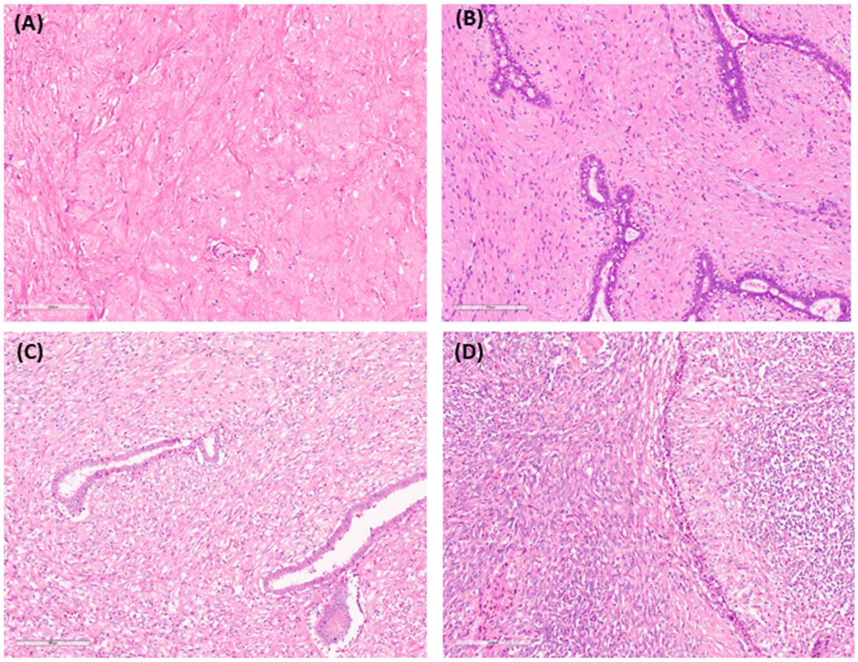

Figure 1 Overall stromal cellularity as depicted by the level of stromal cellularity as being very low (A), low (B), moderate (C), and high (D) (H&E, ×150).

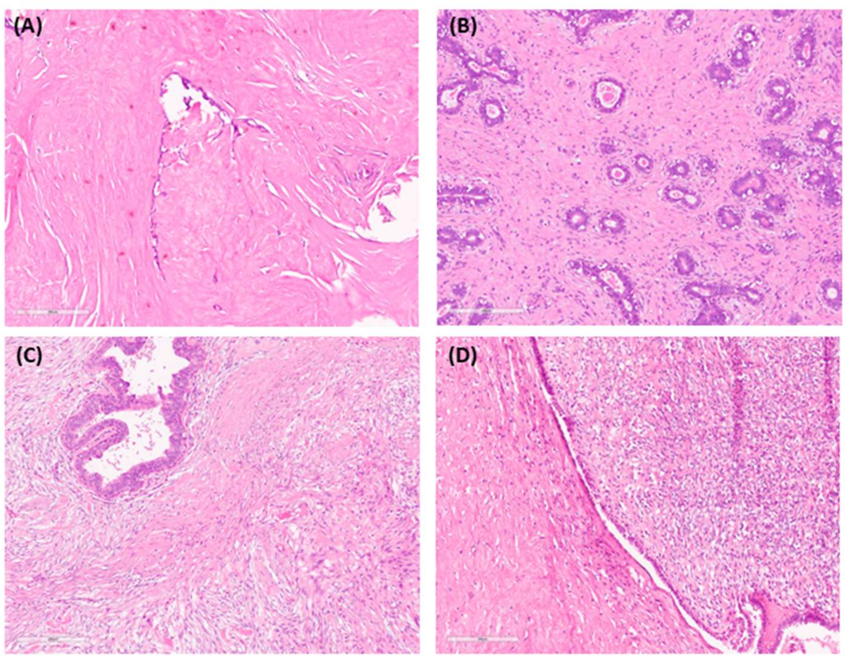

Figure 2 Variability in stromal cellularity characterised as Absent (A), Low (B), Moderate (C), and High (D) (H&E, ×150).

Stromal pleomorphism was categorized as absent (score 0), low (score 1), moderate (score 2), or high (score 3). Stromal cells with low pleomorphism displayed tiny uniform nuclei with absent nucleoli. High stromal pleomorphism was characterized by marked variation in nuclear size and shape with prominent nucleoli. Moderate stromal nuclei had size and shape variation between low and high pleomorphism with inconspicuous nucleoli (Figure 3).

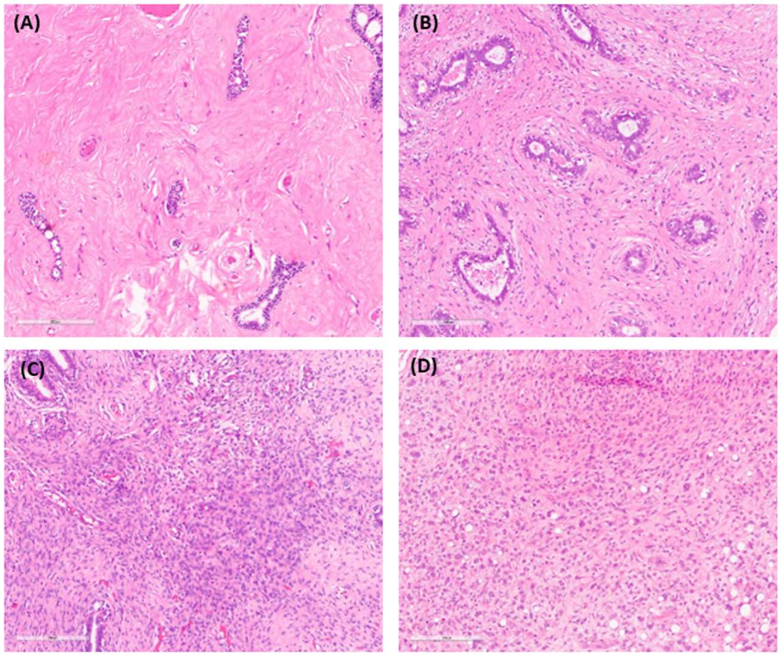

Figure 3 The degree of stromal pleomorphism characterised as Absent (A), Low (B), Moderate (C), and High (D) (H&E, ×150).

Overgrowth of stromal cells was determined as the appearance of stroma absent of epithelium in some low-power fields (x40) or any high-power field (x100). It was categorized as present or absent.

Slit-like spaces were characterized by stromal compressed ducts into slit-like spaces, whereas leaf-like architectures were identified by the expansion of cellular stroma into the space. Fragmentation of the cores was depicted by stroma and epithelium at either one or both ends of the biopsy fragment of the leaf-like scheme in the core biopsy sample. Fat in the stroma was the extension of stromal cells into the surrounding adipose tissue. All the above were categorized as present or absent (Figure 4).

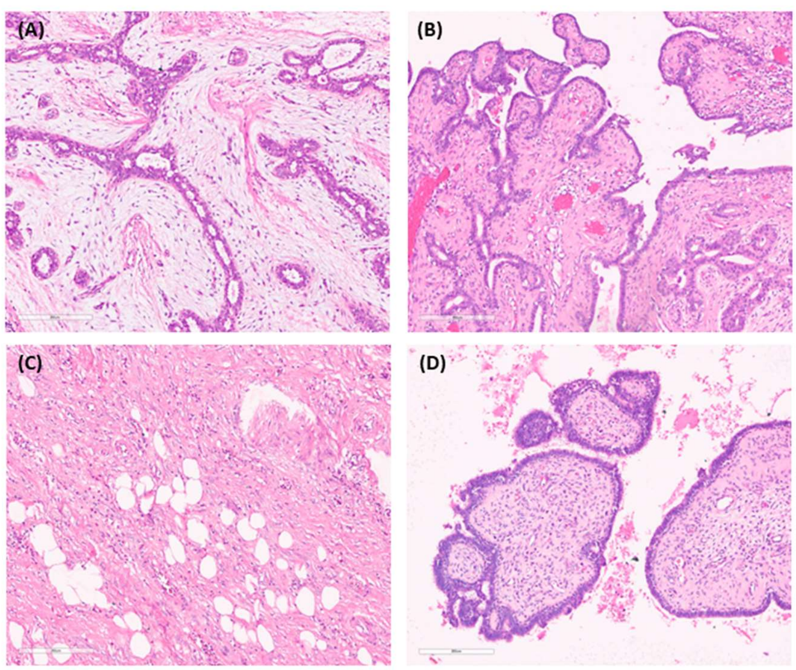

Figure 4 (A) Stroma compressed ducts into slit-like spaces, (B) Leaf-like architectures, (C) Fat in the stroma, and (D) Fragmentation of the cores (H&E, ×150).

The mitotic index was determined by counting the mitotically active areas indicating total mitosis per 10 high-power fields (x400) or 2.37 mm^2.

The margin situation was classified to be infiltrating or rounding, and extension, detected by microscopy, into adjacent adipose tissue was considered as infiltrating. It was evaluated in only the excised specimens. Definitions of each histological feature for evaluation are summarized in Table 1 which has been modified from the WHO classification of tumors, breast tumors [7].

Table 1 Definitions of the Histological Characteristic for Investigation in Core Biopsy and Excisional Specimens.

Histological Features	Definitions
Overall cellularity of stromal cells	
Score 0 = Very low	Less than twice normal perilobular stroma
Score 1 = Low	Twice normal perilobular stroma with evenly spaced nuclei
Score 2 = Moderate	Areas with few overlapping stromal nuclei
Score 3 = High	Distribution of dense stromal cells with prominent areas of overlapping nuclei
variance of cellularity stromal cells	
Score 0 = Absent	Cellularity of the stromal cells was equally in all areas
Score 1 = Low	Mild periepithelial accentuation compared with the interepithelial areas
Score 2 = Moderate	The comparison of moderate periepithelial accentuation and the interepithelial areas
Score 3 = High	Periepithelial accentuation was much higher than interepithelial areas
Pleomorphism of stromal cells	
Score 0 = Absent	No pleomorphism
Score 1 = Low	Tiny, absent nucleoli and uniform nuclei
Score 2 = Moderate	Moderate level in between low and high with inconspicuous nucleoli
Score 3 = High	Marked variation in nuclear size and shape with prominent nucleoli
Stromal overgrowth	Stromal proliferation without epithelial elements
Slit-like spaces	Stroma compress ducts into slit-like spaces
Leaf-like architectures	Expansion of the stroma into epithelial-lined clefts of space
Fragmentation	Ether one or both ends of a fragment of stroma with epithelium
Fat in stroma	Extension of stromal cells into the surrounding adipose tissue
Mitotic count	Investigated in the highest degree of the cellular zone and quantified per 10 HPFs
Margin status	
Round	Well-defined border
Infiltrative	Extension of stromal tumor into adipose tissue or the peritumoral stroma

Abbreviation: HPF, high-power field.

2.3 Statistical analysis

Descriptive statistics were used to calculate the median (range), or number (percentage) of data obtained. Differences of age and tumor size among FA, benign PT, and borderline PT groups were compared by Kruskal-Wallis one-way ANOVA. Chi-square tests (or Fisher's exact tests, as appropriate) were applied to analyze BIRADs category and histological features including cellularity stromal, variability in cellularity, pleomorphism and overgrowth of stromal cells, slit-like spaces, leaf-like architectures, fragmentation, and fat in stroma. Mann–Whitney tests were performed to analyze the difference of mitotic counts in FA and PT. Sensitivity and specificity with the 95% confidence interval of FA and PT on breast CNB were calculated. All statistical analyses were performed using SPSS version 23. *p*-values of less than 0.05 were considered to be statistically significant.

3. Results

3.1 Patient and imaging data

The total of 209 patients diagnosed with FELs on breast CNB composed 133 patients (63.6%) with FELs who received observation and no further excision, and 76 patients (36.4%) who received subsequent excision (Figure 5). Diagnosis of FA on excision was detected in 52 patients with a median age of 38 years (range 18-60 years), while 16 patients were diagnosed to be benign PT and had a median age of 48 years (range 20-72 years), and 8 patients with borderline PT had a median age of 43 years (range 12-51 years) ($p = 0.050$) (Table 2).

Imaging studies of patients with FA, benign PT and borderline PT on excision had a median tumor size of 2.7 cm. (range 0.9-7.0 cm.), 5.6 cm. (range 2.5-15.0 cm.) and 7.9 cm. (range 1.5-15.0 cm.), respectively. ($p < 0.001$).

Imaging studies for the BIRADs category were available for review in 68 of 76 cases (6 cases of FA, 1 case of benign PT, and 1 case of borderline PT had no radiologic information). These patients with high BIRADs category (BIRADs 5) differed when PT cases were compared with FA cases (2 of 24 vs 0 of 52; $p = 0.024$) (Table 2).

Table 2 The predictive factors for diagnosis of the fibroepithelial lesion by core needle biopsy to be phyllodes tumor in patients.

Characteristic	Diagnosis on excisions, No. (%)			*p*-value
	FA n=52 (68.5%)	Benign PT n=16 (21%)	Borderline PT n=8 (10.5%)	
Age, median (range)	38 (18-60)	48 (20-72)	43 (12-51)	0.050[a]
Tumor size on imaging – (cm) median (range)	2.7 (0.9-7.0)	5.6 (2.5-15.0)	7.9 (1.5-15.0)	<0.001[a]
BIRADs score (n, %)				0.024[b]
BIRADS Score	2 (3.8)	0	0	
2	4 (7.7)	1 (6.2)	0	
3	1 (1.9)	1 (6.2)	0	
4	27 (52.0)	8 (50)	1 (12.5)	
4[a]	8 (15.4)	3 (18.8)	0	
4[b]	4 (7.7)	2 (12.5)	4 (50)	
4[c]	0	0	2 (25)	
5	6 (11.5)	1 (6.2)	1 (12.5)	
Missing data				

Abbreviation: FA, fibroadenoma; PT, phyllodes tumor; BIRADs.
[a]Kruskal-Wallis one-way ANOVA.
[b]Chi-square test.

3.2 Surgical excision outcome

Two hundred and nine patients were diagnosed with FELs by CNB as shown in Figure 5. Of this total, 133 cases (83%) required monitoring with no further excision, and 76 (36.4%) received subsequent excision. All 133 cases who received only observation were diagnosed as FA by CNB. A review of CNB in 76 cases showed that 68.4% had FA (52 of 76), 13.2% PT (10 of 76), and 18.4% (14 of 76) had uncertain histological features ranging between FA and PT. For FA core biopsies, the review of excision specimens showed discordant cases (5.8%, 3 of 52), and for PT core biopsies the reviewed excision specimens showed 50% benign PT and 50% borderline PT (5 of 10 in each case). For uncertain histological features of core biopsies, the reviewed excision specimens showed FA in 21.4% (3 of 14), 57.2% benign PT (8 of 14) and 21.4% borderline PT (3 of 14) of cases. No malignant PT was identified in this study.

Of 209 patients diagnosed with FELs by CNB (Figure 5), 133 cases (63.6%) required monitoring with no further excision, whereas 76 (36.4%) received subsequent excision. All 133 cases which received only observation were diagnosed as FA by CNB. Examination of these 76 cases which were diagnosed by CNB found that 68.4% were FA (52 of 76), 13.2% PT (10 of 76), and uncertain histological features between FA and PT were found in 18.4% (14 of 76) of cases. For FA core biopsies, the reviewed excision specimens showed discordant cases in 5.8% (3 of 52) of cases. For PT core biopsies, the reviewed excision specimens showed benign PT and borderline PT in 50% of cases in each (5 of 10 in each). For uncertain histological features of core biopsies, the reviewed excision specimens showed that 21.4% (3 of 14) had FA, 57.2% benign PT (8 of 14) and borderline PT of 21.4% (3 of 14) of cases. No malignant PT was identified in this study (Figure 5). Additionally, sensitivity and specificity were calculated from Figure 5, which showed that sensitivity and specificity of FA diagnosis was 94.2% and 100%, respectively, while PT diagnosis was 87.5% and 100%, respectively (Table 3). Our results showed that sensitivity and specificity is greater than has previously been reported [17-19].

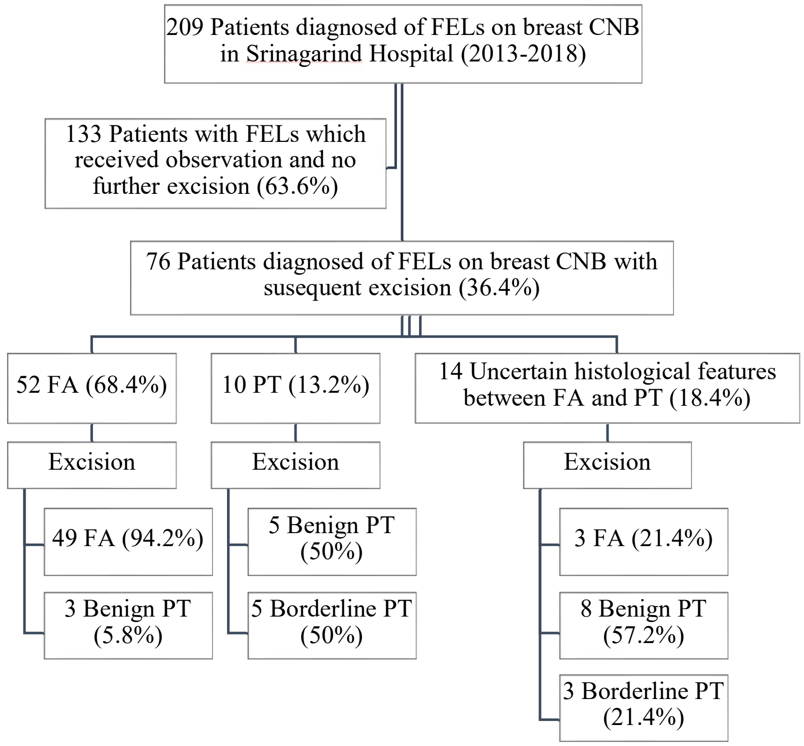

Figure 5 The schematic outcomes of 209 patients with fibroepithelial lesion who underwent core needle biopsy or excisional biopsy.

Table 3 The sensitivity and specificity of fibroadenoma and phyllodes tumor diagnosis of fibroepithelial lesions who underwent core needle biopsy or excisional biopsy.

Type	Diagnosis	Condition		Sensitivity		Specificity	
		Positive	Negative	%	95% CI	%	95% CI
FA (n=52)	Positive	49	0	94.2	(84.1-98.8)	100	(93.15-100)
	Negative	3	52				
PT/Uncertain (n=24)	Positive	21	0	87.5	(67.6-97.3)	100	(85.8 -100)
	Negative	3	24				

Abbreviation: FA, fibroadenoma; PT, phyllodes tumor.

3.3 Histological features on CNB specimens

A comparison of histological features by CNB associated with subsequent excision outcomes were shown in Table 4. The overall stromal cellularity (moderate and high, 50.8 and 20.8%, respectively ; $p< 0.001$), variability in stromal cellularity (moderate, 33.3%; $p= 0.001$), stromal pleomorphism (moderate and high, 66.7 and 4.2%, respectively; $p< 0.001$), margin status (infiltrative, 62.5%; $p< 0.001$), stromal overgrowth at 40x (33.3%; $p< 0.001$), stromal overgrowth at 100x (87.5%; $p < 0.001$), left-like architectures (present 83.3%; $p< 0.001$), fat in stroma (present 70.8%; $p< 0.001$) and mitotic count (range 0-12, median = 3.5; $p< 0.001$) were significantly markedly different in FELs specimens diagnosed by CNB compared with FA and PT specimens. Results of slit-like spaces and fragmentation did not show any significant differences.

None of the FA cases had moderate to high overall stromal cellularity, variability in stromal cellularity, or stromal pleomorphism by CNB diagnosis of specimens. There were no cases of PT that had very low overall cellularity diagnosed by CNB. In contrast, cases with low overall stromal cellularity and absence of low stromal pleomorphism were either FA or PT on subsequent excisions.

All the cases with stromal overgrowth at 40x by CNB were PT on subsequent excisions. On the other hand, absent stromal overgrowth at 40x and absence or presence at 100x were either FA or PT on subsequent excisions.

The mitotic count in PT (range 0-12, median = 3.5; $p< 0.001$) was markedly different in FELs specimens diagnosed by CNB when compared with the previous groups. For slit-like spaces no significant correlation with FA for CNB specimens was found, however, PT was found in slit-like spaces in some cases.

The mitotic count for CNB specimens was still markedly different between cases that were FA and PT on subsequent excision, but there was overlap between the 2 groups, with 1 per 10 HPFs for the 3 FA cases, and a range of 1 to 6 per 10 HPFs for the PT cases. However, no stromal mitoses were found for FA or PT on subsequent excisions.

Table 4 Histological features between core biopsies and subsequent excisions of fibroadenomas and phyllodes tumors.

Histological Features on core biopsies	Score	Diagnosis on excisions, No. (%)		*p*-value
		FA (n*=52)	PT/Uncertain (n*=24)	
Overall stromal cellularity	3	0	5 (20.8)	<0.001[a]
	2	8 (15.4)	14 (58.3)	
	1	34 (65.4)	4 (16.7)	
	0	10 (19.2)	1 (4.2)	
Variability in stromal cellularity	3	0	0	0.001[b]
	2	1 (1.9)	8 (33.3)	
	1	36 (69.2)	13 (54.2)	
	0	15 (28.8)	3 (12.5)	
Stromal pleomorphism	3	0	1 (4.2)	<0.001[b]
	2	9 (17.3)	16 (66.7)	
	1	23 (44.2)	6 (25.0)	
	0	20 (38.5)	1 (4.2)	
Margin status	Infiltrative	3 (5.8)	15 (62.5)	<0.001[a]
	Round	49 (94.2)	9 (37.5)	
Stromal overgrowth (40x)	Present	1 (1.9)	8 (33.3)	<0.001[b]
	Absent	51 (98.1)	16 (66.7)	
Stromal overgrowth (100x)	Present	2 (3.8)	21 (87.5)	<0.001[a]
	Absent	50 (96.2)	3 (12.5)	
Slit-like spaces	Present	51 (98)	22 (91.7)	0.233[b]
	Absent	1 (2)	2 (8.3)	
Leaf-like architectures	Present	16 (30.8)	20 (83.3)	<0.001[a]
	Absent	36 (69.2)	4 (16.7)	
Fat in stroma	Present	14 (26.9)	17 (70.8)	<0.001[a]
	Absent	38 (73.1)	7 (29.2)	
Fragmentation	Present	30 (57.7)	13 (54.2)	0.773[a]
	Absent	22 (42.3)	11 (45.8)	
Mitotic count	Median	0	3.5	<0.001[c]
	Range	0-5	0-12	

*Value inside parenthesis is the percentage of proportion in each histological features of FA or PT/Uncertain. The results of each histological feature of FA or PT/Uncertain are presented as Number of cases (percentage).
Abbreviation: FA, fibroadenoma; PT, phyllodes tumor.
[a]Chi-square.
[b]Fisher's exact.
[c]Mann–Whitney tests.

4. Discussion

Almost all FELs diagnosed by CNB have been previously identified to be FA. The concordance of pathological results can often be securely managed without the requirement of surgery [20-22]. Nevertheless, FELs examined by CNB combined with some histological features have been considered a more advanced lesion than FA may indeed be PT. The PT has been further stratified to levels of benign, borderline, or malignant lesions. They have histological characteristics similar to FA with a combination of additional histological characters, such as the stromal cellularity, stromal pleomorphism, overgrowth of stromal cells, mitotic index, and the feature of the tumor margin. The differentiation between each category, including benign, borderline PT, and FA is problematical in CNB because of the small number of samples examined, and that hypercellularity might also appear in cellular FA. Thus, to date, there are no definitive histological features to distinguish between the levels of lesions [14,23,24].

FA diagnosis by CNB can be clinically observed and followed-up without a recommendation for excision [22,25]. However, in ourstudy, 52 of 76 (68.4%) FA diagnosed by CNB received subsequence excision. The decision for subsequent excision stems from the discussion between the surgeon and the patient based on clinical information, radiographic findings, and the patient's concerns. Previous reports documented the excision after FA diagnosed by CNB as unnecessary if there are no significant clinical and radiographic risk factors [26-28].

Therefore, our study aimed to determine stromal cellular changes, which are the major components of PT, including cellularity, variability in cellularity, and pleomorphism of stromal cells and mitotic counting index by examining FELs diagnosed in CNB. Results showed that stromal cellular changes and mitotic count in PT were significantly higher than FA. These findings are also consistent with previous reports [15,26-28]. Stromal architectural changes including left-like architectures in CNB specimens did not show any significant differences for both PT and FA as shown in previous reports [14-15,29]. We found a significant correlation of stromal overgrowth with the presence of PT at 40x and 100x, and that PT can be discriminated from FA, which has been confirmed by previous studies [14,16,29]. Based on previous suggestions, fat in stroma has been applied to distinguish between FA and PT. Some studies showed fat in the stroma was not present within FA [6,16]. Despite this, the study showed that there was a correlation trend in the absence of fat in the stroma in FA but this was not significantly different between FA and PT. In addition, stromal fragmentation of the cores has been referred to in CNB of PT [14,16,29]. In our study, fragmentation of the core was helpful to refer to PT. This finding might be correlated to the well-known variation of architecture in PT, which can contain zones without the telltale phyllodes feature and core fragmentation. It is possible that the margin may be not have been evaluated with confidence in the setting of CNB, and almost all reports have suggested that infiltrative margins are associated with PT [6,16,29].

In our study, 14 out of 76 cases (18.4%) diagnosed as uncertain histological features between FA and PT on CNB were on subsequent excisions categorized to be PT (11 of 14, 78.6%) (Figure 5). Subsequently, uncertain histological features were focused on the histological features where most had low overall stromal cellularity (7 of 14, 50%), low variability in stromal cellularity (9 of 14, 64.2%), low stromal pleomorphism (9 of 14, 64.2%), and absence in stromal overgrowth at 40x (14 of 14, 100%). However, some cases had stromal overgrowth at 100x (8 of 14, 57.1%), moderate stromal pleomorphism (1 of 14, 7.1%), and few mitotic activities (range 0-3). Importantly, FELs with histological features with at least a moderate degree of stromal cellularity or pleomorphism, stromal overgrowth, and mitotic activities (particularly if > 2 per 10 HPFs) had a high probability of being PT (Figure 5 and Table 4).

Finally, there were 3 out of 52 cases (5.8%) previously diagnosed as FA by CNB which were categorized in our study as PT after excisions (Figure 5). Results showed that all discordant cases following excision were upgraded to PT due to the intratumoral heterogeneity of PT; especially in the level of cellularity, overgrowth of stromal cells, and mitotic count with sampling bias in the condition of larger tumor size or multiple lesions [11,15,23].

The limitations of our study were the relatively small sample size which might affect statistical analyses, and the study had no malignant PT specimens. This study shows a high proportion of PT, because the population was selected in the stage of decision based on CNB. The patients usually have breast mass with some clinical or radiological worrisome features. The actual proportion of PT is only 2.5% of all FELs according to WHO tumors of the breast [7].

5. Conclusion

In summary, FELs of the breast are a heterogeneous group of biphasic neoplasms that consist of FA and PT. PT have been stratified to benign, borderline, and malignant types. Because of any overlapping histological characters, the distinction of FA and benign PT, as well as the accuracy of grading of PT, might prove difficult particularly on a small CNB. We found that assessment of the histological features with a higher score of overall cellularity and variability of stromal cells and pleomorphism overgrowth stromal cells at 40x and 100x, and mitotic index were convenient to predict and diagnose PT. These significant findings suggest that initial excisions in the future should be extended to achieve negative margins.

6. Ethical approval

The study was conducted according to approval by the Ethics Committee of Khon Kaen University (HE621306, Date of approval 16 June 2020).

7. Acknowledgments

We would like to thank Professor Ross Hector Andrews via the Publication Clinic at Khon Kaen University, Thailand, for English editing the manuscript.

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