

## Role of Fine Needle Aspiration Cytology in Diagnosis of Epidermal Inclusion Cysts of Breast: A Clinical and Radiological Dilemma

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### ABSTRACT

**Background:** An epidermal inclusion cyst is a common benign lesion which can occur anywhere in the body. However, EIC occurring in the breast (EICB) is very rare. This study is aimed to analyze the incidence, clinical factors, cytomorphology with the differential diagnosis and cytohistopathological correlation with diagnostic & treatment options of this lesion & to evaluate the role of Fine Needle Aspiration in its diagnosis.

**Methods:** This study was done for a span of 6 years in Department of Pathology at Tertiary Teaching Hospital. In this study, patients with firm breast lump who had undergone FNAC in this duration were analyzed and the cases with one of the diagnosis of EICB were included. Smears from these cases were re-evaluated by two cytopathologists and clinico-radiological and cyto-histopathological correlation was done.

**Result:** This study included 8 female and 1 male patients with age ranging from 26-60 years. Patients presented with firm breast lump measuring from 0.5 to 2.0 cm in periaerolar region. Radiological findings were suggestive of benign breast lesion in six cases and two infective lesion in female. FNAC was performed & cytodiagnosis of EICB was made. Cytohistopathological correlation was available in eight cases.

**Conclusion:** EIC of breast is a rare entity & these lesions are often mistaken as benign or malignant tumours both clinically & radiologically. However, FNAC plays a pivotal role in providing accurate pre-operative diagnosis.

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## Introduction

Epidermoid Cyst of a breast (EICB) is a rare condition which develops due to proliferation and implantation of epidermal elements within a circumscribed space in the dermis.<sup>[1]</sup> An epidermal inclusion cyst is a benign cyst of Pilosebaceous origin. It is also known as follicular infundibular cysts, epidermal cysts and epidermoid cysts. Epidermal Inclusion Cyst (EIC) may occur anywhere in the body, although they are most prevalent on the face, trunk, neck, extremities and scalp.<sup>[1]</sup> EICB manifests as palpable lump that is primarily localized in periaerolar region.<sup>[2]</sup> Published cytological literature on EIC breast is scanty & there are only eleven published reports in the cytological literature.<sup>[1, 2, 3, 4, 5, 6, 7]</sup> The aim of this study is to analyze the incidence, clinical features, cytodiagnosis with differential diagnosis, cytohistopathological correlation with diagnostic treatment options of this lesion.

## Materials and Methods

This is a study over a period of 6 years from Feb 2010 to Jan 2016 which included patients with breast lump, who had undergone FNAC. A total no. of 4260 breast lumps were analyzed. Out of which, 1670 were non-neoplastic in nature on cytological examination.

Among the Non-neoplastic group, benign cystic lesions were 680. Whereas, 14 cases had one of the cytological diagnosis of EICB. However, among this, only 9 lesions were deep-seated, located inside the breast parenchyma. Rest five cases present on the breast skin were excluded from the study. These nine were reevaluated by two Cytopathologists and both clinic-radiological and cyto-histological findings were reviewed.

## Result

There were 8 female and one male (F:M8:1) with age ranging from 26 to 60 years. Patient presented

with breast lump in right side in 6 cases and 3 in left side, size measuring from 0.5 cm to 2 cm firm, mobile and non-tender [7] with tender [2] and sinus discharging pus [2].

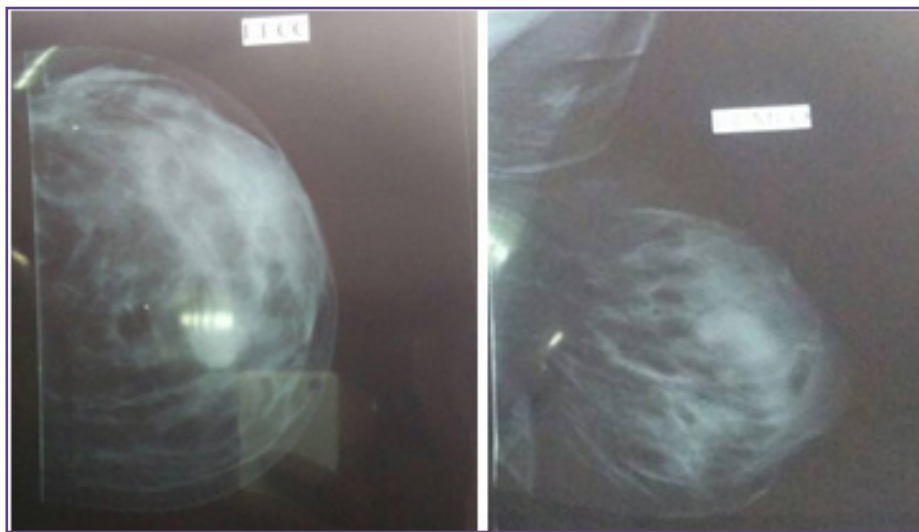
There was no change in overlying skin, retraction of nipple or nipple discharge. Contra-lateral breast and bilateral axilla were normal in all patients and there was no history of trauma, previous surgery, breast infection, hormone intake or a family-history of breast disease. No patient had associated EIC at other body-locations. No information regarding weight, Body Mass Index (BMI) and biochemical tests were available. Radiological diagnosis was suggestive of benign breast disease in females (Fig 1). Patients were subjected to FNAC using 22-gauge disposable needle under aseptic condition. Aspirates were pultaceous in all except in two cases where it was purulent. Smears were air-dried and stained with Giemsa stain. Cytosmears revealed many anucleated squames (AS), nucleated benign squamous epithelial cells (NBSC) along with few adipocytes, benign ductal epithelial cells in the clear background in all cases except in case Nos. 3 & 7 (Fig 2). In case Nos. 3 & 7, cytosmears showed few anucleated squames in acute inflammatory background (Fig 3). Cytological diagnosis of EIC was made under light microscopy in all cases except in case Nos. 3 & 7 in which it was infected EICB, as shown in Table-1 below. Histopathological correlation was made in eight cases except in one male case (case No. 5) where the patient refused to undergo surgery.

Surgical excision of the mass was performed in eight patients. Specimens were submitted for histopathological examination and case Nos. 1, 2, 4, 6, 8 & 9 were diagnosed as EICB (Fig 4) whereas lumpectomy specimen from Case Nos. 3 & 7 were diagnosed as infected EICB. Post-operative course was uneventful & patients remained alive without signs & symptoms of recurrence at a follow-up of 24 months whereas in last two cases, it was only 18 & 11 months respectively of follow-up.

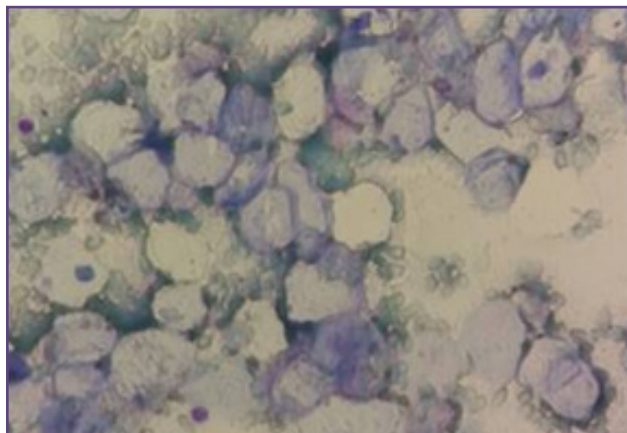
**Table 1: Detailed Clinical findings with Clinic-radiological & cyto-histological correlations.**

Case No.	Age/Sex	Clinical findings	Cytological findings & diagnosis	Radiological diagnosis	Histological diagnosis
1.	37/F	1.0X1.0 cm firm, mobile & non-tender lump in periareolar area of left breast from 4 years	Thick pultaceous aspirate many anucleated squames and nucleated benign squamous cells against clean background. Cytological diagnosis: EIC	Well-defined, hyperdense mass. Diagnosis: Benign lesion	EICB
2.	28/F	1.5X1.0 cm firm, mobile & non-tender lump in periareolar area of right breast from 2 years	Thick pultaceous aspirate. Many anucleated squames and few clusters of benign squamous cells, few adipocytes with clean background. Cytological diagnosis: EIC	Well-defined, hyperdense mass. Diagnosis: Benign lesion	EICB

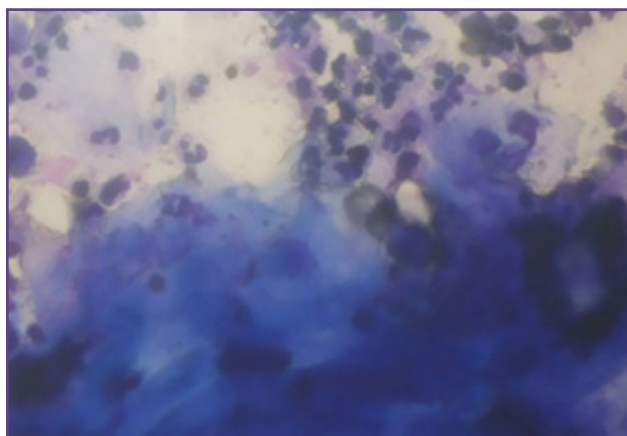
Case No.	Age/Sex	Clinical findings	Cytological findings & diagnosis	Radiological diagnosis	Histological diagnosis
3.	34/F	1.5X1.0cm firm, mobile & tender pus-discharging sinus in periareolar area of left breast from 2 months	Purulent aspirate many polymorphs few histiocytes and many anucleated squames. Cytological Diagnosis: Abscess? TB, infected EIC	Well-defined mass with mixed density. Diagnosis: ?Benign Lesion	Infected EICB
4.	58/F	1.0 X 1.0 cm firm, mobile & non-tender lump in periareolar area of right breast from 1 month	Thick pultaceous aspirate many anucleated squames and nucleated benign squamous cells against clean background. Cytological diagnosis: EIC	Well-defined, hyper-dense mass. Diagnosis: Benign lesion	EICB
5.	26/M	1.0 X 0.5 cm firm, mobile & non-tender lump in periareolar area of right breast from one month	Thick pultaceous aspirate many anucleated squames and nucleated benign squamous cells against clean background. Cytological diagnosis: EIC	-	-
6.	60/F	1.5 X 1.0 cm firm mobile and non-tender lump in periareolar area of right breast from 1 month	Thick pultaceous aspirate many anucleated squames and nucleated benign squamous cells against clean background. Cytological diagnosis: EIC/D: FA/FCD with SM, MCa	Well-defined hyper-dense mass Diagnosis Benign lesion	EICB
7.	31/F	1.0 X 1.0 cm firm mobile and tender pus discharge sinus in right breast from 15 days with past history of ATT.	Purulent aspirate many polymorphs few histiocytes & many anucleated squames. Cytological Diagnosis: Abscess? TB, infected EIC	Well-defined mass with mixed density. Diagnosis: ? Benign Lesion	Infected EICB
8.	40/F	1.0 X 1.0 cm firm, mobile & non-tender lump in periareolar area of left breast from 4 years	Thick pultaceous aspirate many anucleated squames and nucleated benign squamous cells against clean background. Cytological diagnosis: EIC	Well-defined, hyper-dense mass. Diagnosis: Benign lesion	EICB
9.	29/F	1.5 X 1.0 cm firm, mobile & non-tender lump in periareolar area of right breast from 2 years	Thick pultaceous aspirate. Many anucleated squames and few clusters of benign squamous cells, few adipocytes with clean background. Cytological diagnosis: EIC	Well-defined, hyper-dense mass. Diagnosis: Benign lesion	EICB



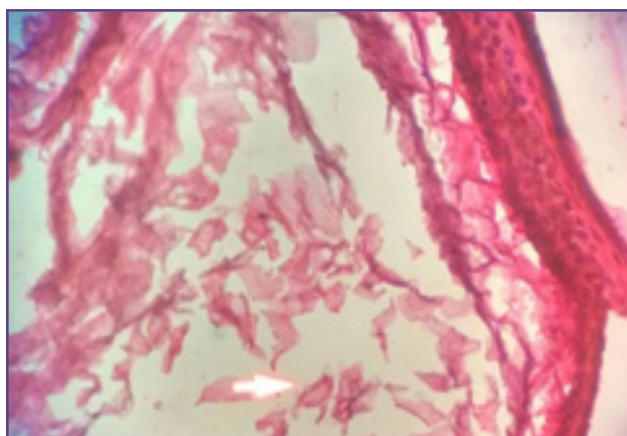
**Fig. 1: Mammogram (Case 1).** Left cranio-caudal (left) and medio-lateral oblique (left) shows solid cystic soft tissue density mass lesion in periareolar region.



**Fig. 2: Cyto-smear shows many anucleate squames and nucleated benign squamous cells (Giemsa x100).**



**Fig. 3: Cyto-smear shows many anucleate squames and a few nucleated benign squamous cells in a background containing neutrophils and few benign ductal epithelial cells (Giemsa x400).**



**Fig 4 Section showing a cyst cavity lined by keratinized squamous epithelium and contents of cyst comprising of lamellated keratin (H&E x100).**

## Discussion

EIC of breast is an uncommon lesion. Only a few case-reports have been described in the literature.<sup>[1]</sup> To date, the international literature has reported 90 cases of patients who have been affected by EIC of the breast.<sup>[8]</sup> To the best of our knowledge, the first histologically defined case of EIC of the breast was reported in December 1990 at John Hopkins Hospital, Baltimore, MD, USA.<sup>[9]</sup>

Several hypothesis have been postulated regarding their etiology within the breast.<sup>[4]</sup> They can develop due to variety of mechanisms that may result in damage to epidermis which gets implanted within the breast tissue and it can occur after trauma, surgical changes, like core needle biopsy or reduction mammoplasty or developed following squamous metaplasia (SM) of normal columnar cells within an ectatic ducts in fibroadenoma (FA), fibrocystic disease (FCD) or phyllodes tumour (PT).<sup>[4, 10, 11]</sup>

In our study, the possible etiology appears to be obstruction of hair follicle as there was no history of previous trauma, surgery or lump in breast. EIC of breast may be congenital, arising from the cell nests that remain from specific cells including the embryonic mammary ridge. EIC of breast may also develop from obstructed hair follicles. FNAC aspirate of EIC yield pultaceous material & cytoscsmears reveal numerous anucleate squamous as well as nucleated benign squamous cells in case of superadded infection, aspirate become usually turbid and shows inflammatory cells such as neutrophils and histiocytes. Radiologically on mammography well circumscribed non-calcified mass with homogeneous increased density was noted (Fig 1).

Ultrasonography shows solid well circumscribed and complex mass.<sup>[4]</sup> An “onion ring” appearance, with alternating concentric hyperechoic and hypoechoic rings corresponding to the multiple layers of laminated Keratin in EICB.<sup>[12]</sup> They are often confused clinically and radiologically with any of the benign or malignant lesions of the breast and accurate preoperative diagnosis may be difficult as breast consists of flexible fat and mammary gland tissue under its skin.<sup>[12]</sup> EIC in Breast grows deep inside the subcutaneous tissue making difficult to differentiate with breast tumours.

Kapila et al in their study found five cases of EIC, in 424 benign breast aspirates from 651 males over a period of 22 years. Cyto-histological correlation was not available in any of the cases.<sup>[6]</sup> Lilleng et al found only one case of EIC in 779 histologically documented benign diagnoses from surgical biopsies of male breast masses over a 10 year period.<sup>[7]</sup> Das et al reported three cases of EIC/ pilar cysts in fine needle aspirates from 188 males with



breast lesions, only one of the three had histopathology available; it indicated a pilomatrixoma.<sup>[5]</sup> Singh et al in their study reported six cases of EICB in 2 years duration with histological correlation in five cases.<sup>[2]</sup> In present study, we reported nine cases of EICB in 6 years duration with histological correlation in eight cases. EIC yields a dirty whitish aspirate, which on smears shows numerous AS or NBSC better seen on Giemsa stain. Due to the intraparenchymal nature of the lesion, sometimes adjacent normal breast epithelial cells and adipocytes can also be included. Since EICB is rare, diagnosis of squamous metaplasia is Fibroadenoma, Fibrocystic disease, phyllodes tumour and rarely metaplastic carcinoma (MCA), depending upon the age of the patient, is also kept as differential diagnosis(D/D) in such lesions.<sup>[2]</sup>

In present study, differential diagnosis included Fibrocystic disease (Case 1, 2, 8 & 9) due to fluid aspirate and presence of a few benign epithelial cells. Breast abscess (Case 3) due to purulent aspirate and tuberculous breast abscess (Case 7) due to purulent aspirate and past history of ATT. Carcinoma Case (4, 6) since the patient was old and gynaecomastia (Case 5).

EICB can cause severe complications as spontaneous rupture leading to release of non-absorbable Keratin, which acts as an irritant and subsequently leads to secondary foreign body reactions, granulomatous reactions or abscess formation. Another rare but important complication is malignant transformation into squamous cell carcinoma.

Malignant change occurs more in EICB, as compared to EIC at other sites and it may be due to squamous metaplasia of mammary duct epithelium.<sup>[2]</sup> The reported malignant transformation of cyst wall varies from 0.045% to 19%.<sup>[9, 13]</sup> Overall, the incidence of EICB is less, reports are variable on its malignant transformation and thus actual percentage is uncertain. Paget's disease can rarely occur in EIC arising from nipple & perinipple epidermis.<sup>[14]</sup> According to Paliotta et al in their extensive review of literature noted a significant correlation between tumour size and malignant transformation.<sup>[8]</sup> Small sized (<2 cm diameter), asymptomatic lesions can be followed by imaging and clinically whereas symptomatic ones require surgical excision through an elliptical incision. The removal of entire cyst wall is recommended for histopathological examination to prevent any complication like recurrence or malignant transformation.<sup>[15]</sup>

## Conclusion

EIC of the breast is a rare entity and FNAC plays an important role in providing a quick & definitive preoperative diagnosis. This is being reported to create awareness among clinicians & Pathologists about such

unusual occurrence of a common benign lesion that may potentially be malignant and to reemphasize the role of FNAC in the diagnosis of a breast lesion. However, studies with focus on identification of predisposing factors, which may influence the development of this disease, is advocated.

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NA

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## Competing Interests

None Declared

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