

Original Article

Histopathological spectrum of breast lesions with reference to uncommon cases

Kulkarni Sangeeta¹, Vora Ila M², Ghorpade Kanchanmala G², Srivastava Shanu³

¹ Associate Professor, ² Professor, ³ Lecturer

Department of Pathology, Terna Medical College, Sector – 12, Nerul, Navi Mumbai – 400706, India

Abstract

Objectives: A retrospective study of last three years was undertaken to determine the histopathological spectrum of breast lesions with detailed study of interesting and uncommon cases, the features of which are helpful in management of the patients.

Methods: Clinical features and histopathological findings were studied in 176 cases with emphasis on uncommon cases.

Results: Out of the 176 cases, benign lesions constituted 80.70% and malignant 19.30%. The commonest benign tumor was fibroadenoma and the commonest malignant tumor was infiltrating duct carcinoma. Uncommon cases in benign group were duct ectasia with granulomatous mastitis, papilloma and galactocele. Metastasis of mixed mucinous carcinoma of the breast to axillary lymph node was an interesting case in the malignant group. **Conclusion:** Identification of benign lesions like duct ectasia with granulomatous mastitis is important as it simulates malignancy. It is important to make distinction between benign and malignant papillary tumors because approach to the diagnosis and management differs. Galactocele is reported for its characteristic appearance. In the malignant group, metastasis of mixed mucinous carcinoma of the breast to lymph node was described as it carries poor prognosis.

Key words: duct ectasia with granulomatous mastitis, galactocele, papilloma of breast, metastasis of mixed mucinous carcinoma of breast to the lymph node

Introduction

The main purpose of this study is to analyze the spectrum of breast lesions at a private teaching institution from Navi Mumbai. Clinicopathological features of benign and malignant lesions of the breast are studied.

In India breast cancer forms the second common malignancy after cervical cancer and is detected in 20 per 1,00,000 women^{1,2}. However there are more benign breast lesions than the malignant breast lesions^{1,3}.

In this study, emphasis has been made on the important features of uncommon cases.

Materials and Methods

This study was conducted in the Department of Pathology, Terna Medical College, Nerul, Navi Mumbai from January 2004 to December 2006. Clinical features and details of the cases were noted from the histopathology requisition forms.

Paper received on 23/08/2007 ; accepted on 24/04/2009

Correspondence :
Dr. Kulkarni Sangeeta
A3, Plot No.68, Kailashkunj,
Sector -2, Kopar Khairne,
Navi Mumbai - 400 709.
Tel. 27541687 Email : trenamedical@indiatime.com

Histopathological examination was done on formalin fixed and paraffin processed tissues from surgically resected specimens and stained by hematoxylin and eosin.

During this study, we came across interesting and uncommon lesions, which were studied in detail. They comprised duct ectasia with granulomatous mastitis, galactocele, papilloma of the breast and metastasis of mixed mucinous carcinoma of breast to the lymph node.

Observation

One hundred and seventy six cases were studied over a period of three years having symptoms related to the breast. Of the 176 cases, 171 were females and five were males. The age ranged between 15-80 years.

Benign lesions in females constituted 138/171 (80.70%) whereas malignant lesions were 33/171 (19.30%). In benign lesions 76/138 (55.07%) patients were <25 years whereas in malignant group 31/33 (93.94%) patients were above 35 years of age. The commonest presenting symptom was lump in the breast in both benign and malignant groups.

Table 1 shows different histopathological lesions in benign and malignant groups.

In the benign group, gynecomastia was the common lesion in all the five male patients. Fibroadenoma was the most common benign lesion countered 86/138 (62.32%).

In the malignant group, infiltrating duct carcinoma (IDC) was the commonest lesion -28/33 (84.85%).

Case report

Case 1

A 22 year old female lactating for the past 1½ years noticed a lump in the right breast since 1½-2 years. There was no history of trauma.

Clinical diagnosis was fibroadenoma or galactocele. Lumpectomy was done.

Gross examination revealed two soft tissue masses; the larger one measuring 4x4x1cm and the smaller 3x3x1cm. Cut surface was grayish white with areas of hemorrhages.

Microscopic examination showed dilated ducts. Majority of the ducts showed disruption of the lining epithelium and lumen was filled with eosinophilic amorphous granular proteinaceous material.

At places, there was granulomatous reaction around the ducts surrounded by foamy histiocytes, occasional Langhan's type of giant cells and lymphoplasmacytic infiltrate. There were lactational changes and diffuse lymphoplasmacytic infiltration in the lobules.

Table 1. Histopathological spectrum of breast lesions.

Histopathological diagnosis	No. of cases	Percentage
I) Benign Group (n-138)		
1. Fibroadenoma	86	62.32
2. Fibrocystic disease	16	11.59
3. Sclerosing adenosis	06	4.35
4. Lactating adenoma	06	4.35
5. Normal breast tissue	05	3.62
6. Chronic mastitis	04	2.90
7. Duct ectasia	04	2.90
8. Benign phyllodes tumor	02	1.45
9. Abscess	02	1.45
10. Tuberculosis	02	1.45
11. Intraductal papilloma	02	1.45
12. Galactocele	01	0.72
13. Lipoma	01	0.72
14. Lymphocytic lobulitis	01	0.72
15. Gynaecomastia *	05	-
II) Malignant Group (n-33)		
1. Infiltrating duct carcinoma	28	84.85
2. Invasive lobular carcinoma	01	3.03
3. Papillary carcinoma	01	3.03
4. Mixed mucinous carcinoma	01	3.03
5. Non Hodgkin's lymphoma	01	3.03
6. Intraductal carcinoma in situ	01	3.03

* - Not counted in analysis.

Diagnosis of duct ectasia with granulomatous mastitis was made.

Case 2

A 30 year old female presented with a lump in the right breast since two years. After the first delivery she noticed a lump in the right breast with increased lactation from the right breast. The lump persisted between the first and the second delivery. During the second delivery the lump increased in size but no milk was coming from that breast. Excision of the lump was done, as it was quite big in size.

Gross examination showed single grayish white, cystic mass measuring 8x6x5cm. External surface was bosselated. Cut surface revealed multiple cystic cavities of varying size totally replacing the normal breast parenchyma. The largest cavity measured 5x5.7x2cm. The walls of the larger cavity were thickened. On bisecting, approximately 500 ml of milk like fluid came out (Figure 1).

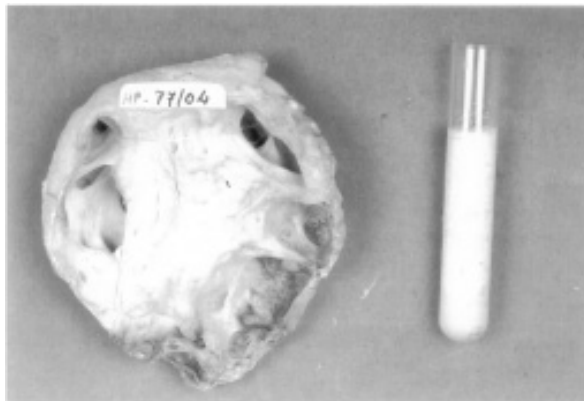


Figure 1. Cut surface of a mass showing multiple cystic cavities of varying sizes totally replacing normal breast parenchyma. The milklike contents are seen in test tube.

Histological examination showed multiple cavities composed of markedly cystic dilated ducts of variable size and shape, lined by flattened to cuboidal epithelium, which was denuded at places. There were multiple anastomosing rounded or irregularly dilated anastomosing cavities composed of cystically dilated ductal and acinar elements.

Many of these ductal cavitary lumina contained eosinophilic proteinaceous material with foamy macrophages at places. These foamy macrophages had multiple tiny vacuoles resembling milk globules. In

between the cavities and the surrounding areas showed breast tissue with lymphoplasmacytic cell infiltration and focal collection of similar foamy macrophages. There were areas of lactating changes all over.

Diagnosis of galactocele of the breast was made.

Case 3

A 46 year old female presented with a lump in the right breast since one year. Breast examination showed soft to firm subareolar lump in the right breast. Lumpectomy specimen revealed two fragmented grayish white soft tissue pieces each measuring 3x2x1cm. Cut surface was cystic with a papillary tumor attached on one side and projecting into the cavity.

Microscopic examination showed cystically dilated ducts. One of them was markedly dilated and showed papillary growth with arborescent epithelial fronds and central fibrovascular core. The lining of the papillae were double layered luminal layer of cuboidal or columnar, normochromic cells with oval nuclei and basal layer of myoepithelial cells. There was a focus of epithelial entrapment lined by columnar cells and myoepithelial cells into the stroma of the stalk of the tumor i.e. pseudo infiltration. True epithelial invasion was absent. The surrounding breast tissue showed mild to moderate dilatation of the ducts with epithelial proliferation.

Diagnosis of intraductal papilloma (solitary) of right breast was made.

Case 4

A 55 year old woman noted a mass in the right axilla. Excisional biopsy was done which revealed a soft to firm tumor mass of the size 6x4.5x2.5cm. On cut section it showed a well circumscribed tan colored, gelatinous current jelly like tumor mass of the size 4x3cm. Solid grey white area was noted at the periphery looking like part of the lymph node.

Microscopic examination showed a well circumscribed area of the tumor occupying almost 80% of the lymph node. The tumor was composed to scattered islands of uniform, rounded ductal cells. The islands were arranged in solid clusters and acinar and micropapillary pattern at places. They looked floating in pools of extra cellular mucinous material suggesting mucinous carcinoma.

Table 2. Comparative study of histopathological lesions in females by other workers. ^{1,4}

No. Benign group	Desai M ¹ (n=172) In%	Malik ⁴ (n=1258) in %	Present study (n=138) in %
1. Fibroadenoma	85.47	55.00	62.32
2. Fibrocystic disease	-	28.38	11.59
3. Sclerosing adenosis	-	0.32	4.35
4. Lactating adenoma	-	0.87	4.35
5. Chronic mastitis	-	6.84	2.90
6. Plasma cell mastitis	-	1.83	-
7. Tuberculous mastitis	1.74	2.46	1.45
8. Abscess	2.33	-	1.45
9. Benign phyllodes tumor	-	1.27	1.45
10. Intraductal papilloma	2.91	0.48	1.45
11. Duct ectasia	-	0.56	2.90
12. Galactocele	1.74	-	0.72
13. Nipple adenoma	1.16	-	-
14. Antibioma	3.49	-	-
15. Miscellaneous	1.16	1.99	5.07
Malignant group	(n=40) In %	(n=466) in %	(n=33) in %
1. Invasive ductal carcinoma + scirrhus carcinoma	100	88.20	84.85
2. Medullary carcinoma	-	2.57	-
3. Invasive lobular carcinoma	-	3.21	3.03
4. Papillary carcinoma	-	0.86	3.03
5. Mucinous carcinoma	-	0.64	3.03
6. Squamous cell carcinoma	-	0.64	-
7. Undifferentiated carcinoma	-	0.64	-
8. Non Hodgkin's lymphoma	-	0.42	3.03
9. Intraductal carcinoma	-	1.50	3.03
10. Miscellaneous	-	1.29	-

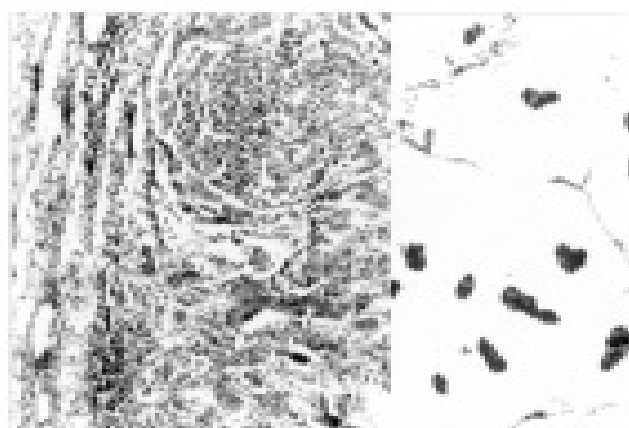


Figure 2. Photomicrograph showing scattered islands of tumor cells floating in lakes of mucin and delicate fibrous septae i.e. mucinous carcinoma (right side) and an area of infiltrating ductal carcinoma in lymph node (left side). (HEX250).

Table 3. Differences between papilloma and papillary carcinoma^{2,6,11,12}.

Features	Papilloma	Papillary carcinoma
1. Configuration of papillae	Blunt and broad club like fronds with fibrovascular core appear stratified	Fronds of varying size and shape, cribriform pattern at places. The ducts
2. Epithelial lining	Double layer of cells – luminal epithelial cells and basal myoepithelial cells (Actin and S100+ve)	Single type of atypical cells, stratification of epithelium arranged in irregular disorganized nests.
3. Myoepithelial cells	Present	Scanty / Absent
4. Nuclei	Normochromatic (benign appearing)	Hyperchromatic (Malignant features)
5. Adjacent ducts	Intraductal hyperplasia	Invasive ductal carcinoma
6. Invasion	No true invasion epithelial cells with myoepithelial cells in stalk or adjacent fibrous tissue pseudo invasion	Epithelial invasion away from the duct wall in adjacent breast parenchyma in destructive fashion i.e. true invasion
7. Clinical features		
- Nipple discharge	Frequent in central solitary papilloma	Less frequent
- Subareolar mass	Less common	Usually present in peripheral multiple papilloma tumor

Alcian blue stain for mucin was positive. Further sections showed a component of infiltrating duct carcinoma. The tumor was composed of large, pleomorphic cells having abundant eosinophilic cytoplasm and centrally placed hyperchromatic nuclei with prominent nucleoli arranged in solid nests and cords. Few mitotic figures were present. Surrounding stroma showed infiltration of tumor cells without being surrounded by mucin. The fibrous stroma inbetween showed chronic inflammatory cells (Figure 2).

Diagnosis of metastasis of mixed mucinous carcinoma in the right axillary lymph node was made.

Mammography revealed a lump in right breast.

Discussion

One hundred and seventy six cases were studied over a period of three years; 97.16% in females and 2.84% in males. Malik ⁴ studied 1824 cases where 94.52% were

females and 5.48% were males. Bauer⁵ in their study of 71 cases over a period of 10 years in the age group of 12-22 years found this condition in 56.34% females and 43.66% males. In the present study, breast lesions encountered in female patients only are analyzed.

The spectrum of breast lesions in female patients in our study showed 80.70% benign lesions of various etiology and 19.30% malignant lesions. Desai ¹ studied 212 cases over a period of 7 years. She reported benign lesions in 81.13% and malignant lesions in 18.87%, which tallies with our incidence. However Malik ⁴ in their study of 1724 cases over a period of 20 years reported benign lesions in 72.97% and malignant lesions in 27.03%.

In the present study, 55.07% of the benign lesions were noted in the patients below the age of 25. In the same age group Desai ¹ noted benign lesions in 68.6% of the cases, Malik ⁴ in 51.19% of the cases and Bauer ⁵ in 95% of the cases. The incidence is higher in the study of Bauer ⁵ as the age group selected for the study was between 12-22 years.

In the malignant group only one case was found below 25 years of age in our study. Similar results were noted by other authors ^{4,5}. This shows that malignant lesions are very rare in adolescent females ⁵.

Lump in the breast was the most common presenting symptom in both benign and malignant groups followed by pain in 10.14% in the benign group and 12.12% in the malignant group. Desai also found lump as the commonest symptom followed by pain in both the groups ¹. Griffith ³ studied frequency of presenting symptoms in benign breast diseases. He found common symptoms as lump in 33% of the cases or lump like feeling in the breast in 36% of the cases followed by pain and nipple discharge and noted that the patients may present with one or more of the symptoms.

In this study fibroadenoma was the most common benign lesion viz 62.32% in females followed by fibrocystic disease in 11.59% of the patients. The study by Desai ¹ showed 85.47% fibroadenomas, whereas Malik ⁴ reported 55.00% in their study.

In our study 52.17% of fibroadenomas were noted in the age group of 15 to 25 years. This was the commonest benign lesion in young age. Malik ⁴ reported 37.04% and Bauer ⁵ 47.50% fibroadenomas in similar age group.

In males all lesions were gynecomastia.

The importance of many benign lesions lies in their ability to mimic cancers and not all benign lesions are completely free of risks ⁴. Inflammatory lesions of the breast are of clinical significance because of their potential for confusing them with cancer ⁴.

Interesting and uncommon cases studied in the benign group were duct ectasia with granulomatous mastitis, galactocele and papilloma of the breast.

In the malignant group, the commonest lesions were infiltrating duct carcinomas of various types, comprising 84.85%. In patients above 35 years of age, malignancies were found in 93.94% of the cases. Maximum incidence of malignant tumors was found in 4th to 5th decade.

The metastasis of mixed mucinous carcinoma of the breast to axillary lymph node is the uncommon case reported here from the malignant group.

Table 2 shows different histopathological lesions by

different workers. Interesting lesions are discussed below.

Case 1- Duct ectasia with granulomatous mastitis.

The term mammary duct ectasia was introduced by Haagenesen to describe a benign condition characterized by dilatation of the subareolar duct system^{2,6}. This is a common incidental finding in the breast ².

Duct ectasia is an inflammatory condition of unknown cause, previously called plasma cell mastitis, mastitis obliterans or comedomastitis ⁶. Inflammation is entirely surrounding the ducts i.e. periductal mastitis ^{2,6}.

In the early stage there is dilatation of the ducts, which get filled with eosinophilic amorphous granular proteinaceous material ^{6,7}. If the duct ruptures, there is spillage of the material giving inflammatory reaction of lymphocytes, plasma cells, neutrophils and foamy macrophages ^{2,6,7} as seen in our case. Granulomas, areas of fat necrosis and dystrophic calcification may be seen⁷. The ductal epithelium shows atrophy rather than hyperplasia ^{6,7}.

As the disease advances, periductal fibrosis occurs. This gives rise to palpable masses and contraction produces nipple inversion ^{2,6,7}, mimicking malignancy clinically. This patient presented with mass in the right breast.

Thus, according to some authors spontaneous blockage of the ducts followed by inflammation is the cause for duct ectasia whereas some consider inflammation as the primary event ².

Granulomatous mastitis is a rare benign disease of unknown etiology occurring in parous women with an antecedent recent pregnancy ^{6,7}. They present with a peripheral firm to hard mass with or without regional lymphadenopathy mimicking carcinoma ^{6,7}.

On histopathology, inflammatory infiltrate shows predominantly lobular distribution. The infiltration is composed of noncaseating granulomas, Langhan's giant cells, foamy histiocytes and intense polymorphonuclear cells ^{6,7}.

The different etiological factors considered are autoimmune phenomenon, reaction to childbirth, prior use of oral contraceptives or a persistent infection ⁷.

They show good response to steroids but strong tendency for post surgical recurrence ⁷.

Granulomatous lesions due to other causes like Tuberculosis, blastomycosis, cryptococcosis, histoplasmosis, actinomycosis, filarial infection and sarcoidosis are to be excluded ⁶.

Case 2 – Galactocele

A galactocele is a milk filled cavity in the breast ^{6,8}. This is an uncommon lesion, seen after an abrupt termination of lactation ^{6,8}. It is a cystic dilatation of the duct or ducts due to obstruction of the main duct or lactiferous sinus ⁹.

Clinically it presents as soft, well-defined, solitary, slow growing mass deep to areola ^{6,8}. This patient had presented with a lump in the right breast near the areola since two years, which was increasing in size. The amount of milk coming from that side was reduced and was totally absent during the second delivery.

Ironsides⁸ described their specimen as a pale, fluctuant mass which on cross section showed two large and multiple smaller cavities containing pale, curd like contents. The gross appearance in our case was similar to that of Ironside ⁸. However in our case there were multiple cavities of variable sizes and the entire mass contained milky fluid.

Later the cyst walls become thicker and the milky fluid becomes more viscid or curd like. Secondary infection results in bacterial mastitis or abscess. The cyst may rupture causing an appearance of duct ectasia or plasma cell mastitis ⁹.

Microscopically, it shows multiple dilated anastomosing channels or cysts. Few of them are markedly dilated and contain abundant eosinophilic acellular material ⁸. They are demarcated from the surrounding normal breast tissue which shows hyperplastic acinar and ductal component ^{6,8}. Hyperplastic acinar elements are arranged in organoid pattern around small ducts ⁸. The ductal component forms a system of channels of progressively increasing caliber, which drains into galactocele cavities ⁸.

The acini, ducts and cavities are lined by tall secretory cells i.e. lactational changes ^{6,8}.

Leakage of cyst content into surrounding tissue shows

lipogranulomatous reaction and focal collection of foamy macrophages ⁶ as seen in our case.

The lesions occurring during pregnancy or lactation are predominantly benign like abscess, lactating adenoma, galactocele, fibroadenoma, cyst and phyllodes tumor, whereas, the malignant lesions are lobular carcinoma and rapidly progressing breast cancer¹⁰.

Lactating adenoma can be differentiated from galactocele on histopathological examination. Lactating adenoma does not possess a true capsule and is well demarcated from the surrounding breast tissue with variable sized proliferating secretory lobules having a minor stromal component ^{2,10}.

Case 3 - Intraductal papilloma (solitary type).

Intraductal papilloma of the breast is a benign lesion ^{2,11}. The papillomas can arise at any point in the ductal system but they show a predilection for its extremes i.e. the lactiferous sinuses and the terminal ductules ^{2,7,12}.

Among breast papillomas 90% are solitary and seen in peri or post menopausal group ^{7,11}. 20-25% are multiple and are associated with an increased concurrent or subsequent risk of carcinoma ^{2,7,11,12}.

Nipple discharge or palpable subareolar mass are the commonest presenting symptoms ^{2,6,7,11}. Nipple discharge is more common in solitary papilloma ^{6,11}.

At macroscopic level, papilloma looks like a warty mass protruding from a portion of the wall of the duct ¹².

The size of the lesion varies between 0.5-3 cm ^{2,7,11}. Microscopically, intraductal papillary arborescent fronds lined by cuboidal or columnar cells and myoepithelial cells with central fibrovascular stroma is the hallmark of the lesion ^{7,11,12}.

Table 3 shows the important differences between papilloma and papillary carcinoma.

Papillomas frequently undergo fibrosis, infarction or hemorrhage ^{2,11,12}. Sometimes the epithelial elements get trapped in the fibrous tissue at the stalk and leads to pseudoinvasion ^{2,11,12}. This has to be differentiated from invasive carcinoma ^{2,11,12}. In intraductal papilloma the entrapped epithelium usually consists of smoothly contoured clusters of benign cells with myoepithelial

cells. This type of pseudoinvasion does not extend very far from the wall of the duct¹². The presence of two cell types with myoepithelial cells in at least some of the trapped component and absence of associated intraductal carcinoma go in favor of benign lesion^{2,7,12}. Hence, it is essential to look for myoepithelial cells, as seen in our case.

It is important to make distinction between benign and malignant papillary tumors because approach to the diagnosis and management differs in both the groups^{13,7,11,12}.

Case 4 Metastasis of mixed mucinous carcinoma of breast to the axillary lymph node

Mucinous carcinoma (MC) also known as mucoid, colloid or gelatinous carcinoma constitutes 2-3% of all the breast carcinomas^{2,6}. The mean age of occurrence of MC has been reported significantly higher than invasive ductal carcinoma (IDC). Most of the patients are postmenopausal and present as soft palpable mass^{2,6,11}.

Although mucinous carcinoma of the breast is considered to originate from ductal carcinoma, Kanto et al¹³ in their study revealed that mucinous growth in MC begins in the intraductal carcinoma and in common IDC.

Microscopically primary mucinous carcinoma of the breast shows at least 25% of the tumor composed of solid tumor tissue floating in abundant extra cellular mucin which should constitute at least 1/3rd of the total tumor tissue¹⁴. Classic description of MC on microscopy is small clusters of tumor cells "floating in sea of mucin"^{2,11,14}.

Mucinous carcinoma occurs in two forms: as a pure mucinous carcinoma and impure or mixed i.e. mixed mucinous carcinoma (MMC) in which mucinous pattern admixed with an invasive carcinoma¹¹. The solid elements in MMC may be invasive ductal or lobular carcinoma, papillary, adenocystic or tubular carcinoma or combination of these⁶.

According to Rasmussen¹⁴ all mucinous carcinomas originate as pure carcinomas and a clone of tumor cells differentiates and loses its abilities to produce and secrete mucin which changes the tumor from pure MC to MMC. This explains larger size of MMC than pure MC.

Pure MC is generally regarded as an invasive type of tumor. According to Rosai¹¹, pure MC is a form of in situ ductal carcinoma where it is the mucin rather than cells that are invading the stroma. This explains extracellular mucin produced by this tumor and excellent prognosis of pure MC than MMC and IDC¹¹.

The mucin is acidic – sulfomucin or neutral type which can be demonstrated by alcian blue or PAS stain⁶.

On mammography, large pure MC has circumscribed margins which tally with circumscribed and expansile growth pattern on microscopy. MMC has irregular margins regardless of fibrotic, infiltrative nature of nonmucinous component¹⁵.

Biologic behavior of this tumor depends upon nonmucinous areas rather than mucin¹⁴. Pure MC recurs at slower rate as compared to MMC and IDC¹⁴.

Pure mucinous carcinomas hardly ever metastasize (2-4%) compared to MMC (40%)^{11,14}. Hence if lymph node metastasis of MC is encountered, one should study further sections to look for IDC component as done in our case.

Signet ring carcinoma and mucocoele like lesions are the differential diagnosis of MC^{2,6,15}. The lesions can be differentiated on routine histopathological examination. In signet ring cell carcinoma the mucin is intracytoplasmic whereas in mucocoele like lesions few cell islands are seen in mucin pools lined by myoepithelial cells and seen at periphery with variable distended ducts due to mucinous material^{2,6,11}.

Thorough sampling is required to rule out mucocoele like lesions as they are associated with atypical ductal hyperplasia, ductal carcinoma in situ and MC^{2,6,11}.

Conclusion

The unusual cases studied in benign group comprised duct ectasia with granulomatous mastitis, intraductal papilloma (solitary) type and galactocele. In malignant group metastasis of mixed mucinous carcinoma of the breast to axillary lymph node was interesting and an uncommon case.

The important findings from these cases were studied in detail. These features were useful in the management of patients as well as carried prognostic value.

1. Identification of benign lesions like duct ectasia with granulomatous mastitis is important as they mimic malignancy clinically. The treatment as well as prognosis in this condition differs.
2. It is important to differentiate between benign and malignant papillary tumors of the breast because solitary papillomas are curable by local excision. However, increased risk for the development of invasive carcinoma applies to patients with multiple papillomas.
3. Galactocele is an uncommon condition with characteristic gross appearance and is diagnosed when characteristic milky or creamy fluid is obtained and treatment is usually by aspiration. As such, these lesions are rarely excised.
4. Search for invasive carcinoma in all lymph node biopsies showing metastasis of MC is mandatory to determine the prognosis. The prognostic factors for MC are – type of MC, tumor size, cellularity and lymph node metastasis.

References

1. Desai M. Role of obstetrician and gynecologist in management of breast lump. *J Obstet Gynaecol India* 2003;53:389-91.
2. Sharkey FE, Craig Allred DC, Valente PT. Breast. In: Damjanov I, Linder J, (eds.) *Anderson's Pathology*. 10th ed. St. Louis: Mosby, 1996;2354-85.
3. Griffith CDM. Benign breast disease. In: Sengupta BS, Chattopadhyay SK, Dutta DC, Sinha DP, Varma TR, eds. *Gynaecology for postgraduates and practitioners*. New Delhi: BI Publications, 1998;464-75.
4. Malik R, Bharadwaj VK. Breast lesions in young females – a 20 year study for significance of early recognition. *Indian J Pathol Microbiol* 2003;46:559-62.
5. Bauer BS, Jones KM, Talbot CW. Mammary masses in the adolescent female. *Surg Gynecol Obstet* 1987;165:63-5.
6. Mills RR, Hanby AM, Oberman HA. The Breast. In: Sternberg SS, Antonioli DA, Carter D et al (eds). *Diagnostic surgical pathology* 3rd ed. Philadelphia: Lippincott, Williams and Wilkins, 1999;319-85.
7. Rege JD, Shet TM. Diagnostic problems and definitions of benign lesions. In: Chinoy RF (ed). *Guidelines for breast Pathology reporting*. Mumbai: Tata Memorial Hospital 1997;15-32.
8. Ironside JW, Guthrie W. The galactocoele: a light and electronmicroscopic study. *Histopathology* 1985;9:457-67.
9. Bartow SA, Preiser CF. The breast. In: Rubin E, Farber JL (eds). *Pathology*. Philadelphia: J.B. Lippincott, 1988:990-1013.
10. Choudhury M, Singal MK. Lactating adenoma – cytomorphic study with review of literature. *Indian J Pathol Microbiol* 2001;44:445-8.
11. Rosai J, Breast. In: Rosai J (ed), *Ackerman's surgical pathology*. 8th ed. St. Louis: Mosby, 1996:1565-1660.
12. Oyama T, Koerner F. Noninvasive papillary proliferations. *Semin Diagn Pathol* 2004;21:32-41.
13. Kato N, Endo Y, Tamura G, et al. Mucinous carcinoma of the breast: a multifaceted study with special reference to histogenesis and neuroendocrine differentiation. *Pathol Int*. 1999;49:947-55.
14. Rasmussen BB, Rose C, Christensen B. Prognostic factors in primary mucinous breast carcinoma. *Am J Clin Pathol* 1987;87:155-60.
15. Wilson TE, Helvie MA, Oberman HA et al. Pure and mixed mucinous carcinoma of the breast: Pathologic basis for differences in mammographic appearance. *AJR Am J Roentgenol* 1995;165:285-9.