

Breast Disease in Men and Young Women

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Imaging of the Male Breast

Development

- Birth to puberty same as female

Anatomy [Figure 1]

- Major ducts with little branching
- Connective tissue and fat
- Almost no terminal duct lobular units (TDLUs)

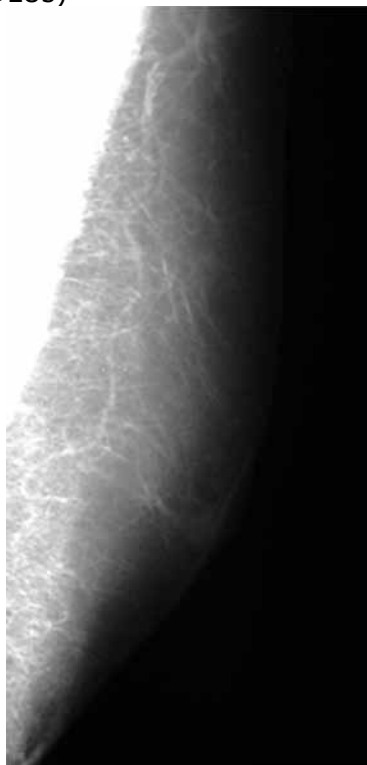


Figure 1
Normal male breast.

Male Breast Disease

- Presents as mass, swelling, pain, or nipple discharge
- Can be benign or malignant

Benign Disease

- Gynecomastia
- Pseudogynecomastia
- Papilloma
- Adenoma
- Myofibroblastoma
- Granular cell tumor
- Fibrocystic change
- Diabetic mastopathy
- Epithelial inclusion cyst
- Cystic lymphangioma
- Pleomorphic hyalinizing angiectatic tumor of soft parts
- Varix
- Leiomyoma
- Lipoma (most frequent)

Benign Disease

- No lactating adenomas
 - No pregnancy
- Rare lobular tumors
 - No TDLUs without progesterone
 - Rare invasive lobular carcinomas reported
- Rare fibroepithelial lesions
 - Fibroadenoma, phyllodes, carcinosarcoma
 - Lesions begin in TDLU
 - ❖ Lobular development rare in men

Gynecomastia

- Potentially reversible enlargement of the male breast
- Presents as soft mobile tender subareolar mass
- Simultaneous proliferation of ducts and stroma without encapsulation
 - Florid (early; nodular glandular) phase
 - ❖ Begins as increased number of ducts and epithelial proliferation with edema and cellular fibroblastic stroma
 - ❖ Reversible phase
 - Fibrotic (late; dendritic) stage
 - ❖ Progresses to dilated ducts, moderate epithelial proliferation and fibrosis
 - ❖ About 6 months after florid phase
 - Diffuse glandular

Gynecomastia

- Absolute increase in estrogen human chorionic gonadotropin (HCG) or estrogen precursors
 - Secretion by tumors
 - ❖ Leydig cell tumor
 - ❖ Germ cell tumors
 - ❖ Hepatoma
 - ❖ Adrenal cortical tumors
 - ❖ Pituitary tumors
 - Estrogen therapy
 - ❖ Prostate carcinoma
 - ❖ Topical estradiol to scalp
 - Increase in estrogen precursors
 - ❖ Cirrhosis
 - ❖ Hyperthyroidism

Gynecomastia

- Relative increase in estrogen
 - Testicular failure or atrophy
 - ❖ Idiopathic
 - ❖ Cytotoxic chemotherapy
 - Puberty and senescence
 - ❖ Transient in puberty (1–2 years)
 - Klinefelter syndrome (XXY)
 - Testicular feminization syndrome
- Hyperthyroidism
 - Reverses when the patient is euthyroid
- Refeeding after malnutrition or starvation
- Onset of hemodialysis

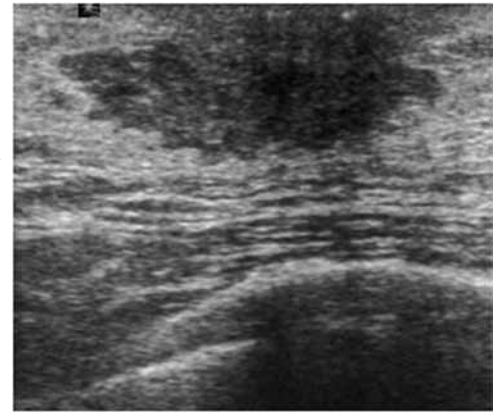


Figure 2C
"Microlobulated" subareolar mass is classic for gynecomastia.

Gynecomastia

- Drugs (partial list)
 - Spironolactone
 - Reserpine
 - Digitalis
 - Ergot
 - Thyroid extract
 - Dilantin
 - Thiazide diuretics
 - Cimetidine
 - Marijuana

Gynecomastia

- Mammographic patterns
 - Nodular glandular (acute or florid phase)
 - Dendritic (chronic or fibrotic phase)
 - Diffuse glandular (very high estrogen levels)

Nodular Glandular Pattern [Figures 2 & 3]

- Fan-shaped density radiating from the nipple
 - May be more prominent in upper outer quadrant (UOQ)
 - Blends into surrounding fat

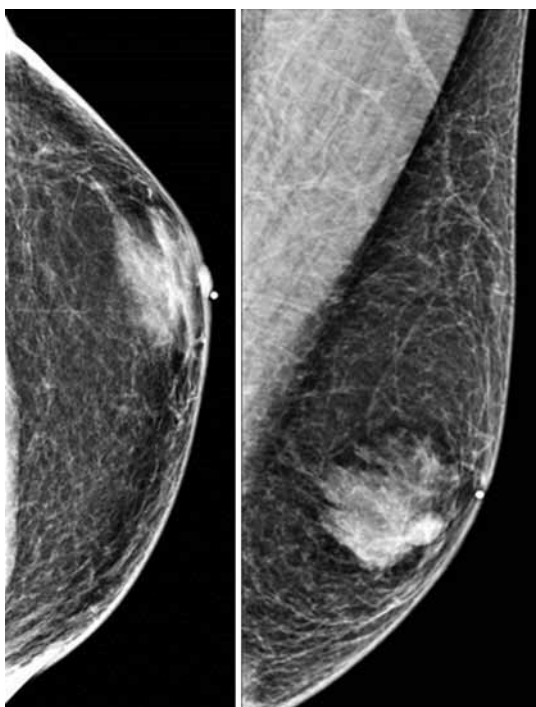
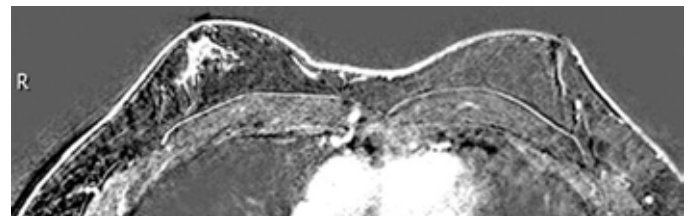


Figure 2 A & B

Fan-shaped subareolar density of gynecomastia.



Figure 3 A & B
Irregular enhancing subareolar pattern of gynecomastia.



Dendritic Pattern [Figure 4]

- Subareolar density with prominent extensions into fat
 - Density smaller than nodular pattern

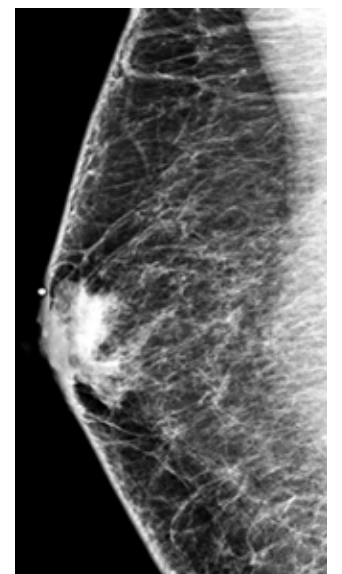
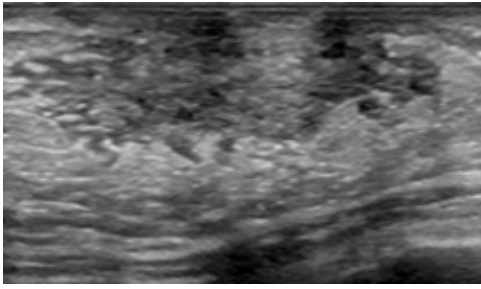


Figure 4A
Dense contracted "spiculated" chronic gynecomastia.

Figure 4B

Dense contracted "spiculated" chronic gynecomastia.



Diffuse Glandular Pattern [Figure 5]

- Small heterogeneously dense breast

Figure 5

Pattern of small dense breast, classic for the diffuse glandular pattern of gynecomastia.

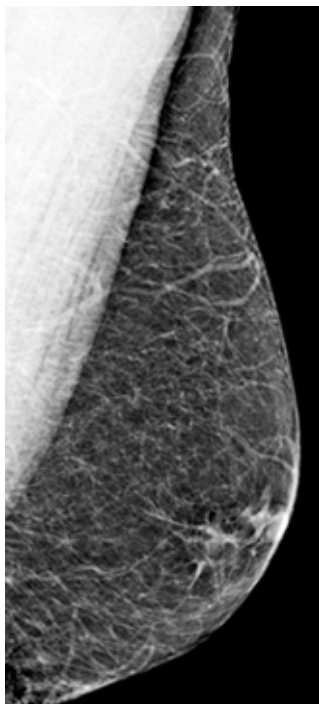


Pseudogynecomastia [Figure 6]

- Usually bilateral
- No palpable mass
- Excessive fat deposition in breast area
 - Normal variant
 - Obesity
 - Neurofibromatosis

Figure 6

Fatty large male breast is pseudogynecomastia.



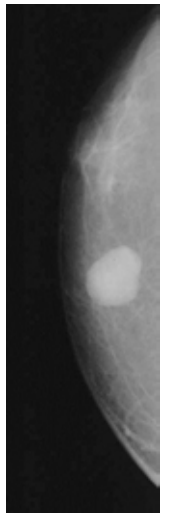
Myofibroblastoma [Figure 7]

- Solitary palpable firm mass
 - Rarely bilateral
 - No calcifications
- Freely moveable
- More common in men than women
- Mean age late 50
- Circumscribed lobulated mass without calcification
- Treated with local excision



Figure 7 A, B & C

Oval solid mass not subareolar is myofibroblastoma in this case.

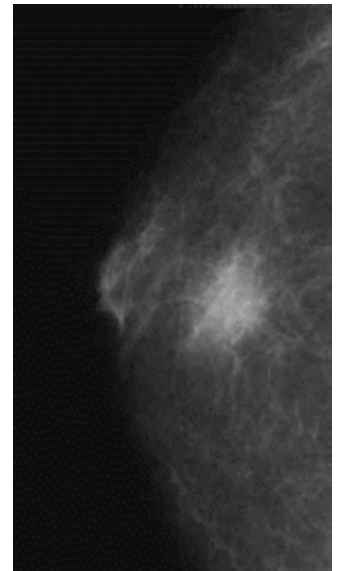


Granular Cell Tumor [Figure 8]

- Benign tumor of neural origin
- 6% in breast
- 10% in men
- Typical age is 30–40 years old
- Bimodal appearance
 - Spiculated or circumscribed (10%)
 - ❖ Usually circumscribed in men

Figure 8

Indistinct spiculated mass is a benign granular cell tumor.



Malignant Disease

- Carcinoma
- Metastasis
- Lymphoma
- Sarcoma

Male Breast Cancer

- 2,000 new cases estimated in USA
 - 450 men will die of disease each year
- <1% of all invasive mammary cancers
 - Higher incidence in China and Africa
 - ❖ High incidence of hyperestrogenism secondary to parasitic liver disease
- Age range 5–97 years (mean 61 years)

Male Breast Cancer

- Mass frequently located subareolar
 - Most common presentation is a painless subareolar mass (65%–95%)
 - ❖ Mass usually eccentric to the nipple
 - Mass round, oval, or irregular
 - Calcifications rare and coarser than in women

Male Breast Cancer

- Paget disease (12%) and skin ulceration (4%–36%) more common than in women
- Axillary metastases similar to women at same stage
- Found at later stage than women

Male Breast Cancer

- Ductal carcinoma in situ (DCIS)
 - 10% of cases
 - Usually papillary type
 - Comedo type very rare
- Liposarcoma
- Lymphoblastic lymphoma
- Metastasis

Carcinoma Risk Factors

- Advanced age
- Family history
- Jewish heritage
- Chest wall irradiation
- Hyperestrogenism
- Hyperthyroidism
- Exposure to hepatotoxins
- Occupational exposure to high heat

Carcinoma Risk Factors

- BRCA2 in 4%–16% of cancer patients
 - 40% in Iceland
 - Cumulative risk at age 70 is 6.8%
 - ❖ 1.2% for BRCA1
- Undescended testes
- Orchiectomy and orchitis
- Prolactinoma
- Klinefelter syndrome
 - 47, XXY
 - 6% of male breast cancer
 - 3% lifetime risk

Invasive Ductal Carcinoma [Figure 9]

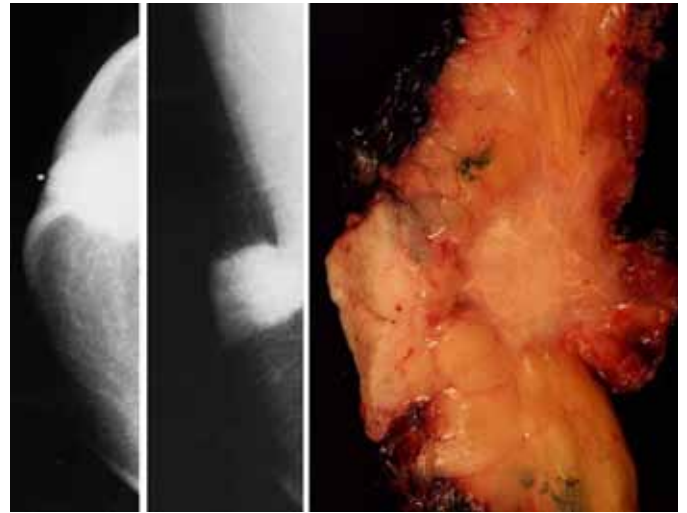


Figure 9 A, B & C

High-density irregular mass with skin retraction, an invasive ductal carcinoma.

Gynecomastia

Age 60's
Soft
Mobile
Usually tender
Subareolar
- Central
Unilateral or bilateral
Nodular, fibrotic, or diffuse

Carcinoma

Age 60's
Soft or hard
Mobile or fixed
Usually painless
Subareolar
- Usually eccentric
Unilateral
Mass, large or small

Conclusion

- Disease presents as mass pain or nipple discharge
- Gynecomastia and invasive ductal cancer are the most common lesions in the male breast
 - There are other rarer benign and malignant lesions
- Gynecomastia and carcinoma can look similar
 - Biopsy is sometimes necessary to separate gynecomastia from carcinoma
- All lesions eccentric to the nipple need biopsy unless they are characteristically benign
 - Contain fat
 - Lymph node

Imaging in Young Women

Lesions in Young Women are Rare

- Women 21 years old and younger
 - Fibroadenoma (up to 95% clinically)
 - Juvenile hypertrophy
 - Abscess and mastitis
 - Phyllodes tumor
 - Malignancy
 - ❖ Primary
 - ❖ Metastatic
 - Cysts are rare
- Women over 21 years old
 - Fibroadenoma
 - Abscess and mastitis
 - Phyllodes tumor
 - Cysts
 - ❖ More common as age approaches 35
 - Malignancy

Presenting Signs and Symptoms

- Mass
- Pain
- Nipple discharge
- Screening
 - Gene positive
 - Strong family history

Diagnosis in Young Women

- Ultrasound is primary modality
 - Breasts are dense after puberty
- Mammography is used in select older patients
 - High-risk screening
 - Solid masses in patients over 30
 - Malignant-looking lesions

More Common Benign Lesions

- Fibroadenoma
 - Juvenile
 - Giant
- Phyllodes benign
- Granular cell tumor
- Lactating adenoma
- Hamartoma
- Normal breast
- Fibrocystic change
- Intraductal papilloma
- Juvenile papillomatosis
- Mastitis
- Juvenile hypertrophy
- Diabetic mastopathy

Less Common Benign Lesions

- Pseudoangiomatous stromal hyperplasia (PASH)
- Granulomatous mastitis
- Fibromatosis
- Adenosis
- Fibroadenomatoid hyperplasia or nodule
- Fibrosis
- Mondor disease
- Varix
- Rosai-Dorfman disease (sinus histiocytosis with lymphadenopathy)

Fibroadenoma

- Youngest patient age 5 in our series
- Multiple in 16%–25% of patients clinically
 - Do complete bilateral ultrasound?
 - Multiple makes it BIRADS 2
- Found in 25% of breasts examined microscopically

Fibroadenomatoid Nodule [Figure 10]

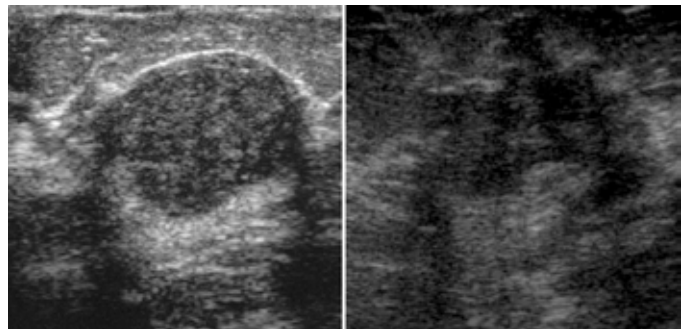


Figure 10 A & B

*Left Image: Circumscribed fibroadenomatoid nodule.
Right Image: Irregularly shaped solid mass, a fibroadenomatoid nodule.*

Fibroadenoma [Figure 11]



Figure 11

Fibroadenoma showing push rather than invasive border with surrounding breast tissue.

Giant Fibroadenoma vs Juvenile Fibroadenoma

- Giant fibroadenoma
 - Large lesion >10 cm
- Juvenile fibroadenoma
 - Age 20 years old or younger
 - Typically rapid growth and large size
 - Usually pericanicular type with cellular stroma

Giant Fibroadenoma [Figure 12]

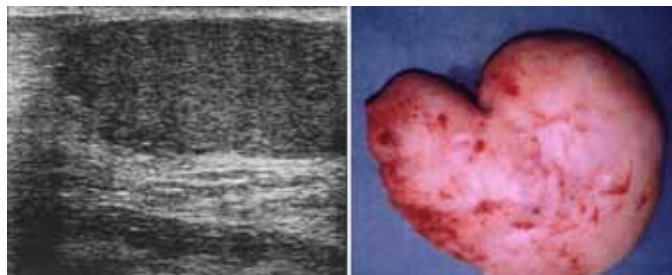
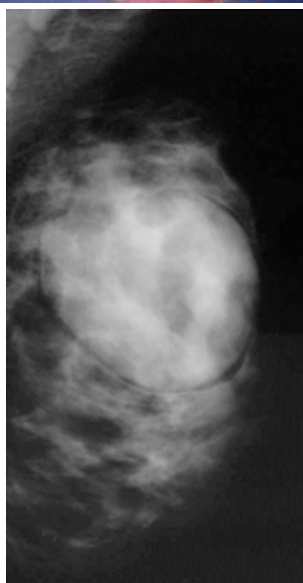


Figure 12 A, B & C

Giant fibroadenoma is a very large fibroadenoma.



Juvenile Fibroadenoma [Figure 13]

- Age 14

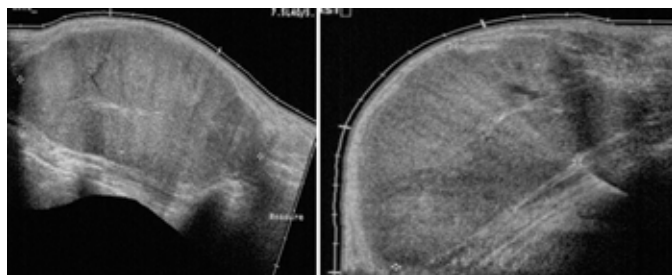


Figure 13 A, B & C

Juvenile fibroadenoma is a cellular rapidly growing pericanicular fibroadenoma in a young patient.



Phyllodes Tumor

- Benign epithelial elements and cellular spindle cell stroma
- Can act malignant
 - Local recurrence
 - Distant blood-borne metastases
 - Lymph node enlargement reactive usually
- Well-circumscribed lobulated mass
- Similar appearance on sonography to fibroadenoma
 - May have cystic spaces

Phyllodes Tumor

- Benign (15% recurrence)
 - Pushing margins
 - Mild atypia
 - May recur locally
 - Rare metastases
- Borderline (25% recurrence)
- Malignant (30% recurrence)
 - Invasive margin
 - Moderate to severe atypia
 - Common local recurrence
 - Hematogenous metastases

Phyllodes Tumor

- Treatment
 - Wide local excision
- You get 2 tries to get it right
 - Each recurrence may show grade deterioration

Benign Phyllodes [Figure 14]

- Can occur in girls under 10 years old
- Usually older than 10 years old
- Tendency to recur but not metastasize
- Pushing margins without invasion

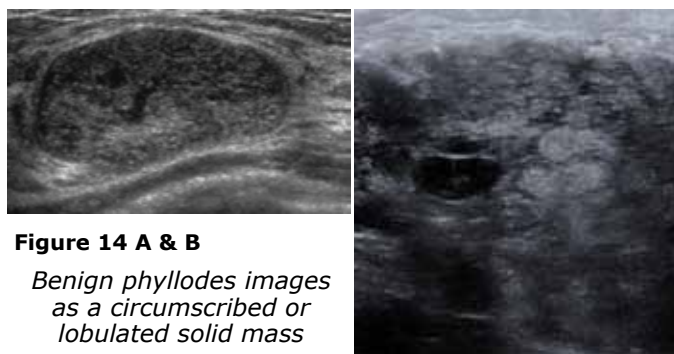


Figure 14 A & B

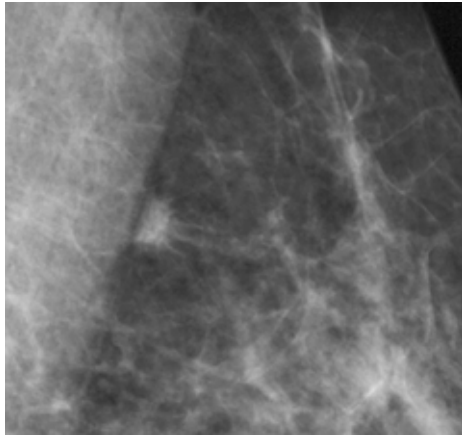
Benign phyllodes images as a circumscribed or lobulated solid mass

Granular Cell Tumor [Figure 15]

- Neural cell origin
 - Wide age range (17–75 years old)
 - ❖ Average age 30's
 - Discrete round mass or spiculated mass
 - ❖ Push or invasive margin
 - Rare metastasis to axillary nodes
 - ❖ One case in literature of lung metastases

Figure 15

Spiculated mass is a benign granular cell tumor.



Lactating Adenoma [Figure 16]

- Young women
- Pregnant or lactating women
- Circumscribed lobulated mass

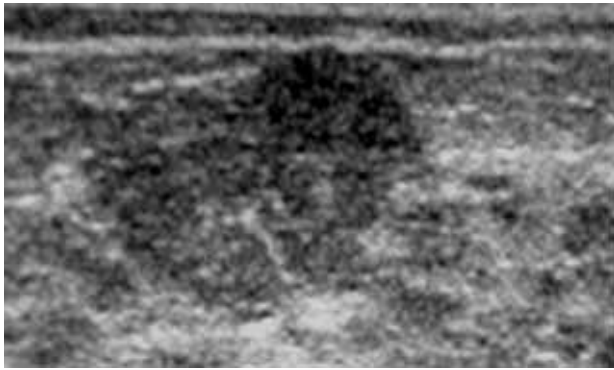
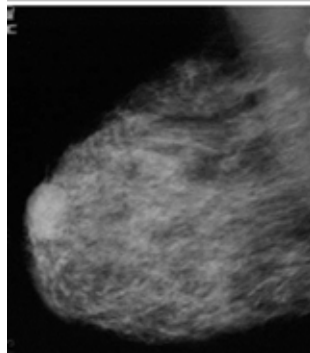
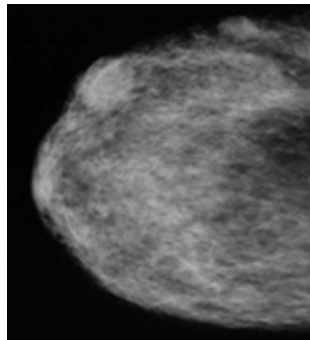


Figure 16 A, B & C

Lactating adenoma looks like a fibroadenoma.



Juvenile Papillomatosis

- Firm discrete mass
 - Localized cystically dilated ducts with intraductal proliferation
- 2/3 less than 20 years old
- Association with family history of breast carcinoma
 - 10% develop carcinoma within 10 years
- Treat with excisional biopsy

Juvenile Papillomatosis [Figure 17]

- Age 14

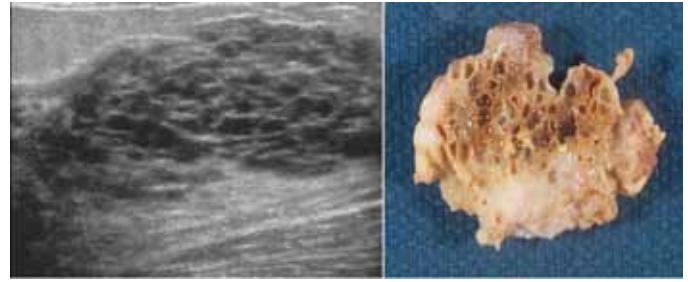


Figure 17 A & B

Multiple small cystic spaces in the mass represent dilated ducts in juvenile papillomatosis.

Juvenile Hypertrophy [Figure 18]

- Usually 11–14 years old
- Usually coincides with first menses
- Usually lasts 3–6 months
- Unilateral or bilateral palpable mass
- Iatrogenic amastia if removed

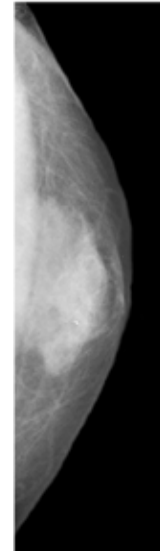


Figure 18

Juvenile hypertrophy looks like gynecomastia but in a pubertal female patient.

Diabetic Mastopathy [Figure 19]

- Focal fibrosis in the breast
- Diabetes mellitus type 1 since childhood
 - Poorly controlled
 - Complications from vasculitis elsewhere
- Occurs in young to middle age

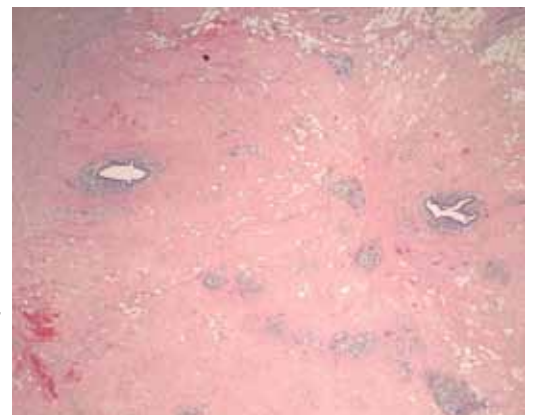
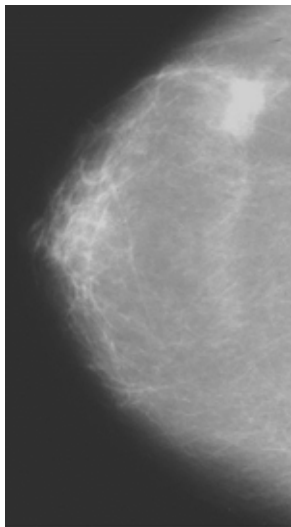


Figure 19A

Focal fibrosis in this patient with diabetic mastopathy.

Figure 19B

Diabetic mastopathy has a nonspecific appearance of mass or asymmetry.



PASH (Pseudoangiomatous Stromal Hyperplasia) [Figure 20]

- Wide age range
- Focal lesion usually
- Histologically shows slit-like separation of stromal cells
- Exaggerated stromal response to hormone stimulation

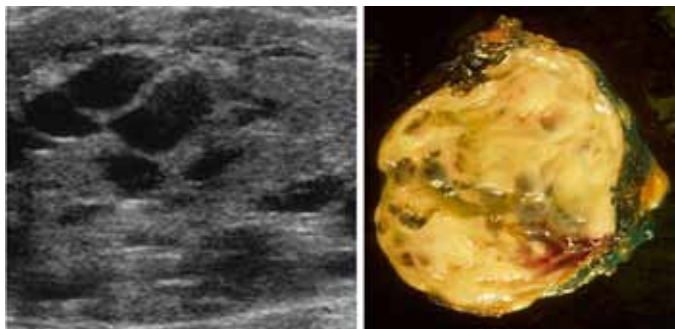
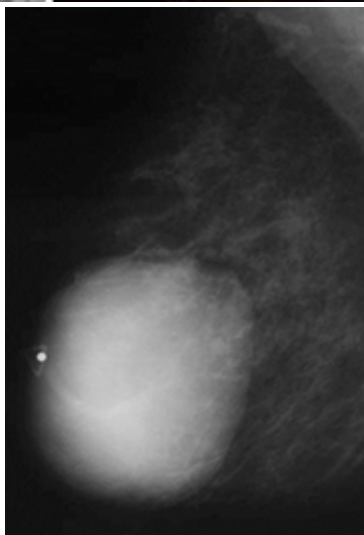


Figure 20 A, B & C

Tumoral type of pseudoangiomatous stromal hyperplasia (PASH) showing mass with nonvascular cystic spaces (pseudoangiomatous).



Granulomatous Mastitis [Figure 21]

- Usually in reproductive age
- Often within 3 years of pregnancy
- Idiopathic
- Specific causes must be excluded
 - Tuberculosis (TB) or other bacteria
 - Sarcoid
 - Fat necrosis
 - Foreign body

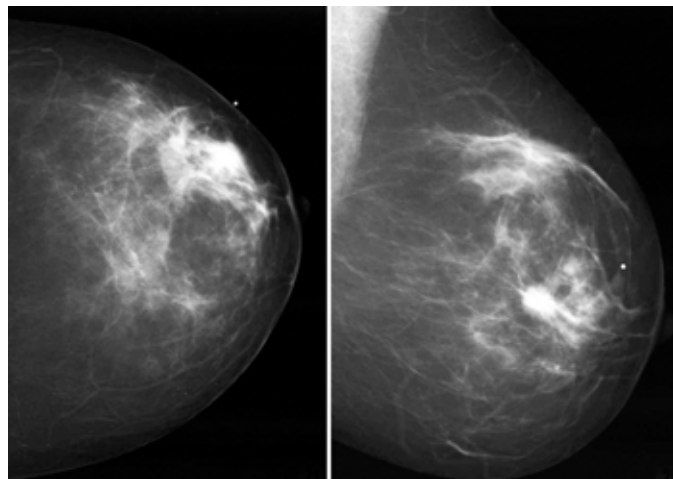


Figure 21 A & B

Spiculated mass of benign granulomatous mastitis.

Malignant Disease

- Youngest patient 5 years old in our series
 - Secretory carcinoma
- Invasive ductal carcinoma
- DCIS
- Sarcoma
 - Angiosarcoma most common
- Malignant phyllodes
- Lymphoma
- Metastasis

Invasive Ductal Carcinoma

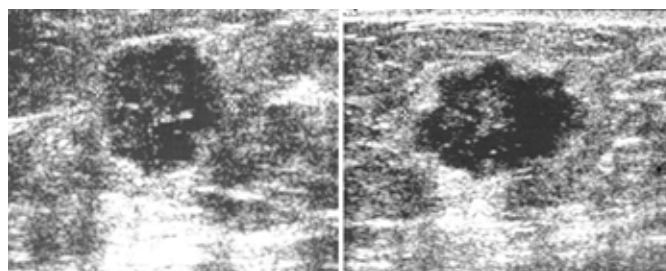
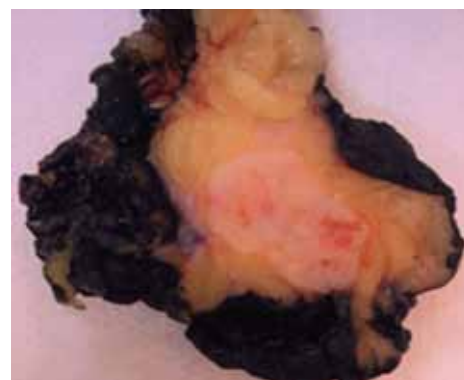
- Most common carcinoma
- Youngest patient 6 years old (not in this series)
- Signs similar to older patients

Medullary Carcinoma [Figure 22]

- Age 17

Figure 22 A, B & C

Medullary carcinoma in a 17-year-old patient.



Secretory Carcinoma

- Previously called juvenile carcinoma
 - Variant of invasive ductal carcinoma
- Initial report 3–15 years old
 - Oldest patient 87 years old
- Limited aggressiveness in younger patients
 - Nearly 100% curable in young patients

Ductal Carcinoma In Situ

- Screening mammography in high-risk patients
- Mass or nipple discharge

Sarcoma

- Malignant mesenchymal tumors
- 1% of malignant tumors in all ages
 - Higher % in young women
- After radiation therapy, 2–15 years old
- Many histological subtypes

Sarcoma

- Angiosarcoma
- Granulocytic sarcoma
- Myosarcoma

Angiosarcoma [Figure 23]

- 14–82 years old
 - Mean of 35 years old
- Lobulated mass
- Highly aggressive lesion
 - Axillary metastasis rare
 - Hematogenous metastasis usual

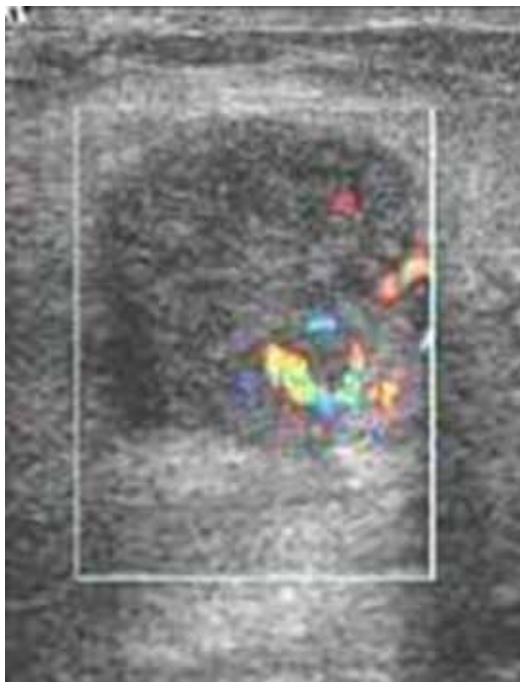


Figure 23

Highly vascular small angiosarcoma.

Malignant Phyllodes [Figure 24]

- Usually older than 10 years old
- Tendency to recur and metastasize
- Invasive margins
- Axillary adenopathy usually reactive
- Metastases hematogenous

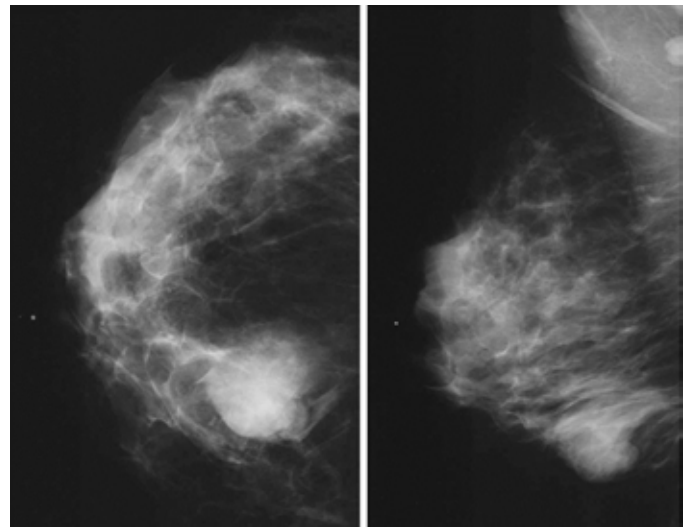


Figure 24 A, B & C

Nonspecific solid mass was a malignant phyllodes tumor.



Lymphoma

- Primary or secondary
- Focal mass or diffuse process

Metastatic Disease

- Neurofibrosarcoma
- In adults
 - Breast
 - Melanoma
 - Lung
 - Lymphoma

Conclusions

- Ultrasound is the primary modality in this age group
- Mammography is reserved for screening, likely malignant lesions and the older patients in this group
- MR indications are the same as for adults
- Cysts are rare, especially in the younger age groups
- Most solid lesions are benign
 - Fibroadenoma most common
- Juvenile hypertrophy and juvenile papillomatosis are unique to this age group and have specific appearances on imaging
- Malignant lesions occur and look like malignant lesions in older women
 - Invasive ductal carcinoma most common

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