Common Breast Problems in Adolescents

Amy D. DiVasta, MD, MMSc
Divisions of Adolescent Medicine & Gynecology

Christopher Weldon, MD, PhD
Department of Surgery

Boston Children’s Hospital

Objectives

• Identify the most common etiologies of breast complaints in the adolescent female
• Recognize the important role of breast US in distinguishing amongst the varying causes of breast masses and breast discharge
• Compare management strategies for treatment of these lesions
Disclosures

We have nothing to disclose.

Normal Breast Anatomy
“Don’t Like How They Look”
Anatomic Abnormalities

- Hear patient’s concerns
- Exam in upright position
- Measure!
Amastia

- Very rare: low E2 or no response to E2
  - Protein tyrosine receptor type F gene (PTPRF)
- Usually unilateral
- Iatrogenic: disruption of breast bud, chest wall trauma (chest tube, NICU procedures), radiation
- Androgen excess: CAH, gonadal dysgenesis

Poland Syndrome

- Absence/hypoplasia of pectoralis muscles
- Scoliosis
- Rib abnormalities
- Webbed fingers
- Small nipple/areolar complex
Breast Asymmetry

- Common! ~25% teens have persistent asymmetry
- Rule out cyst, mass, abscess on larger side
- Asynchronous development or asymmetry?
  - By T4, breast mass is developed so “catch up” unlikely
  - Don’t over-reassure or expect improvement with time
Breast Asymmetry: Impact

• “Just a cosmetic concern”?  
  – ↓ Short Form-36 role-emotional scale score  
  – ↓ Rosenberg Self-Esteem Scale scores  
  – Independent of differences in body mass  
• Findings suggest that patients suffering from breast asymmetry have poorer emotional well-being and lower self-esteem than peers  
• Suggest need for early intervention to minimize negative outcomes  

Breast Asymmetry: Interventions

• Temporary cosmetic measures  
  – Prosthetics  
• Surgical correction  
  – Augmentation vs. reduction  
• Most payors do not cover asymmetry  
  – “No functional impairment” from asymmetry  
  – Only 52% covered at our institution 2008-2013  
• Disparity of care  
  – Covered if cancer-related, but not congenital
Macromastia/Hypertrophy

- Usually bilateral finding
  - Unilateral suggests large tumor (>5-10 cm) or lymphoma
- May lead to breast pain, back pain, limitation of activities, postural issues, skin breakdown, emotional distress, depression, intertrigo
- Associated with obesity
  - Not causative; wide range of BMI reported
Macromastia: Impact

- Prospective study at BCH
- Subjects 12-21 y

### Table 3: Linear Regression Models on the Effect of Macromastia on Mean Survey Score

<table>
<thead>
<tr>
<th></th>
<th>Macromastia (n = 50)</th>
<th>Controls (n = 100)</th>
<th>p1</th>
<th>p2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical functioning</td>
<td>58.7 ± 15.4</td>
<td>91.6 ± 18.3</td>
<td>&lt;0.001</td>
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</tr>
<tr>
<td>Role-physical</td>
<td>60.5 ± 20.4</td>
<td>86.7 ± 17.7</td>
<td>&lt;0.001</td>
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</tr>
<tr>
<td>Bodily pain</td>
<td>49.5 ± 21.3</td>
<td>72.5 ± 19.3</td>
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<td>&lt;0.001</td>
</tr>
<tr>
<td>General health</td>
<td>47.6 ± 18.8</td>
<td>74.2 ± 20.9</td>
<td>0.02</td>
<td>0.15</td>
</tr>
<tr>
<td>Vitality</td>
<td>40.1 ± 16.7</td>
<td>48.4 ± 15.8</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
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<tr>
<td>Social functioning</td>
<td>70.4 ± 26.4</td>
<td>82.7 ± 19.8</td>
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<td>Role-emotional</td>
<td>36.4 ± 22.6</td>
<td>82.0 ± 18.8</td>
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<tr>
<td>Mental health</td>
<td>50.0 ± 20.1</td>
<td>72.6 ± 10.5</td>
<td>0.002</td>
<td>0.01</td>
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<tr>
<td>SF-36 mean, SD</td>
<td>88.8 ± 5.4</td>
<td>92.7 ± 5.7</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
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<tr>
<td>SF-36, mean, SD</td>
<td>78.4 ± 19.4</td>
<td>95.8 ± 10.9</td>
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<tr>
<td>SF-36, mean, SD</td>
<td>10.7 ± 11.6</td>
<td>7.5 ± 7.0</td>
<td>0.02</td>
<td>0.12</td>
</tr>
</tbody>
</table>

* p value for regression coefficient (β) for race status.
* Unadjusted
* Adjusted for BMI category.
Macromastia: Impact

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- Subjects 12-21 y

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<td></td>
<td></td>
<td></td>
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<td>&lt;.001</td>
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<td>Mental health</td>
<td>74.3 ± 21.1</td>
<td>79.6 ± 19.7</td>
<td>0.05</td>
<td>0.95</td>
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</tbody>
</table>

* P value for regression coefficient β for each category.
* *Unadjusted.
* *Adjusted for BMI category.
Myths and Misconceptions

- Solely a cosmetic concern
  - 80% patients become symptomatic at puberty
- Result of obesity; resolves with weight loss
  - Exercise becomes difficult/impossible
  - No research indicates obesity as a cause
- No surgery until >18 y, or children born
  - Postpone until growth completed
  - Ductal system typically spared, sensation okay
- Not covered by insurance

Surgical Correction

- No clear guidelines for timing of surgery
- Individualize treatment based on emotional and physical readiness, maturity
  - Too late: psychosocial and physical distress
  - Too soon: potential to need second procedure, lack of risk comprehension
- Reduction mammoplasty, once growth complete
  - 97% covered at our institution 2008-2013
- Typical volume removed ~2000 g
Surgical Correction

- Complications same as adults: infection, scarring, sensory loss, breastfeeding issues
- Correction improves HRQoL scores (Neto 2012)
- No recurrence if timing appropriate
- Increased minor complications in obesity

Mammaplasty & Obesity

<table>
<thead>
<tr>
<th>TABLE 1. Surgical Outcomes</th>
<th>All (n = 47)</th>
<th>Nonobese (n = 45)</th>
<th>Obese (n = 12)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast tissue* (in)</td>
<td>123 ± 67.1</td>
<td>114 ± 64.1</td>
<td>182 ± 92.3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Patients reporting complications (n, %)</td>
<td>14 (30.4%)</td>
<td>10 (22.2%)</td>
<td>4 (33.3%)</td>
<td>0.1111</td>
</tr>
<tr>
<td>Complications per patient*</td>
<td>1.35 ± 0.66</td>
<td>1.04 ± 0.36</td>
<td>1.68 ± 0.73</td>
<td>0.0133</td>
</tr>
<tr>
<td>Self-reported patient satisfaction</td>
<td>58 (88.6%)</td>
<td>39 (86.7%)</td>
<td>19 (86.4%)</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

Complications
- Skin separation/minor wound issue
- Altered nipple sensation
- Hypertrophic scar
- Asymmetry/symmetry irregularity (major)
- Infection needing antibiotics (oral or intravenous)
- Hematoma
- Deep or necrotic revision

*Number of times inserted per patient.
*Two-sample t-test.
*Pearson χ² test.
*Among patients reporting complications. 
*Values absent.

One patient had a breast abscess surgically drained that required intravenous antibiotics (major complication).
Insurance Coverage

- Neck/shoulder pain
- Shoulder grooving from brassiere straps
- Skin changes under the breasts, such as rash, thinning, or breakdown
- Chest radiography
- Minimum of 500 g is required to be removed from each breast

Xue AS, et al. JPAG 2013

Juvenile ("Virginal") Breast Hypertrophy

- Alarmingly rapid enlargement of breast connective tissue during puberty
- Persistent overgrowth
  - Erythema, firm/tense breast, striae
- Estrogen hypersensitivity?
- Therapy
  - Tamoxifen, medroxyprogesterone
  - Surgical reduction; average >5000 g removed
  - Recurrence prevention (~40% recur)
  - Mastectomy
Virginal Hypertrophy

Tuberous Breast Deformity

- Congenital anomaly
- Appearance:
  - Inferior hypoplasia and skin deficiency
  - Constriction at breast base
  - Overdeveloped nipple/areolar complex ("areolar herniation")
  - Superior malposition of the inframammary fold
Tuberous Breast Deformity

Kolker AR and Collins MS. Plast Reconstr Surg 2015

Tuberous Deformity: Correction

Kolker AR and Collins MS. Plast Reconstr Surg 2015
Tuberous Deformity: Correction

18 mo follow-up:
-- Bilateral implants, bilateral mastopexy, release of constriction

Kolker AR and Collins MS. Plast Reconstr Surg 2015
“Red, Black, or Blue”

Infection

Firm, tender to touch, red, warm
Abscess

Risk factors: post-partum, trauma, piercing, preexisting ductal blockage, areolar hair removal

Typical organisms: staph, strep, enterococcus, anaerobes. Consider local MRSA prevalence.

Imaging: Ultrasound differentiates cyst v. solid
  – Complex cyst, debris in cyst

Mastitis and Abscess
**14 y CC: R breast pain, swelling, erythema**

**Mastitis and Abscess**
- Risk factors: post-partum, trauma, piercing, preexisting ductal blockage, areolar hair removal
- Typical organisms: staph, strep, enterococcus, anaerobes. Consider local MRSA prevalence.
- Imaging: Ultrasound differentiates cyst v. solid
  - Complex cyst, debris in cyst
- Tx: Dicloxacillin or Augmentin or Clindamycin x 10d
- If persistent – drainage
- If recurrent: suspect ductal ectasia or duct anomaly in teen, hemangioma/anomaly in infant
Mastitis and Abscess

IR
- <3cm
- Simple
- Multifocal
- Concerns with lactation or cosmesis
- Subareolar

SURGERY
- >5cm
- Complex
- Multiloculated
- Longstanding

Expert Rev Anti Infect Ther 2014, epub

Abscess: Sequelae

- Neonatal mastitis may be associated with long-term consequences
  - N=8/10 girls followed-up 10-15 y later
  - N=7/8 had surgical drainage

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<th>Outcome</th>
<th>Number affected n (%)</th>
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<tr>
<td>Asymmetry</td>
<td>2 (25%)</td>
</tr>
<tr>
<td>Change in texture</td>
<td>4 (50%)</td>
</tr>
<tr>
<td>Intraductal dilatation, fibrous elements and calcifications</td>
<td>2 (25%)</td>
</tr>
<tr>
<td>Fibrous changes</td>
<td>1 (13%)</td>
</tr>
<tr>
<td>Breast tissue trapped under scar</td>
<td>1 (13%)</td>
</tr>
</tbody>
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Panteli C. Arch Dis Child 2012
Trauma

- Fat necrosis
- Burns
- Contusion
- Hematoma
- Management: Pain meds, ice, binding

“Leaky”
Nipple Discharge

• Type/Color of discharge?
  – Bloody?
  – Clear and sticky?
  – White, milky? Galactorrhea

Nipple Discharge

• Type/Color of discharge?
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• Unilateral or bilateral?
• History of stimulation? Sexual history?
Nipple Discharge

- Type/Color of discharge?
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- Unilateral or bilateral?
- History of stimulation? Sexual history?
- Medications?
  - Anti-psychotics, tricyclics, SSRIs
  - Metoclopramide
  - Verapamil
  - Opioids
Nipple Discharge

• Type/Color of discharge?
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  – White, milky? Galactorrhea

• Unilateral or bilateral?

• History of stimulation? Sexual history?

• Medications?

• Review of systems:
  – Headache
  – Visual disturbances
  – Menstrual history

ROS: headache, visual disturbances, menstrual history

Examination of breast: Gentle fluid expression
#1 Take Home Point:

Every fluid that comes out of the breast is NOT milk

Nipple Discharge: Etiologies

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<tr>
<td>Multi-colored, sticky</td>
<td>Ductal ectasia</td>
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<td>Purulent</td>
<td>Mastitis, abscess</td>
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<td>Watery</td>
<td>Papilloma</td>
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<td>Intraductal papilloma, ductal ectasia</td>
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<td>Montgomery tubercles</td>
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- Pregnancy, post-pregnancy, post-Ab
- Medications
- Prolactinoma/Microadenoma
- Thyroid disease

- **Jogger’s nipple/eczema**
Nipple Discharge

• Smear of discharge for cytology
• Laboratory evaluation
  – Pregnancy test
  – Prolactin, TFTs,
• Unclear etiology? Fat staining
• Bloody discharge? Gram stain & culture
• If unilateral or mass palpated, ultrasound
• If elevated PRL x 2, consider pituitary MR

Mammary Duct Ectasia

• Distension of subareolar ducts with fibrosis and inflammation
• Nipple discharge or mass
• Usually spontaneous resolution <1 y
• May present as a “blue breast”
• Risk factor for mastitis
• Persistent symptoms → excision
15 y CC: unilateral serous discharge, lump

Retroareolar Cysts

- aka Cysts of Montgomery
- Discharge not from nipple
- If obstructed
  - Acute inflammation
  - Asymptomatic mass
- Can confirm dx with US
- Can tx with NSAIDs/Abx
- 80% spontaneously resolve; can take up to 2y
16 yo intermittent brown discharge

“Lumps and Bumps”
Evaluation of Breast Mass

- Duration, location, rate of growth
- Inspection, palpation, measurement
- Imaging studies:
  - Ultrasound: cyst vs. solid; measurement
  - Mammogram: No!
  - Fine needle aspiration: No
  - Core Needle Biopsy
  - MRI

Masses IN the breast

- Hemangioma
- Lymph node
- Skin lesion
- Malignant tumor (secondary cancer)
Masses OF the breast

- Fibroadenomas -- 67% to 94%
- Fibrocystic changes
- Simple cysts
- Abscess/mastitis

- Vast majority resolve or do not enlarge

Benign Breast Lumps

Common benign causes of breast lumps

- Fibroadenoma
- Cystic breast changes
Fibrocystic Changes

- Diffuse cord-like thickening and nodularity, pain
- Varies with menstrual cycle (improve w/period)
- Exam:
  - Non-distinct margins; Serial examinations show changes
  - May cause discharge
- Treatment:
  - Firm brassiere and NSAIDs
  - OCPs improve 70-90% cases (20 mcg EE)
  - Caffeine avoidance
  - Vitamin E, evening primrose oil

Benign Breast Disease

- Risk factors during adolescence:
  - Alcohol consumption ages 18-22 y
    - Risk BBD increases 15% for every 10 g EtOH consumed per day
  - Thinner during childhood
    - OR 0.91 per kg/m²; p<0.04
  - Most rapid growth (OR 1.88; p=0.04)
  - No association between age at menarche & BBD

Berkey CS. Pediatrics 2010; Liu et al Pediatrics 2012
Fibroadenoma

- Benign; 67-94% of teen breast masses
- Rubbery, discrete, upper outer quadrant
- US: well-circumscribed, hypoechoic
- Conservative, nonsurgical management
  - <5 cm: Serial exams, observation (2/3 stay same size or regress), asymptomatic
  - > 5 cm, symptomatic: remove
  - Cosmesis and psychological concerns*
- No increased lifetime risk of breast CA with simple fibroadenoma

17 yo CC: painful R breast lump
Ultrasound Findings

- **Reassuring US**
  - Uniform, hyperechoic pattern,
  - Circumscribed margin
  - Oval, round, macrolobulated (<2-3) shape
  - Thin echogenic capsule

- **Non-reassuring US**
  - Irregular shape
  - Microlobulation
  - Increased number of lobulations
  - Spiculated margin
  - Microcalcifications
  - Ductal extension
  - Internal cystic changes

Phyllodes Tumors

- **Stromal tumor** (cystosarcoma phyllodes)
- Only 0.3% to 1% of breast masses in teens
- More common in African-Americans
- Large (4-13 cm), firm, rapidly growing, skin
- 3 variants – benign, borderline, malignant
- **US/CNB**: difficult to differentiate
- **Treatment**: Surgical removal
- **Met work-up**
Malignancy

- 1/8 women get breast cancer
- 90% of women have CIS in their 90’s in autopsy series
- Primary breast cancer in young women is RARE
  - 20-24 yrs 0.2/100,000
  - <20 yrs 0.8/100,000

Cumulative Breast CA 2000-2005

Risk of Breast Cancer as Function of Age Estimated From Women Diagnosed in the US SEER17 Registries, 2004

Anders CK Semin Oncol 2009

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>1:571,429</td>
</tr>
<tr>
<td>20</td>
<td>1:75,188</td>
</tr>
<tr>
<td>25</td>
<td>1:8,684</td>
</tr>
<tr>
<td>30</td>
<td>1:1,523</td>
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</tbody>
</table>
Malignancy

• Secondary breast lesions far more common in younger patients
  – Rhabdomyosarcoma
  – Neuroblastoma
  – ‘Liquid’ cancers

• Childhood CA survivors with previous chest XRT require careful screening

Screening for CA survivors

Breast cancer surveillance is recommended for female childhood, adolescent and young adult cancer survivors treated with ≥20 Gy chest radiation.

Annual breast cancer surveillance is recommended for female childhood, adolescent and young adult cancer survivors treated with ≥20 Gy chest radiation for at least up to 30 years of age.

Annual breast cancer surveillance in female childhood, adolescent and young adult cancer survivors older than age 30 is reasonable based upon clinical judgment and pending availability of further data.

Mammography or breast MRI or a combination of mammography and breast MRI is recommended for female childhood, adolescent and young adult cancer survivors treated with chest radiation. The evidence is insufficient to recommend the ideal imaging modality.

Clinical breast exams may be reasonable for female childhood, adolescent and young adult cancer survivors treated with chest radiation returning for follow-up medical evaluations in countries where breast cancer surveillance access is through clinical referral.

Mulder RL. *Lancet Oncol*, 2013
Malignancy

- Familial association common (20-30%)
- Hereditary predisposition is 5-10%
  - Secondary breast lesions
    - BRCA 1, BRCA 2 (AD)
      - 2-3x greater risk and 85% cumulative risk at 75 y
      - Monthly SBE at 18 y
      - MR yearly at 25 y with biannual visit
      - Prophylactic mastectomies 10 years before index case of CA
    - Li-Fraumeni syndrome – p53 mutation and incomplete penetrance of breast v other malignancies

BCH Data

- 15-yr retrospective review (1993 to 2008)
- 276 masses in 214 women
  - 89% benign
  - 0.4% phyllodes
  - 2% malignant
  - 9% total cohort non-neoplastic
  - NO primary epithelial breast malignancies
- Since 2008, 2 more malignancies
  - 1 benign phyllodes
  - 1 juvenile/secretory epithelial breast CA
BCH Data

- Surgical principles
  - AVOID surgery
    - Q4 month US x 1 year/repeat visits/SBE Qmo
    - REASSURANCE
  - Operate for:
    - Mental anguish
    - Symptoms
    - Growth
  - Periareolar incisions
  - Breast preservation
  - Compression vest 4 weeks/Sports bra 4 weeks
  - No activity 4 weeks/No contact sports 8 weeks
To operate or not to operate?

- **NCI**: Most tumors involving the breast in childhood are noncancerous; watch without biopsy.

- **Reasons for surgery**: palpable mass, progressive growth, no regression in size, complex US findings, family history of breast cancer, patient’s past history of malignant disease.

*Ezer SS. JPAG 2013*
To examine, or not to examine?

- Meta-analyses of randomized and non-randomized studies of SBE have shown that SBE has no effect on mortality from breast CA.

<table>
<thead>
<tr>
<th>Table 4. Guidelines for Breast-Cancer Screening.</th>
<th>Warner E NEJM 2011</th>
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<tbody>
<tr>
<td>Organization</td>
<td>Year Guidelines Issued</td>
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<tr>
<td>---------------------------------</td>
<td>------------------------</td>
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<tr>
<td>USPSTF</td>
<td>2009</td>
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<td>American Cancer Society</td>
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<td>National Comprehensive Cancer Network</td>
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<tr>
<td>American College of Physicians</td>
<td>2007</td>
</tr>
<tr>
<td>American College of Obstetricians and Gynecologists</td>
<td>2005</td>
</tr>
<tr>
<td>American College of Radiology</td>
<td>2008</td>
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Mastalgia

- Breast pain, often cyclic and premenstrual
- Mild swelling and nodularity
- Usually due to hormonal stimulation
- Treatment
  - Supportive measures: well-fitting bra
  - Reassurance
  - Smoking cessation
  - Caffeine limitation
  - Meds: NSAIDs, OCPs, Vitamin E 1,200 IU daily, evening primrose oil 3000 mg daily

Summary

- Majority of adolescent breast complaints have benign etiologies
- Conservative medical therapy appropriate for management of most breast masses
- Nipple discharge may have a variety of benign causes: evaluation necessary
Objectives

- Identify the most common etiologies of breast complaints in the adolescent female
- Recognize the important role of breast US in distinguishing amongst the varying causes of breast masses and breast discharge
- Compare management strategies for treatment of these lesions

Thank you