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The Female and Male Adolescent Breast

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The female and male adolescent breast

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Abstract

The breast is an important organ system for the adolescent female and occasionally for the adolescent male as well. This chapter reviews basic principles of breast concerns and disorders including congenital anomalies, asymmetric breast development, underdeveloped breasts, virginal hypertrophy, breast masses, mastalgia, galactorrhea, gynecomastia in males, and others. Clinicians should be attuned to issues and concerns for this important structure in adolescents.

Keywords: Adolescence, female, male, breast

Introduction

The breast is a modified sweat gland that is enveloped by layers (superficial and deep) of the superficial fascia in the thorax; this organ system is suspended from the chest wall by Cooper's ligaments (fibrous septae) that extend from the pectoralis fascia to the dermis. Estrogen, progesterone and prolactin are hormones that are important in breast development as reviewed in Table 1. Additional key hormones include thyroxine, insulin, growth hormone, and adrenal corticoids.

Clinician's breast examination

Though often neglected by clinicians, breast examination remains an important aspect of the physical examination process in adolescents (1-5). Though rare in adolescents, breast pain and/or a breast lump stimulate fears of breast cancer in the youth and her parents. The clinician should not ignore this system, but learn to minimize embarrassment in the exam process and help the adolescent understand her body as well as possible. During the adolescent years, she can be taught about breast self-examination as a

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way of reducing her breast cancer risk as she reaches adulthood. Regular self-examinations should be developed by age 20 years.

A careful history is important, and includes age, initial presence of breast buds (Tanner 2 or Sexual Maturity Rating 2) and breast growth rate as well as the possible presence of nipple discharge, lesions, and pain. A menstrual history is also important to obtain. The female may be concerned about the size of her breasts, possible asymmetry or the timing of the growth of her breasts (precocious or delayed). While the youth may not vocalize concerns, it is important to emphasize the normalcy of her breasts, if appropriate.

Table 1. Impact of Hormones on Breast Development

1. Estrogen induces:
a) Ductal system growth
b) Nipple maturation
c) Areolar development (increased pigmentation and size)
d) Induction of periductal fibrous tissue growth
2. Progesterone induces alveolar maturation
3. Prolactin allows maturation resulting in lactation

Congenital anomalies

Athelia and amastia

The absence of a nipple (athelia) is a rare congenital anomaly resulting from maternal use of exogenous androgen during pregnancy (6,7). Another rare anomaly is absence of a breast (amastia), caused by mammary ridge involution involving the pectoral ridge on the affected side.

Amastia is typically unilateral and associated with defects of the chest wall. Poland Syndrome is characterized by unilateral amastia with no pectoralis muscle development, defects of the ribs, radial nerve palsy, and webbing of the fingers.

Amastia can be acquired after birth from inadvertent breast bed biopsy, radiation damage to the breast, or other injury. Treatment involves surgical correction of abnormalities.

Polythelia and polymastia

Extra accessory nipples (polythelia) and accessory breast tissue (polymastia or supernumerary breasts) are more common congenital breast anomalies found along the milk lines from the axilla to the groin. A variety of nipple, areola, and glandular tissue combinations can be found. Polythelia (involving nipple and areola) is noted in 1-2% of the general population, and may be associated with cardiovascular and genitourinary defects. The extra nipple tissue may erroneously be called a mole, while the extra breast tissue can be mistaken for hidradenitis suppurativa. Management involves surgical removal if the patient is concerned about cosmetic appearance.

Other nipple anomalies

A nipple that does not extend beyond the breast surface is called an inverted nipple; it is often bilateral and normally corrects itself within a few weeks after birth. If still noted after puberty, concerns about its appearance, frequent infection, and/or lactation problems may surface in the youth. Congenital nipple inversion can lead to chronic areolar abscess, characterized by nipple swelling, pain, and discharge along with periareolar erythema. Treatment involves local heat, antibiotics, and surgery in some cases to remove the duct system.

Acute retraction of a nipple may suggest breast disease, such as breast cancer. Fortunately, this is rare in the adolescent. Other defects include a depressed nipple (with lactiferous ducts opening into a depressed area in the areolar center) and a bifid or split nipple. Depressed, bifid, or split nipples may also be managed surgically.

Asymmetric breast development

Breast asymmetry develops in many female adolescents, often improves as puberty progresses, and is noted in about 25% of adult females (8). It usually is a normal variant of breast growth with the smaller breast typically opposite to the dominant hand. A padded bra and reassurance is all that is needed in most cases. Once the breast development is

complete on both sides, surgical correction of the asymmetry can be considered if desired and affordable.

In adolescence, as one breast bud develops before the other, the young adolescent may present with a unilateral mass sometimes mistaken for a tumor. Biopsy of this "lesion" results in damage to the yet-to-mature breast and should be avoided. Damage to a breast bud can also result from injury to this area from infection, burns, anterolateral thoracotomy, and thoracostomy tube insertions in childhood. Burns to the chest area usually cause skin contractures with underlying normal breast tissue; release of these contractures in the early teen years allow normal growth of the adolescent breast. Also, scoliosis or defects of the rib cage can result in the appearance of breast asymmetry, or pseudoasymmetry.

Underdeveloped breasts

A common concern among adolescent females is that of small breasts (micromastia), or breasts that are much smaller than what they or society feels are normal. It is often a familial condition, and may be noted in those with a tall, thin body type with limited subcutaneous tissue in general and sometimes who have connective tissue disorders. Reassurance of the normalcy of the breasts is important, and that the "small" breasts need not interfere with her sense of femininity, sexual relations, pregnancy, or lactation. Augmentation mammoplasty can be done at some time in her life when she is emotionally, cognitively, and financially ready for such surgery.

Unilateral or bilateral hypoplasia of the breasts may be difficult to distinguish from micromastia. Hypoplasia or hypomastia may be due to partial end-organ response failure, in which the breast(s) do not develop into normal breasts. Bilateral hypoplasia may result from androgen excess in utero or in early infant life. This may be due to congenital adrenal hyperplasia, leading to the prevention of ovarian maturation and estrogen secretion during puberty. The nipples are smaller, less pigmented, less estrogenized, and do not have papillae that are protuberant. The pubic hair may develop without thelarche and menarche may be delayed. A careful genetic and endocrinologic evaluation is necessary for bilateral

hypoplasia. Causes include gonadal dysgenesis (Turner Syndrome), androgen-producing tumors, preadolescent hypothyroidism, and gonadotropin deficiency (pituitary hypogonadism). Poor or limited breast development may also result from radiation and bilateral ovariectomy.

Breast atrophy

Atrophy of the breasts results from significant weight loss and hypoestrogenemia, as noted in anorexia nervosa, chronic illness, postpartum depression, crash dieting, and other conditions. The result is loss of breast adipose tissue and often, severe acquired breast atrophy. Scleroderma can cause local breast changes while premature ovarian failure can induce secondary amenorrhea and breast atrophy. The breasts become wrinkled, flattened, and old in appearance. Treatment of breast atrophy is to correct the underlying problem.

Tuberous breasts

In this rare breast anomaly, the shape of the breasts is abnormal in which the tuberous breasts project forward without normal fullness. The areolar complex is overdeveloped, with the appearance of a herniation of breast tissue into the areola. Surgical correction is necessary to improve the breast appearance by reconstructing the nipple-areolar complex along with breast augmentation.

Virginal hypertrophy

Thelarche in some females leads to massive diffuse enlargement of breasts to such an extent that it is termed juvenile, virginal, or idiopathic breast hypertrophy; even more massive development is called macromastia or gigantomastia (9). The cause is usually linked to individual variation, familial factors, sensitivity to estrogen and/or an abnormal estrogen-progesterone ratio, and endogenous production of estrogen within breast cells. Obesity may play a role in some youth. Unilateral hypertrophy may also be seen and can be caused by a breast neoplasm (such as a giant fibroadenoma—see below). Breasts may

develop superficial changes including prominent superficial veins and possibly skin necrosis. The nipple and areola may be stretched so that they are difficult to distinguish. Complications may be worsened with a tight brassiere.

There are no medications that are acceptable to use in adolescents. Some clinicians have used danazol or medroxyprogesterone to reduce breast size; however, there is no clear research that these really help. Side effects of the medications (such as masculinization and teratogenicity) prohibit their use in youth. Surgical breast reduction is an option when the adolescent is mature enough to understand this surgery and accept potential complications. If surgery is done too early, breast enlargement may continue and negate the effects of the surgery.

Breast reduction often involves reimplantation of the nipple-areolar complex, leading to potential lactation and nerve damage; the erotic potential of breast stimulation may be reduced.

Breast masses

Table 2 lists causes of breast masses in the adolescent; 70-90% of masses that are biopsied are fibroadenomas, and most of the other masses are benign cysts. Since malignancy is rare in the adolescent, observation of a mass over a few months is usually an appropriate clinical response. Breast cancer is noted in less than 2.5% of palpable breast masses in females under 30 and less than 0.5% in those under age 20 years. Important historical points in the assessment of a breast mass are associated pain (cyclical or non-cyclical), galactorrhea, size of the lesion, and how long it has been present.

An excisional biopsy is typically obtained for a mass that is hard, does not resolve, increases in size, fails to decrease over a few menstrual cycles, resumes after aspiration, and/or has bloody nipple discharge.

Fibroadenoma

Fibroadenoma is a benign tumor arising from ducts and stroma of the terminal part of the breast system (8). It is the most common lesion noted in post-pubertal females up to 25 years of age.

Table 2. Causes of Breast Masses in Adolescents

Fibroadenoma
Juvenile (giant) fibroadenoma
Other fibroadenoma variants
Virginal Hyperplasia
Breast abscess/Mastitis
Cystosarcoma phylloides
Intraductal papilloma (Papillomatosis)
Adenocarcinoma
Breast cysts
Fibrocystic Change
Ductal adenocarcinoma
Gynecomastia
Nipple adenoma
Nipple keratoma
Fat necrosis
Lipoma
Intraductal granuloma
Hematoma
Interstitial (parenchymal) fibrosis
Mammary duct ectasia
Metastatic Disease (leukemia, lymphoma, ovarian malignancy, others)
Angiosarcoma
Dermatofibromatosis
Hemangioma
Lymphangioma
Neurofibromatosis
Papilloma sarcoidosis
Sclerosing adenosis
Tuberos mastitis
Others

Table 3. Differential Diagnosis of Intraductal Papilloma

1. Intraductal papilloma
2. Papillar Carcinoma
3. Nipple adenoma
4. Mammary duct ectasia
5. Fibroadenoma
6. Cystosarcoma phylloides
7. Infiltrating ductal adenocarcinoma (rare)

Fibroadenomas are typically well-demarcated, encapsulated, round, rubbery, and non-tender. They are usually single and found in the upper, outer quadrant, though any quadrant may be noted. As many as 20% have bilateral or multiple tumors in which case the condition is called fibroadenomatosis. A fibroadenoma may be 2-3 cm when first found but may enlarge at the end of a menstrual cycle and can also increase during pregnancy. The ultrasound

appearance is that of a smooth margin mass that is homogeneous. A fibroadenoma does not become malignant and does not increase the adolescent's risk for malignancy later in life. If a lesion appearing to be a fibroadenoma does not decrease over 4 to 6 months or if it continues to enlarge, excision is usually recommended. Removal of a large mass may require more surgery to reduce the skin envelope for a cosmetic closure. If concern is raised about potential cancer, excision is also suggested.

Giant (juvenile) fibroadenoma

A fibroadenoma that is over 5 cm is often defined as a giant or juvenile type and is important because it can grow quickly to a large size, doubling itself in three to six months. It tends to be seen in young adolescents, has a softer consistency, has more dilation of superficial veins, and can cause considerable breast distortion. Though a benign tumor, it should be excised before becoming too large.

Cystosarcoma phylloides

Cystosarcoma phylloides (Phylloides tumors) is the most common malignant tumor of the breast reported in adolescents. Though a rare event in youth, the incidence is 0.3 to 0.8% of all breast tumors in adults, with an incidence of metastasis of 3% to 12%; approximately 8% of these tumors occur in females under age 20 years. Cystosarcoma phylloides presents as a painless, multi-lobular tumor that is rapidly-growing, is non-fixed, and is often 8 to 10 cm when first found. It often presents with nipple discharge, venous dilation, and skin discoloration. Studies note that 10% to 15% are malignant and metastases develop, particularly to the lungs.

A wide excision (with 2 cm margins that are tumor-free) is considered curative for benign tumors. Management of a malignant type includes surgery, radiation, chemotherapy, and hormonal treatment. Though the prognosis is poor, it is better in adolescents than in adults.

Intraductal papilloma

intraductal papilloma (papillomatosis) typically presents as a painful, sub-areolar mass that is unilateral in three-fourths of cases. A serosanguineous or serous nipple discharge is often described on the affected side. In studies of breast masses in adolescents, an incidence of 4% to 6% and a mean age of 17 to 18 years of age at presentation are reported.

In 30% of cases, a painful mass is not appreciated, though breast palpation may compress ducts filled with tumor that leads to nipple discharge. The differential diagnosis is listed in Table 3. The evaluation may include fine needle aspiration, breast ultrasonography, and ductography. Intraductal papilloma is typically a benign tumor, though the adolescent patient should be followed carefully for the possible development of a malignant change.

Mammary duct ectasia

Mammary duct ectasia (periductal mastitis) refers to a condition that presents as a painful subareolar nodule with nipple discharge, nipple retraction, sinus tracts (or fistulae), and axillary lymphadenopathy. It is usually seen in menopausal females who often had a history of lactation problems. It is the most common cause of acquired nipple inversion. Infection with bacteroides sp is seen in adolescents, leading to inflammatory changes and periductal fibrosis with destruction of the ductal wall. Management includes local excision of the sinus tract or fistula along with antibiotics.

Cystic breast disease

Well-known, but less common in the adolescents are single or multiple cysts of benign breast disease. These cysts are typically not fixed to breast tissue and aspiration reveals sterile fluid that is clear, brownish, or blood-tinged.

Cysts can be classified in various ways and one system is listed in Table 4, including normal physiologic changes in breast size in adolescents with up to 50% size change during a menstrual cycle; these

pseudolumps are normal. In the postpartum period, lactiferous ducts may become distended and become galactoceles, presenting as a subareolar mass with a yellow nipple discharge; it usually disappears with lactation, but surgical excision may become necessary.

Management of a breast cyst often involves fine-needle aspiration with cytologic evaluation to identify if it is normal physiology or overt pathology. If the lesion disappears on aspiration, it is assumed to be a cyst and the patient can be evaluated again in 2 to 3 months. If the lesion recurs or is solid, ultrasonography is obtained for further evaluation. Sometimes an open, exisional biopsy is necessary to identify and remove the breast lesion, if aspiration is not successful or not possible.

Table 4. Classification of Breast Cysts

1. Fibrocystic disease or change (with multiple small cysts)
2. Solitary large or "blue-domed cysts (with bloody fluid)
3. Single single cysts
4. Galactoceles
5. Normal physiologic change ("pseudolumps")

Fibrocystic change

Fibrocystic change (previously called fibrocystic disease) is noted in adolescents, but is more commonly seen in adult females over the age of 35. It presents as firm, movable nodularities that are cord-like and distributed diffusely in the breasts. Some females develop "lumpy" breasts in their young adult years that may develop into overt fibrocystic change in later adult life. Typically, there is breast tenderness before menstruation and change in breast size during the menstrual cycle. Sometimes, non-cyclic pain and size change may be noted. Biopsy may be necessary to identify the actual pathology.

Management includes good brassiere support and heat. Ibuprofen may be helpful for adolescents. Oral contraceptives may offer pain relief by inhibiting progesterone secretion, as cysts tend to be more painful in the secretory or progesterational part of the menstrual cycle. Though recommended by some clinicians, there is no clear research support for the

use of vitamin E, α -tocopherol (600 IU/day) and dietary limitation of methylxanthines (caffeine and other substances). Danazol, bromocriptine, and tamoxifen have been tried in adults, but have no clear indication in adolescents.

Breast abscess

A breast abscess presents as a painful, erythematous cystic lesion that is raised and often indurated; there may also be mastitis (10). One or multiple abscess may be noted along with fever, cellulitis, and regional lymphadenopathy. Causes of a breast abscess include squeezing acne lesions, areolar hair plucking, lactation, trauma (including sexual), an epidermal cyst, and chronic illness with reduced host defenses. The most common bacterial causes include staphylococcus aureus and streptococcus, though escherichia coli, pseudomonas and other gram negative organisms have also been noted. Blood cultures should be obtained in hospitalized patients.

Management includes heat with warm compresses, analgesics, incision and drainage. Antibiotics are given seeking to cover most likely organisms and often include amoxicillin-clavulanate potassium or various cephalosporins. The antibiotic regimen should provide antistaphylococcal coverage. In more severe infections, antibiotics should be given parenterally. There is a 50% recurrence rate for infections that are delayed or only partially treated. Residual scarring may develop if there is underlying trauma and may be mistaken for a tumor. A subareolar abscess can result in scarring that leads to an inverted nipple. If lactational mastitis develops, breast feeding is usually not stopped unless overt purulent nipple discharge develops.

Mastodynia

Mastodynia (mastalgia) refers to breast pain, often a hormonally-induced process that is cyclic and associated with physiologic changes characterized by nodularities and swellings. Menstrually-induced mastodynia may be due to deficient activity of the corpus luteum producing a relative hyperestronism. Breast trauma (the adolescent patient may have

forgotten an inciting incident), hypertrophy, and infection can cause breast pain. Breast pain may also be a side effect of oral contraceptives. Other medications that can induce painful breast enlargement includes phenothiazines, reserpine, exogenous hormones, and possibly, marijuana. The differential diagnosis of mastodynia includes costochondritis, cardiac disease, and cervical spine pathology.

Management of mastodynia includes heat, good bra support, and analgesics (including the non-steroidal anti-inflammatory agents ibuprofen or naproxen sodium) (11). If exogenous estrogen is an underlying cause, stop this medication.

If the pain is severe and not related to estrogen administration, cycling the menstrual periods with oral contraceptives may be helpful. Some clinicians prescribe vitamin E (alpha tocopherol), though its actual benefit in this situation is not proven. Other unproven measures used in adult females with mastodynia are evening primrose oil and the avoidance of methylxanthines (found in cola, tea, or coffee), chocolate, nicotine, stress, and dairy products.

Additional pharmacotherapeutics include danazol, bromocriptine, and tamoxifen. Danazol is an androgen steroid and used by some clinicians to manage severe breast pain in adult females; it is not recommended in adolescents because it is not proven to help. Danazol has significant side effects, such as potential masculinization and teratogenicity.

Also tried in adult females are bromocriptine (a prolactin antagonist) and tamoxifen (competes for estrogen receptors), there is no evidence of their benefit in adolescents. If breast discomfort or pain is part of swelling and weight gain associated with the menstrual cycle, diuretics may help with the breast swelling and pain.

Mondor's disease is superficial thrombophlebitis of the thoracoepigastric vein seen with pregnancy and various types of trauma (including biopsy or breast surgery). It presents with painful cords of phlebitis palpated over the involved breast, typically in the upper, lateral breast area. It typically fully resolves in 10 to 21 days and management includes local heat along with oral analgesics.

Nipple discharge

Causes of nipple discharge are listed in Table 5 (12). A yellow discharge is seen with normal physiologic effects or a galactocele while a clear, serous, or greenish discharge suggests a physiologic cyst. If the discharge is milky, consider such causes as lactation, breast cancer, microadenoma, elevated TSH, acromegaly, or phenothiazine effects. A bloody nipple discharge may be due to cystosarcoma phylloides, papillary carcinoma, intraductal papilloma, or cystic ductal hyperplasia. A brownish nipple discharge is noted with Montgomery gland secretion or intraductal papilloma, while a purulent discharge is associated with infection.

Table 5. Causes of Nipple Discharge

1. Galactorrhea
2. Areolar (Montgomery) gland secretion
3. Pregnancy or abortion
4. Breast cyst (including fibrocystic change)
5. Cystic ductal hyperplasia
6. Intraductal papillomatosis (ectasia)
7. Chronic subareolar abscess
8. Carcinoma
9. Various drug effects (as marijuana, amphetamine or codeine)
10. Galactocele

When evaluating an adolescent with a nipple discharge, the clinician should take a careful history that includes the amount and color of the nipple discharge, associated breast abnormalities, and any history for trauma, breast manipulation, or menstrual disorders. Examine the breasts (including the nipples) carefully. A ductogram (galactograph) may be helpful. Surgery may be necessary to remove the involved areolar duct to be sure a rare malignancy is not present, such as cytosarcoma phylloides or papillary carcinoma.

Galactorrhea

Galactorrhea is breast milk secretion unrelated to pregnancy or nursing that occurs more than one year after nursing. The fluid may be clear, white or milky, green, or yellow; it varies in amount and a Sudan stain

reveals fat globules. Table 6 lists causes of (benign), self-manipulation, pharmacologic, galactorrhea, though the most frequent are idiopathic prolactinoma, and hypothyroidism.

Table 6. Causes of Galactorrhea*

Recent pregnancy terminated by spontaneous or induced abortion
Neurogenic
Chest wall disorders
Bronchiectasis and chronic bronchitis
Herpes zoster
Chronic crutch use
Thoracotomy or thoracoplasty
Burns to chest wall
Breast (nipple) manipulation or stimulation
Chronic inflammatory disease or abscess of breast
Psychogenic, including pseudocyesis and pseudonursing
Miscellaneous
Hysterectomy or uterine tumors
Laparotomy
Spinal cord disorders and surgery
Idiopathic normoprolactinemic, with or without amenorrhea
Central nervous system abnormalities
Diffuse brain disease
Coma
Pseudotumor cerebri
Encephalitis and sequelae
Uremia
Tumors, infiltrations, structural abnormalities
Neurocutaneous syndromes
Craniopharyngioma
Pineal tumors
Other intracranial tumors, cysts and masses
Histiocytosis X
Sarcoidosis
Pituitary
Stalk section
Empty sella syndrome
Pituitary infarction and Sheehan syndrome
Hyperprolactinemia with or without prolactinoma
Other functional pituitary tumors
Miscellaneous
Hypo- and hyperthyroidism
Chronic Renal Disease
Adrenal tumors and hypernephromas
Cirrhosis
Nelson syndrome
Acute Intermittent Porphyria
Testicular and ovarian tumors
Contraceptive pills; including other estrogen or progesterone
Polycystic ovary syndrome (PCOS)
Starvation or refeeding (including anorexia nervosa)
Cushing's Disease
Hypogonadism
Acute intermittent porphyria
Starvation or refeeding, including anorexia nervosa

Drugs

Phenothiazines, thioxanthines, other major tranquilizers
Tricyclic antidepressants
Opiates, including codeine and heroin
Monoamine oxidase inhibitors
Amphetamines
Chlordiazepoxide
Meprobamate
Metoclopramide
Bromocriptine withdrawal
Cimetidine and ranitidine
Tamoxifen
Verapamil
Isoniazid
Estrogens
Opiates (including codeine and heroin)
Phenothiazines, thioxanthines, other psychotropic drugs
Tricyclic antidepressants
Other chemotherapy drugs (cisplatin, cytosine arabinoside, adriamycin; see text)
Others

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A variety of medications or drugs can induce hyperprolactinemia, including those that block dopamine receptors (tricyclic antidepressants, butyrophenones, and phenothiazines), deplete dopamine (cocaine), stimulate lactotrophs (narcotics, verapamil, and high dose estrogens), and those that bind to dopamine receptors in the gastrointestinal tract (metoclopramide). Galactorrhea may be induced by oral contraceptives, reserpine, spironolactone, methyltestosterone, and others. Marijuana has been implicated, but is not proven as a cause.

The adolescent who presents with galactorrhea needs a careful evaluation for the many causes that are possible, as noted in Table 6.

The history should look for drug abuse, menstrual abnormalities, breast stimulation, headaches, visual disturbances, thyroid disorder and other factors. Depending on the history and physical exam, checking prolactin and thyroid levels is prudent. A CT or MRI of the sella turcica may be important tests to obtain. Additional testing may be necessary depending on the precise findings.

The management depends on the underlying etiology. Underlying thyroid dysfunction or menstrual abnormality should be treated. Management of a microadenoma is often with a dopamine agonist, as bromocriptine, and if necessary, surgery.

Offending drugs or medications should be stopped, as should be self-manipulation or stimulation if causative. Careful follow-up is important and consultation with experts is suggested for severe, confusing, or cases resistant to treatment.

Gynecomastia

Gynecomastia is a proliferation of the glandular tissue of the male breast and can be neonatal, prepubertal or pubertal. Transient breast development is noted in 65-70% of adolescent males and may be linked to transient imbalances in endogenous production of estrogen (relative excess) and testosterone (relative deficiency) with end organ sensitivity.

The most common type consists of a small, tender, firm, discoid subareolar mass measuring 2 to 3 cm in diameter, which is referred to as type 1 gynecomastia, or benign adolescent hypertrophy. Type 2 gynecomastia is a more generalized glandular enlargement approximating Tanner stage 3 or even stage 4 breast development seen in adolescent girls.

Besides idiopathic gynecomastia, pseudogynecomastia may occur in obese adolescent males with the deposition of fat in the breast region or in youth with well-developed pectoralis muscles. If gynecomastia occurs at a time other than between

Tanner 2 and 4 pubertal stages, other causes should be considered.

Table 7. Causes of Gynecomastia*

1. Familial gynecomastia
2. Klinefelter's syndrome
3. Androgen insensitivity syndrome
4. Hodgkin's disease
5. Pituitary tumor
6. Adrenal tumor
7. Thyroid dysfunction (Hypo/hyperthyroidism)
8. Miscellaneous tumors (teratoma, seminoma, Leydig-cell tumor, hepatoma, bronchogenic carcinoma, others)
9. Cirrhosis of the liver
10. Chronic glomerulonephritis
11. Male pseudohermaphroditism
12. Leukemia
13. Hemophilia
14. Traumatic paraplegia
15. Starvation (on refeeding)
16. Miscellaneous drugs
Amphetamines
Anabolic steroids
Birth control pills
Busulfan (and other chemotherapeutic agents)
Cimetidine
Corticosteroids
Digitalis
Estrogens
Human chorionic gonadotropin
Insulin
Isoniazid (and other anti-tuberculosis drugs)
Marijuana
Methadone
Phenothiazines
Reserpine
Spirolactone
Testosterone
Tricyclic antidepressants
Others

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Such causes are often classified as hypothalamic, pituitary, endocrine (hormonal) or drug-induced. Hypogonadism, as seen in Klinefelter's syndrome must be ruled out. Klinefelter's syndrome may present with gynecomastia and small testes. Other pituitary-gonadal endocrinopathies may also be implicated, including pituitary, adrenal, or testicular

tumors. A wide variety of drugs have also been implicated including estrogens (which may be taken as "street" drugs by some gay youths) and others listed in Table 7.

A careful evaluation is necessary for youth with gynecomastia. The history must include drugs/medications, family history, duration of the gynecomastia, weight changes and systemic disease symptomatology. The physical examination must include Tanner staging and size of each breast, testicular exam, and abdominal and neurological exams. Height, weight, and vital signs are also important.

Treatment of normal physiologic gynecomastia consists, first, of reassuring the boy that his hormones have not gone awry and that some mysterious internal confusion has not confused his sex. Mild forms, or stage 1 gynecomastia, require nothing more. Boys who are singularly upset or bordering on homosexual panic (a not uncommon normal developmental stage in the young adolescent that is likely to be exacerbated by gynecomastia) may need additional counseling, emotional support, and possibly a medical excuse (based on some other less compromising cause) from physical education classes to avoid the overwhelming anxiety that may be encountered in the locker room.

Any gynecomastia-inducing drug which is being taken should be identified and stopped. Type 2 gynecomastia deserves surgical correction as soon as it is apparent that resolution will not occur (that is, after observation for 6 to 12 months). Hormonal therapy (testosterone, tamoxifen, clomiphene, or danazol) is not normally recommended for adolescents. Testosterone has been used for the gynecomastia seen in Klinefelter's syndrome and antiestrogenic medications (tamoxifen and clomiphene) have been used in some adults with gynecomastia.

Conclusion

This chapter has reviewed important issues and disorders in the adolescent breast, an organ system with complex ties to sexuality and potential pathology. The adolescent female may present with concerns of having too large or too small breasts,

breast pain, breast mass, or other issues as noted in this chapter. Concerns that are raised should be addressed with a comprehensive yet sensitive history and physical examination. Pharmacologic management is also considered where appropriate.

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