Management of Gynecomastia and Male Benign Diseases

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KEYWORDS

- Gynecomastia • Benign male breast disease • Pseudogynecomastia • Lipomastia

KEY POINTS

- Gynecomastia is a relatively common benign male breast disease that is often self-limiting.
- Workup begins with a thorough history and physical, as well as a comprehensive metabolic workup to rule out cancer or other pathologic conditions.
- Management of gynecomastia begins with removal of possible offending agents, followed by androgen deprivation therapy.
- If medical management fails, surgical management involving one of several breast reduction techniques can be used.
- Surgical management of gynecomastia is most effective in patients with refractory disease.

GYNECOMASTIA
Definition

Gynecomastia is the benign enlargement of male breast due to increased proliferation of glandular tissue (ie, ductal hyperplasia).[1,2] Gynecomastia should be differentiated from pseudogynecomastia (lipomastia), which is an enlargement of the male breast due to adipose tissue hypertrophy, without glandular involvement.[1,2] Gynecomastia is thought to develop in response to a hormonal shift in the balance between estrogens and androgens that favors a relative increase in estrogens.[1–3] The causes of the

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hormonal flux seen in gynecomastia are highly variable and may be physiologic or pathologic in nature.

Epidemiology

Physiologic gynecomastia is generally observed in 3 distinct age groups within the larger male population: neonates, adolescents, and older adults. Neonatal gynecomastia is thought to be the result of exposure to high concentrations of maternal estrogens and is observed in 60% to 90% of the newborn male population.[2,4] Neonatal gynecomastia is typically self-limiting, resolving within 2 to 3 weeks after delivery.[4]

Pubertal gynecomastia is estimated to have a prevalence anywhere between 22% and 69% in adolescent boys with most cases occurring between ages 13 and 14 after the onset of testicular development.[4–7] Lack of consistency regarding the size of palpable glandular tissue required for diagnosis may explain the wide range in reported prevalence among adolescents.[2,8] Approximately 95% to 97% of pubertal gynecomastia cases will resolve without treatment within 18 months of initial discovery.[1,4] Persistent pubertal gynecomastia accounts for approximately 25% of all cases of gynecomastia.[9]

Gynecomastia in older adults is highly prevalent and may affect as many as 36% to 57% of men in this age group.[4,10–12] Unlike children and younger adults, gynecomastia in older adults is more associated with pathologic causes. Pathologic gynecomastia has been linked to numerous pathologic conditions including cirrhosis, malnutrition, drugs, hypogonadism, testicular tumors, hyperthyroidism, and chronic kidney disease.[1,2] Approximately 58% of all cases of adult gynecomastia are idiopathic.[2,9]

Pathophysiology

The basic underlying mechanism responsible for the proliferation of glandular tissue in the breast is commonly thought to be an increase in the relative estrogen to androgen ratio, which may occur by either increased estrogen or decreased androgen availability to breast tissue.[1,2] Androgens have an inhibitory effect on glandular development, whereas estrogens stimulate its growth. Factors that contribute to the overall estrogen/androgen environment in breast tissue include the initial production of testosterone and estrogen by the testes as well as peripheral conversion of androgens to estrogens by the enzyme *aromatase* primarily in adipose tissue.[1,2] Additionally, the serum concentration of sex hormone-binding globulin (SHBG) and the intactness of the androgen receptor pathways that lead to gene activation and transcription can alter the relative availability of estrogens and androgens under certain circumstances.[1,2]

In pubertal gynecomastia, the predominant cause of ductal hyperplasia may be related to a temporary increase in testicular production of estrogen compared with testosterone that occurs during puberty. Additionally, *aromatase* activity in peripheral tissues is thought to be higher during puberty and may increase the amount of estrogen available to breast tissue.[1] Interestingly, serum concentrations of testosterone, androstenolone, and estradiol in patients that develop pubertal gynecomastia have not been found to differ significantly when compared with patients without gynecomastia.[2] However, free testosterone (ie, testosterone not bound to SHBG or albumin) was found to be lower in these patients.[2] The cumulative effect of these processes can be described by the free hormone hypothesis. In the blood, testosterone exists in 3 major forms: free testosterone (2%), testosterone weakly bound to albumin (54%), and testosterone tightly bound to SHBG (44%).[13,14] According to the free hormone hypothesis, only free testosterone and testosterone bound to albumin are accessible to target tissues and together comprise the total bioavailable testosterone in the blood.

Additionally, the affinity of SHBG for androgen substrate is greater than that for estrogens.[1] It is likely that an increase in serum SHBG would disproportionally reduce bioavailable testosterone relative to estrogen and might explain the decrease in free testosterone levels seen in patients suffering from pubertal gynecomastia.

Most cases of pubertal gynecomastia will resolve without intervention within 18 months.[1,4] This is likely due to an equilibration of free testosterone during puberty. It is important to note that these temporary hormone fluctuations can have a lasting effect. When pubertal gynecomastia persists beyond 1 year, fibrosis of the glandular tissue can occur, which decreases the likelihood that the condition will spontaneously regress independent of treatment.[1]

Gynecomastia as a result of pharmacologic intervention may comprise upward of 10% to 25% of all reported cases.[15] Drugs strongly associated with gynecomastia including spironolactone, cimetidine, ketoconazole, human growth hormone, estrogens, human chorionic gonadotropin (hCG), antiandrogens, gonadotropin releasing hormone agonists, and 5-α reductase inhibitors.[15] Other drugs that may also be associated with gynecomastia are risperidone, verapamil, nifedipine, omeprazole, alkylating agents, efavirenz, anabolic steroids, alcohol, marijuana, and opioids.[9,15] All of these drugs are thought to either directly or indirectly affect the relative estrogen to androgen availability to breast tissue. Additionally, case reports of topical products containing lavender and tea tree oils may suggest an association of such products with the development of gynecomastia.[16]

Pathologic conditions that may cause gynecomastia include cirrhosis, malnutrition, hypogonadism (primary and secondary), Klinefelter syndrome, testicular tumors (Leydig and Sertoli cell varieties), hCG-secreting tumors, hyperthyroidism, and chronic kidney disease.[1,2] More commonly, increased adipose tissue as seen in obesity and aging may upregulate the enzyme *aromatase* and contribute to the development of gynecomastia in these populations.[1,2] It is important to keep in mind that most gynecomastia cases are idiopathic and may result from the interaction of multiple mechanisms.[2,9]

Workup and Diagnosis

The workup and diagnosis of gynecomastia can be challenging, with 25% to 58% of cases having no clear cause.[1,2,9] As with other breast masses, workup begins with a thorough history elucidating when the growth was first detected, for how long, how fast it has grown, and associated symptoms such as pain, skin changes, nipple discharge, and weight gain or loss. It is also important to conduct a complete review of systems to detect causes such as endocrine, renal, or liver pathologic condition.[17] The patient's medications and nonprescription drug use (alcohol, tobacco, marijuana, testosterone, anabolic steroids, dietary supplements, and so forth) should also be reviewed.

Physical examination is performed with the patient both in a seated, upright position and in the supine position.[18] Breast tissue should be examined in a consistent, methodical fashion using the thumb and forefinger, ensuring that all areas of the breast are palpated. It is important to note the laterality, texture of tissue, location, tenderness, and if there are any palpable lymph nodes. Gynecomastia should be bilateral, glandular (rubbery), located underneath the nipple areolar complex (NAC), nontender, and without associated discharge or palpable lymph nodes.[17,18] If the patient presents in the early, growth phase of gynecomastia they may report tenderness. Additionally, some patients may also present with unilateral or asymmetric gynecomastia.[11] In comparison, male breast cancer will commonly be unilateral and can be firm, tender, located away from the NAC, and associated with discharge or nipple retraction.[1] The

remainder of the physical examination should be tailored to the patient's history, potentially consisting of a thyroid examination, assessing for liver and kidney disease, secondary sexual development, and any testicular mass or enlargement because these positive findings can help establish the cause.

Laboratory evaluation should be guided by the history and physical examination findings. Thyroid, renal, and hepatic function tests should be obtained, as should serum levels of testosterone, prolactin, follicle-stimulating hormone, and luteinizing hormone.[17,19,20] Although not a common cause of gynecomastia, hyperprolactinemia can be evaluated with serum prolactin.[21] If there is concern for malignancy-associated gynecomastia, serum levels of estrogen, hCG, dehydroepiandrosterone, and urinary 17-ketosteroids should also be obtained. Karyotype testing can also be performed if there is concern for Klinefelter syndrome.[19]

Contrary to workup of female breast masses, routine mammography and breast ultrasonography are not recommended unless there is suspicion for breast cancer or unilateral breast enlargement is present, in which case it is appropriate to perform mammography and ultrasound, and if positive, core needle biopsy (CNB).[17,22–24] If there is concern for distant tumor or malignancy as the cause, then testicular ultrasound, abdominal and/or chest computed tomography (CT) should be obtained.

Medical Treatment

Medical management of gynecomastia should be centered around physical examination, imaging/biopsy, and laboratory findings. Underlying conditions such as malignancy or endocrine disorders should be addressed first because resolution of the condition can reduce the amount of glandular tissue. Offending medications and drugs should be discontinued when possible. For idiopathic and pubertal cases, selective estrogen receptor modulator (SERM) therapy with raloxifene and tamoxifen can be effective.[18,25] SERM therapy can also be trialed in patients who have refractory gynecomastia in which the underlying cause has been treated. Aromatase inhibitor therapy can also be useful in the treatment of true gynecomastia. Anastrozole has been found to be effective in pubertal gynecomastia[18]; however, in adults it has been found to have little to no effect.[26] Testosterone has been reported to be successful in cases of hypogonadism[27]; however, it may increase gynecomastia rather than decrease the amount of tissue, particularly if the patient is eugonadal.

In situations where the offending medication cannot be discontinued, such as with androgen deprivation therapy for prostate cancer, treatment with tamoxifen or raloxifene together with radiation has been found to significantly reduce gynecomastia.[28,29]

Most cases of gynecomastia are benign and self-limiting; however, if gynecomastia has been present for greater than 12 months, it is unlikely that it will resolve with discontinuation of offending medications or with medical treatment because the glandular tissue has likely developed irreversible fibrosis and hyalinization.[17] In these scenarios, surgical excision by an experienced plastic surgeon is the most effective treatment. It is important to note that gynecomastia itself is a benign condition and does not need treatment unless there are aesthetic and psychological reasons for pursuing treatment.

Surgical Management

The most effective treatment of gynecomastia is surgery. However, as stated above, before consideration of any surgery, it is necessary that every patient has a complete medical and physical evaluation, hormone levels, review of medications and supplements, ultrasound, and ruling out any other systemic diseases.[21,30]

Surgical treatment is typically reserved for patients with long-lasting gynecomastia without spontaneous regression or refractory to medical treatment, usually after 6 months to 1 year of observation since the initial presentation in adults, and up to 2 years in pubertal patients.[30–32] Surgery is routinely performed on an outpatient basis. Several surgical techniques and combinations have been described that depend on the grade of gynecomastia.[33] The Simon classification is the most used, followed by the Rohrich classification.[32,34] The Simon classification places emphasis on the degree of enlargement and presence of excess skin, whereas the Rohrich classification places emphasis on the degree of enlargement and ptosis while also differentiating on the type of tissue present. (**Tables 1** and **2**)

Surgical procedures

The major principle of gynecomastia surgery is restoring the chest shape with minimal scar.[35] Although there are many surgical techniques described in the literature, the most commonly used technique is the skin-sparing mastectomy.[36]

Based on the Simon classification of gynecomastia, patients with grade I usually undergo liposuction, because this is very effective for the small amount of tissue present, and decreased risk of scar formation.[21] Although water-assisted and laser-assisted liposuction can be used, ultrasound-assisted liposuction (UAL) is the most recommended for its improved ability to reduce the density of fibroconnective tissue, especially when working close to the skin.[32,37,38] When performing liposuction, the ports are usually located at the lateral inframammary line with a superior pointing angle at the anterior axillary line or periareolar region.[21] Additional options for this grade of gynecomastia include the combination of liposuction and nipple sparing mastectomy (NSM) with a periareolar or inframammary incision, or the microdebrider excision and liposuction.[21,30,36,37] It is important to note that the residual subareolar glandular tissue usually causes patient dissatisfaction, which needs to be excised primarily or using a staged procedure via the liposuction incision with pull-through, or periareolar or transareolar incisions.[21,39,40] **Fig. 1** shows before and after photographs of liposuction with periareolar excision.

Simon grade IIa is usually treated depending on the size of NAC. If there is no enlargement, NSM with liposuction has demonstrated excellent outcomes. For these patients, the Pintaguy technique using a transareolar approach or Webster technique with an inferior periareolar approach are well accepted.[35] Other techniques available are the vacuum-assisted mastectomy and endoscopic mastectomy.

Another option for patients with Simon grade IIa with enlarged NAC and grade IIb is mastectomy with skin resection (MSR) via periareolar incision, or Davidson technique with liposuction, to remove the excess skin.[35] Other techniques described include the inferior deepithelialized pedicle with an inframammary incision or boomerang pattern reduction. The periareolar approach is the most recommended for patients who require skin resection because it achieves the best aesthetic acceptable outcomes.

Table 1 Simon classification[34]	
Grade	**Description**
I	Small enlargement, no excess skin
IIa	Moderate enlargement, no excess skin
IIb	Moderate enlargement, excess skin present
III	Marked enlargement with excess skin present

Table 2
Rohrich classification[32]

Grade	Description
Grade I	Minimal hypertrophy (<250g of breast tissue) without ptosis
IA	Minimal hypertrophy—primarily glandular
IB	Minimal hypertrophy—primarily fibrous
Grade II	Moderate hypertrophy (250–500 g of breast tissue) without ptosis
IIA	Moderate hypertrophy—primarily glandular
IIB	Moderate hypertrophy—primarily fibrous
Grade III	Severe hypertrophy (>500g of breast tissue) with grade I ptosis (glandular or fibrous)
Grade IV	Severe hypertrophy with grade II or III ptosis (glandular or fibrous)

In addition, the UAL with "pull-through" excision or "orange peel" technique has shown promising results for low grades of gynecomastia, where the subareolar tissue is excised through a minimal incision with excellent results and minimal complications.[41–43] Sometimes, this method requires 2-staged procedures, with the second one in 6 to 9 months after UAL, which allows the revascularization of the NAC and due to the skin retraction in grades IIb and III, might obviate further surgeries.[41]

For patients with grade III or severe grade of gynecomastia, there are several techniques published; however, it depends on the distance from the nipple to the inframammary fold. If the distance is less than 10 cm, previously described techniques used for Simon grade IIa and IIb can be used.[36,37] However, if the distance is more than 10 cm, due to concern for pedicle perfusion, they usually undergo simple mastectomy with a free NAC graft.[21,37] Before and after pictures of simple mastectomy with free NAC graft can be seen in **Fig. 2**. For patients who desire to preservation of areolar pigmentation and nipple sensation, elliptical excision patterns may be an alternative.[21] Moreover, a new technique has been described with the preservation of NAC positioned at 16 cm from the clavicle, which consists of liposuction, MSR through an inframammary fold incision with a wide de-epithelialized postero-inferior dermal pedicle.[44,45]
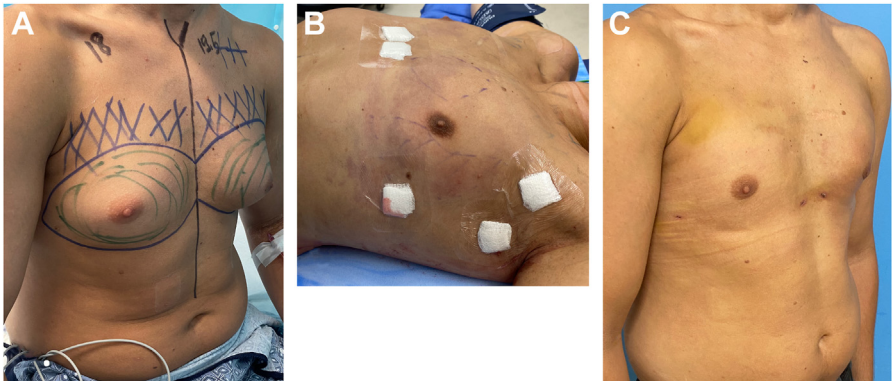
Fig. 1. Liposuction with periareolar excision. A. Preoperative marking B. Immediate postoperative appearance C. Postoperative appearance at follow-up visit.

Fig. 2. Simple mastectomy with free nipple–areolar complex graft. (*A*) Preoperative marking (*B*) Postoperative appearance at follow-up visit.

In the setting of pseudogynecomastia, liposuction alone is usually preferred.[37] For all types of gynecomastia, the only contraindication for liposuction and close techniques is in patients with Klinefelter who have 50-fold to 60-fold of greater risk for breast cancer, for who mastectomy is recommended.[41] Despite an incidence of breast cancer of 1% in men, all the tissue removed should undergo histopathologic analysis.[37,44]

Outcomes and complications
The overall complication rate is 0% to 53%. This large range of complication rate is explained by the fact that different surgical approaches have different complications profiles. Hematoma is the most common presentation, with an incidence of 4.6% to 5.8%, followed by seroma in 2.4% of patients.[21,36,46,47] Late complications are usually cosmetic and due to inadequate resection of glandular tissue or skin,[21] which can typically be corrected with second-stage procedures. It is crucial to identify the difference between incomplete resection versus recurrence, which should raise the suspicion of an underlying disease, typically noted by nonfibrotic glands on pathologic condition.[21,37,48] Complications involving the NAC, such as indentation and necrosis, occur at low rates and can be avoided by leaving 2 to 10 mm of retroareolar tissue.[36] Systemic complications tend to be minimal in gynecomastia surgery.[33]

Patient-focused outcomes are typically related to aesthetics. Multiple studies have demonstrated that even in the setting of high complications, patient satisfaction can be up to 85%.[35,48]

OTHER BENIGN BREAST DISEASE
Breast Cysts

Breast cysts are fluid-filled sacs within the breast and occur very rarely in men.[49] Few cases have been reported in the literature; however, its consideration in the differential

diagnosis between benign and malignant lesions in the male breast is crucial.[50] Due to anatomy, it is the most common type of breast mass in females with a lifetime prevalence of 70% to 90%; whereas in men, its incidence is very low.[50,51] Among male breast masses, cysts are usually less frequent than gynecomastia, lipomas, and epidermal inclusion cysts.[52] Their main cause is dilatation of the ducts, usually composed of ductal epithelium similar to apocrine sweat glands. Moreover, they are usually found as single lesions, associated with gynecomastia and cause alarm due to its singularity and solid consistency.[53]

Histologically, male and female breasts are different. In men, the breast usually consists of subcutaneous fat with few ducts and stroma, whereas in women, it mostly composed of ducts and glandular tissue surrounded of stroma.[2,52] Simple breast cysts occur due to the obstruction of a terminal duct from lobular hyperplasia of the epithelium or ductal extrusion into the stroma with consequent inflammation, forming an epithelium-lined fluid-filled round structure.[50,54] Gynecomastia can be associated with lobular units in male breasts, which increases the probability of cyst formation; however, cysts without gynecomastia suggest ductal origin. Maimone and colleagues found that among 5425 men who had breast imaging, 19 (0.4%) had parenchymal breast cysts, 58% of which were associated with gynecomastia.[55] Additionally, there is a proposed hypothesis of low androgen to estrogen ratio or estrogen stimulation.[52]

Breast cysts in men can be classified similarly to breast cysts in women. According to the location, they can be single, diffuse, in any quadrant, and sometimes bilateral. With regards to structure, they can be simple, complicated, or complex.[50,52] They are usually asymptomatic but can be reported as palpable, mobile, tender or nontender, and sometimes associated with nipple discharge. The frequency of clinical symptoms has been reported to be 2.4% in 2008, and imaging is usually the next step in the evaluation.[49,52,56]

The workup of breast cysts is identical to that of gynecomastia and other breast masses, consisting of clinical evaluation by a physician, imaging, and possible biopsy. Under ultrasonography, features of a simple cyst are well-defined margins, internal anechoic content, lateral acoustic shadows with posterior wall acoustic enhancement.[53] Under color-Doppler, it may have perilesional signal caused by compression of surrounding vascular structures.[53] Under mammography, they are usually seen as solitary or multiple, unilateral or bilateral, small, round, oval or lobulated, well-defined, equal or low density mass, located within the breast parenchyma.[55]

Management is similar to that of breast cysts in women. If classic benign imaging characteristics are found, there is no need for a biopsy or follow-up, and the prognosis is excellent.[52,55] However, a fine needle aspiration cytology or CNB under ultrasound guidance is warranted if any suspicious features are found as solid components seen as hypoechoic formations or vegetations, septations, noncircumscribed margins, irregular shape, thick walls, and under color Doppler it may have intralesional signals.[53,57] Despite a likelihood of malignancy of less than 2% in women, there are some case reports in male population to take in consideration when features described above are identified (56, 59–62).[55,58–61]

Lipomas

Lipomas are benign tumors of mature white fat cells contained within a fibrous capsule and are the most common neoplasm of the male breast.[62–64] Lipomas arise within the subcutaneous tissue but may occasionally extend deeper into neighboring muscle and fascia. The typical characteristic of a lipoma is a slow-growing mass with well-circumscribed margins with an overall diameter of less than 5 cm. Lipomas are rarely painful and usually represent a primarily cosmetic concern to the patient. Peak

incidence of newly diagnosed lipomas is between 40 and 60 years old, although discovery of lipomas in other age groups is not uncommon. Lipomas exist as a single lesion in up to 95% of all cases but may be multiple in rare instances. Discovery of multiple lipomas in a single patient may increase the likelihood of an underlying genetic condition such as familial multiple lipomatosis or increase clinical suspicion for malignancy. The overall risk of malignant transformation of lipoma to liposarcoma is generally accepted to be approximately 1%.[63]

Most diagnoses of lipomas are made clinically by inspection and palpation alone. Findings consistent with lipomas are a well-circumscribed, subcutaneous mass that is mobile under the skin. The mass should be soft, painless, and nontender. Most commonly, lipomas exist as a singular lesion that is less than 5 cm in diameter. Patient history will often reveal that the mass has been present for a substantial amount of time and has not dramatically increased in size. Findings that increase suspicion for liposarcoma include a mass greater than 5 cm in diameter, immobilization, muscular involvement, irregular margins, multiple masses, pain, rapid growth, or a firm, nodular texture.

If physical examination findings are consistent with lipoma (ie, <5 cm), no imaging studies are indicated. However, if physical examination findings are equivocal or suspicious for malignancy (ie, >5 cm), further imaging studies should be performed.[63] Ultrasound, CT, and MRI can be used in the diagnosis, with MRI reported as the most sensitive method.[62–64] In general, histology plays little role in diagnosis unless there is significant concern for malignancy. Referral for genetic testing is only indicated when suspicion is high for an underlying genetic condition such as familial multiple lipomatosis.[63] The predominant indications for treatment include cosmetics, pain, functional impairment, or clinical findings suspicious for liposarcoma. Traditionally, management of lipomas has been limited to simple excision or liposuction. However, recent literature has highlighted the potential role for deoxycholate injections in reducing the overall volume of lipomas by approximately 75%, providing a potential future alternative to surgery. Further research into the safety and efficacy of deoxycholate injections in the treatment of lipomas is ongoing.[63–65]

The most common method for treating lipomas is surgical excision. Typically, the procedure can be performed in the office or operating room under local anesthesia. Minimal preoperative planning is required for excision of a simple lipoma. An elliptical incision should be made directly above the mass and extended to approximately two-thirds the diameter. A combination of blunt and sharp dissection should be used to fully excise the mass along with electrocautery to achieve hemostasis. Approximation of the wound is achieved via absorbable subcutaneous sutures followed by wound closure with nonabsorbable sutures. The recurrence rate for surgically excised lipomas is approximately 1% to 2%.[63] Alternative methods for the removal of lipomas include liposuction or a combination of liposuction and surgical resection. The main benefit of liposuction is a smaller, more cosmetic incision. However, controversy exists over the accuracy of histologic determinations on samples obtained from liposuction, thereby limiting the ability to rule out the possibility of liposarcoma. Additionally, the rate of recurrence for lipomas treated with liposuction is thought to be higher than for surgical excision.[63,66,67]

Pseudoangiomatous Stromal Hyperplasia

Pseudoangiomatous stromal hyperplasia (PASH) is another benign condition that can be seen in men. PASH is a proliferation of mesenchymal breast tissue, specifically stromal myofibroblasts, due to hormonal stimulation.[68] In women, PASH is a rare condition, with reports in the literature consisting of small sample size case reports.[69]

Given the link to hormonal stimulation, it is a very rare condition to see in men and can often be linked to gynecomastia.[68,70–72] Although benign, it is important to distinguish this condition from low-grade angiosarcoma.[68] Workup of this condition begins with a thorough history and physical examination, looking for distinguishing findings such as tenderness, texture, size, mobile versus fixed, and location. Radiographic workup begins with mammography, in which PASH seems as an oval mass without microcalcifications.[70,71] Ultrasound can then be used to further assess the mass, with the distinguishing finding of a hypoechoic mass.[56] Definitive diagnosis is made with tissue biopsy, with the gold standard being CNB.[70] On biopsy, the characteristic findings are slit-like spaces lined by myofibroblasts, which resemble vascular spaces (leading to the pseudoangiomatous name), as well as a collagen-based stroma.[68,70] Immunohistochemistry can be used to differentiate from low-grade angiosarcoma because the sample will stain in the profile of myofibroblasts.[70]

Management of this condition frequently consists of surgical excision.[68] However, given the extremely low potential for malignant transformation, it is reasonable to consider observation after discussion at tumor board with serial mammography if core biopsy is confirmatory for PASH and there is a negative family history of breast cancer.[69,71] It is also reasonable to pursue surgical excision for cosmetic reasons should the appearance of a breast mass be bothersome given the low amount of baseline breast tissue in men. Regardless of the indication, surgical excision should proceed as a standard breast surgical biopsy, involving a needle-guided excision.

Breast Infections

Infections of the breast are yet another condition that can affect men. Types of infections can include cellulitis, breast abscess, and skin abscess overlying the breast. Cellulitis will present as pain, erythema, tenderness, and warmth. Risk factors for cellulitis include prior infection, recent surgery, trauma, or lesions such as eczema.[73–75] The most common pathogens are beta-hemolytic streptococci.[74,75] Diagnosis consists of thorough history and physical examination, ruling out any suspicious masses or fluid collections.[76] If there is suspicion for abscess or mass, imaging can be obtained using ultrasound and mammography.[77,78] If cellulitis is confirmed, treatment should consist of antibiotics to cover common skin flora–specific regimens are covered in this section on antibiotics. Anti-inflammatory medications such as ibuprofen can be used to reduce pain and discomfort.

Skin abscesses can result from epidermoid cysts and hidradenitis suppurativa. The most common pathogens are *Staphylococcus aureus* and beta-hemolytic streptococci.[79] As previously described, workup should consist of a thorough history and physical examination, with imaging obtained as needed. Incision and drainage should be performed, as described in this section on incision and drainage. A culture should be obtained, and the patient should be started on antibiotics, as described below. The patient should receive close follow-up to ensure resolution.

Breast abscesses can occur as a primary process, or commonly as a complication of mastitis.[80] Primary breast abscesses are associated with many risk factors such as diabetes mellitus, obesity, and tobacco smoking.[81] Fundamentally, there should be some explanation for why an abscess has occurred, which also includes breast cancer in the differential and a thorough history and physical examination with appropriate imaging should rule out breast cancer as a possible cause especially in patients with personal or family risk factors for breast cancer. A breast abscess is most commonly due to *S. aureus* infection.[81] Patients can frequently present with fever and malaise, and a painful, fluctuant mass. If the overlying skin seems normal, needle aspiration under ultrasound guidance can be used to drain the cavity and obtain a culture to guide

antibiotic therapy.[82] If needle aspiration is performed, close follow-up is needed to monitor for resolution of the abscess, which is defined as an abscess cavity without pus, or with serous fluid.[80] Repeat aspirations may be needed for resolution. If there is evidence of skin ischemia or necrosis, or if the abscess does not improve with needle aspiration, incision and drainage can be performed.[83] This can be performed as described below. Following drainage and culture, the patient should be started on antibiotics and seen in follow-up to ensure resolution.

An incision and drainage of the breast can be performed as follows. The skin should be prepped with antiseptic solution, and the area should be infiltrated with local anesthetic. A linear incision should be made, taking care to follow Langer's lines to improve final cosmetic appearance. A culture should be taken, and then the fluid should be drained out. If there is clinical suspicion, a small breast specimen could be obtained and sent to pathology to rule out breast cancer. Once drained, a probe should be used to determine if there are any loculated areas.[84] Once completely drained, the cavity should be irrigated with saline.[85] Then, it should be allowed it to heal by secondary intention with packing/dressing changes. If the abscess is large, or the patient is immunocompromised or diabetic, packing should be used to prevent recurrence.

Antibiotic choice should be tailored to the patient's clinical condition. Oral antibiotic regimens are often appropriate; however, intravenous antibiotics should be used if the patient has signs of systemic infection. Antibiotic therapy should provide coverage for *S. aureus* and is tailored to the culture data.[81] The first-line oral antibiotics include cephalexin, clindamycin, and trimethoprim sulfamethoxazole, typically administered for a 10-day to 14-day course.[81,86] For more severe infections requiring hospitalization, appropriate intravenous choices include ampicillin-sulbactam, or vancomycin if there is concern for methicillin resistant *S. aureus* infection.

Seromas

A seroma is a subcutaneous collection of fluid comprising a mixture of plasma, lymph, and inflammatory exudate and is a common complication associated with many surgical procedures.[87,88] The pathophysiologic mechanism underlying seroma formation is likely related to transection of lymphatics during the surgical procedure resulting in leakage of lymph and production of an inflammatory exudate by the damaged tissue.[89,90] Surgical procedures that involve the creation of anatomic dead space have an increased likelihood of developing seromas. Surgical techniques that increase inflammation, such as the use of electrocautery or prophylactic sclerosants, are also associated with increased risk of seromas, as is early postoperative mobilization.[87,91,92] Overall, seromas represent a common cause of patient discomfort during the postoperative period and often require drainage to prevent infection. In rare instances, reoperation may be necessary.[87]

The diagnosis of a postoperative complication of seroma is most often a clinical diagnosis. On physical examination, a seroma should seem as a subcutaneous bulge with a positive fluid wave. Signs of inflammation may or may not be present. Seromas are typically not painful, although patients may indicate the presence of an uncomfortable sensation or pressure under the skin. Finally, ultrasound is a sensitive and cost-effective method that is routinely used to assist in the workup and diagnosis.[93]

In general, most symptomatic seromas should be treated with needle aspiration using sterile technique under local anesthesia and wrapped in a compression bandage. Occasionally, repeated drainage may be necessary. Small, asymptomatic seromas tend to resolve spontaneously and may not require drainage.[94]

Importantly, evidence-based strategies for the prevention of postoperative seroma formation should be used by all practicing surgeons during the initial surgery. Efforts

should be made during the index procedure to minimize dead space, shear stress, and electrocautery to help reduce the risk of seromas. Furthermore, the use of drains postoperative has also been associated with a reduced risk of seroma formation.[87]

CLINICS CARE POINTS

- Gynecomastia is the benign proliferation of glandular breast tissue.
- Gynecomastia can be seen in men of all ages; however, most frequently occurs in neonates, adolescents, and older men.
- Most cases of adolescent gynecomastia will spontaneously resolve within 1 year.
- Gynecomastia in adults is often secondary to medication, alcohol, or marijuana use. Cessation of the offending agent(s) may improve the condition.
- Laboratory tests useful in the workup of gynecomastia include the following:
  - Thyroid-stimulating hormone
  - Triiodothyronine
  - Alanine transaminase
  - Alkaline phosphatase
  - Creatinine
  - Testosterone
  - Prolactin
  - Follicle-stimulating hormone
  - Luteinizing hormone
- Gynecomastia lasting longer than 1 year typically requires medical or surgical intervention for resolution to occur.
- Medical management of gynecomastia may include tamoxifen (first-line), other SERMs (raloxifene and clomiphene), and aromatase inhibitor s (anastrozole and testolactone). Early initiation of therapy increases the likelihood for successful treatment.
- Surgery is a safe and effective treatment of gynecomastia and should be considered in cases that persist longer than 1 year or are refractory to medical management.
- Breast cysts in men are rare; however, it can be associated with gynecomastia.
- The workup of male breast cysts should involve thorough history and physical examination, as well as imaging and possible biopsy to rule out malignancy.
- Management of breast cysts in men depends on imaging and biopsy findings and can vary from watchful waiting to surgical excision.
- Lipomas are the most common benign breast neoplasms in men, consisting of mature fat cells contained in a fibrous capsule, usually found in the subcutaneous plane.
- Diagnosis is made through history, inspection, and palpation, demonstrated a long standing, slow growing, mobile mass often measuring less than 5 cm.
- Unless there are concerning features of malignancy, lipomas are often only excised for cosmetic reasons or for patient comfort.
- Pseudoangiomatous stromal hyperplasia (PASH) is a rare condition in men, consisting of abnormal proliferation of mesenchymal breast tissue that can resemble angiosarcoma.
- PASH is often diagnosed through imaging or biopsy and can be found during pathologic examination of gynecomastia specimens.
- PASH may be excised using a surgical biopsy if patient is concerned but it is a benign process, and watchful waiting can be used in the appropriate patient.
- Breast infections are another common benign breast lesion in men, most frequently consisting of cellulitis, skin abscess, or primary breast abscess.

- Workup of breast infections should be performed to rule out malignancy.
- The mainstay of treatment of breast infections includes antibiotics treatment, and in the case of abscesses, aspiration or surgical drainage.
- Seromas can be seen in male patients following surgical procedures on or near the breast and are often related to the disruption of lymphatics and local inflammation.
- Seromas are often diagnosed through physical examination and ultrasonography.
- Management of seromas involves aspiration of the fluid collection followed by compression of the site.

DISCLOSURE

The authors have nothing to disclose.

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