



The surgeon's guide to fibroadenomas

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Abstract: This review article takes a modern perspective on the assessment and management of fibroadenomas (FA) from the viewpoint of the breast surgeon, using evidence-based guidelines. This manuscript includes an overview of associated breast cancer risk with regards to FA and specific risk factors for FA, which are questions often asked by patients. Attention is paid to the appropriate work-up of FA from the clinical, imaging, and pathologic perspectives. There are multiple management options described for FA, including surveillance, surgical excision, and alternative methods such as cryoablation and high frequency ultrasound (US) ablation. The rationale and recommendations for each of these options is reviewed in detail, with particular emphasis on the oncoplastic approach in regards to surgical excision. Finally, the review article is summarized with concise recommendations to help guide the breast surgeon who is caring for a patient with a FA. Common clinical scenarios with references are also included to help every breast surgeon guide their patient in clinical-decision making in regards to FA. A table of clinical pearls and a table that summarizes studies that guide FA management are included to ensure that evidence-based guidelines are being emphasized and these can be used as a reference for physicians and patients.

Keywords: Fibroadenoma (FA); breast surgery; oncoplastic breast surgery

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Introduction

Fibroadenomas (FA) are the most common benign breast lesion. The true incidence of FA is difficult to assess since many of these patients are followed by imaging or clinical exam in their primary care physician's office. However, autopsy studies show approximately 20 percent of women in adolescence to mid-20's have FA (1). FA account for approximately half of all breast biopsies and are most commonly diagnosed in women between 15 and 35 years old (2). The risk of FA decreases significantly with age after the peak incidence in the 20–30 age group (3). Many FA patients are referred to breast surgery clinic. Therefore, as a modern breast surgeon, it is critically important to understand the appropriate work-up and management for this type of patient.

Definitions and breast cancer risk

FAs usually grow as sharply circumscribed spherical nodules and they are made up of epithelial and stromal components (4,5). FA are characterized as proliferative breast lesions without atypia and they are associated with a slight increased risk of developing breast cancer in the future, however there is some variation in risk based on subtype (6). The common subtypes of FA are juvenile, simple, complex, and giant.

Juvenile FA occur in young women between ages 10 and 18 and comprise 8% of all FAs; they present with an accelerated growth pattern (7). At the time of diagnosis, up to 25% of juvenile FA patients will have multiple or bilateral tumors (8). Simple FA represent approximately 86% of all FAs and most often present as a palpable mass (9). The

majority of women with simple FA and no family history of breast cancer are not at an increased risk of breast cancer in the future (10,11). Complex FA are FA with associated cysts, sclerosing adenosis, epithelial calcifications, or papillary apocrine changes and they represent approximately 14% of FA (9,11). Breast cancer risk in patients with complex FA is increased if there are proliferative changes in the surrounding breast tissue and complex FA alone is not considered an independent risk factor (9). Giant FA are greater than 5 cm in size and comprise 0.5–2% of all FA (12). There is rapid growth noted in giant FA and tissue diagnosis is necessary to rule out the possibility of a phyllodes tumor (13). Due to the size of these lesions and the diagnostic dilemma differentiating giant FA from a phyllodes tumor, surgical excision is the mainstay of treatment (14).

Risk factors for FA

The exact etiology of FA is unknown. There is likely a hormonal component because FA are most common during the reproductive years and they also often enlarge during pregnancy or with estrogen therapies. Risk factors that increase a women's risk for breast cancer also seem to increase her risk for FA, including early menarche in some reports (15). A family history of breast cancer has also been shown to increase the risk of FA in certain women (16). A case-control study from China showed a significant decreased risk of FA with increased intake of fruits and vegetables as well as oral contraceptive use (17). However, other studies have not demonstrated a linkage between FA and age at menarche, age at menopause, or hormonal therapy, including oral contraceptives (18).

Workup

Breast complaints compromise at least 3% of women's visits with their general practice physician and an increasing number of these patients are referred to a specialized breast clinic (19,20). As a breast surgeon, the work-up of a new breast mass can be classified as clinical, imaging assessment, and pathologic examination (21). Using all three of these processes in a complementary and coordinated fashion ensures that patients get the highest level of care without unnecessary interventions.

Clinical

FA usually have the presenting symptom of a breast mass.

Key history points that help differentiate this within the broad differential of breast mass include duration of symptoms and severity. If there is any fluctuation in size of the mass with the menstrual cycle, this mass is more likely to be a cyst (22). A history of trauma or surgery to the breast is often associated with fat necrosis (23). Associated symptoms such as skin changes or nipple discharge decrease the likelihood the mass is a FA. A focused history of prior breast biopsies and surgeries as well as family history of cancer will aid in assessing risk factors for FA.

On clinical exam, key areas of focus are the lymph node basins (specifically cervical, supraclavicular, infraclavicular, and axillary) and breast exam. Careful visual exam of the patient's breasts with the arms at the sides and raised above the head help highlight cosmetic deformity caused by an underlying breast mass. The lymph node exam should be performed with the patient seated. The breast exam should be performed in both the seated and supine positions for greatest accuracy (24). FA usually present as a well-defined mobile mass in the breast without overlying skin changes or nipple discharge. Lymph node examination would be expected to be normal for these patients.

Imaging assessment

Imaging assessment of a new breast mass is necessary in essentially all patients because the mass may not exhibit distinctive physical findings. It is preferable for imaging to occur prior to biopsy as the biopsy changes may obscure the imaging interpretation. The American College of Radiology Appropriateness Criteria[®] for palpable breast masses outlines that for a clinically detected palpable breast mass, the patient's age dictates the recommended first imaging modality. If a patient is 40 or older, she should start with diagnostic mammography. If she is younger than 30, the first imaging option is a breast ultrasound (US). If the patient is between 30 and 39, either US or diagnostic mammography are reasonable as initial imaging. Any highly suspicious breast mass should be biopsied, regardless of imaging findings (25).

US should be performed using a high-resolution, real-time, linear array scanner with a minimum frequency of 10 MHz (25). The US should be directed to the palpable mass (26). On US, FA are most commonly described as a hypoechoic mass with a circumscribed border (27). Diagnostic mammogram usually consists of a craniocaudal (CC) and mediolateral oblique (MLO) view of each breast. A small radiopaque marker is placed on the skin overlying

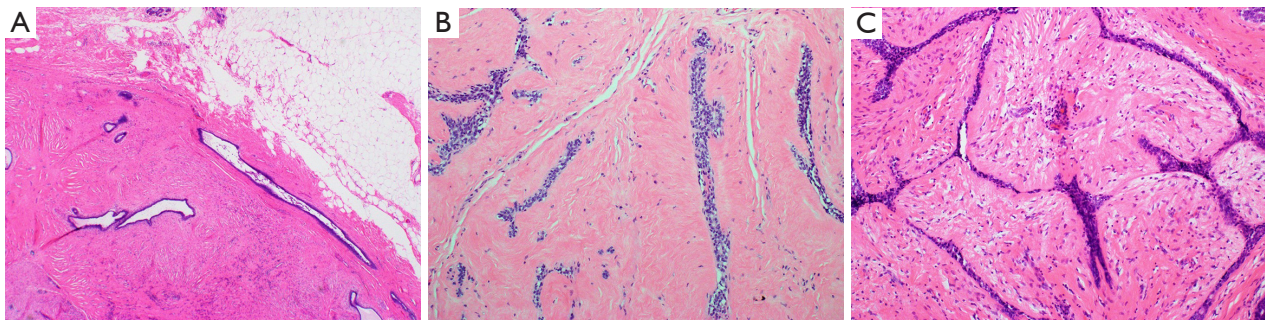


Figure 1 Fibroadenoma pathology. (A) FA with a pushing border between the lesion and the adjacent fatty tissue (hematoxylin and eosin, 2× magnification). (B) FA with hyalinized stroma (hematoxylin and eosin, 10× magnification). (C) FA with mildly hypercellular stroma (hematoxylin and eosin, 10× magnification). FA, fibroadenoma.

the mass to aid in the ability to obtain spot compression or magnification views (25). Mammogram demonstrates an oval or round mass with a circumscribed margin (28). Calcifications are occasionally seen associated with an involuting FA, often in post-menopausal women, and are usually coarse and “popcorn-like” (7). Breast magnetic resonance imaging (MRI) is occasionally used in the work-up of FA, especially if there are multiple breast masses and biopsy of all the findings would be difficult (29). The appearance of FA on MRI varies based on the hyalinization of the lesion. T2 hypointensity is seen with sclerotic or hyalinized FA while T2 hyperintensity is seen with cellular FA. FA also show varied enhancement patterns however typical FA show rapid initial and persistent delayed phases, also called type 1 enhancement kinetics (30).

Pathologic examination

Clinical concern and imaging characteristics determine the need for pathologic examination in suspected FA. Younger patients, under age 40, with a Breast Imaging-Reporting and Data System (BIRADS) 3 lesion can often be safely followed with careful surveillance. Women over age 40 with palpable breast masses, even with benign features on imaging, and all women with a BIRADS 4 or higher finding should be considered for biopsy (31). The ideal approach is a percutaneous core biopsy. FA classically have an evenly distributed glandular and stromal elements ratio and the borders of the lesion are usually circumscribed and pushing, without infiltrating the surrounding tissue. The stroma is typically low in cellularity and does not have significant nuclear atypia. The epithelial component shows an intact myoepithelial layer supporting ductal epithelial

cells (32) (*Figure 1*). Percutaneous core needle biopsy is recommended over a fine needle aspiration as it is more accurate in differentiating between a FA and a phyllodes tumor (33).

Management options

Once the breast surgeon has diagnosed an FA in their patient, the next step is discussing a management strategy; surveillance, surgical excision, or alternative management (*Table 1*).

Surveillance

Observation alone is reasonable in pediatric FA that are asymptomatic (34). In adult patients, the American Society of Breast Surgeons Choosing Wisely® campaign recommends against routinely excising biopsy-proven FA that are <2 cm (35). The American College of Radiology Appropriateness Criteria® for palpable breast masses even states that short term imaging follow-up (such as every 6 months for 2 years) is a reasonable alternative to biopsy for solid masses with probably benign features suggesting FA (36).

Surgical excision

Defining which patients require surgery for biopsy proven FA can be difficult and it requires the breast surgeon to take an individualized case-based approach. Some earlier data drove a more aggressive stance, recommending surgical excision for patients >35 years old, immobile or poorly circumscribed masses, and FA size greater than 2.5 cm (38).

Table 1 Fibroadenoma management options

Author	Type of study	Number of subjects	Average patient age	Key point(s)
Surveillance				
McLaughlin (34)	Retrospective chart review	196	15	Observation is appropriate for asymptomatic breast masses in children
Rao (35)	Evidence based guidelines	N/A	N/A	No routine excision of <2 cm FA
Harvey (36)	Evidence based guidelines	N/A	N/A	Short term imaging follow up for benign appearing masses
Surgical excision				
Dialani (37)	Retrospective review	378	Not reported	Even FA that are enlarging on imaging are highly unlikely to be malignant
Hubbard (38)	Retrospective review	723	32	Surgery for FA if patient >35 years old, FA >2.5 cm, or poorly circumscribed mass
Alternative management				
Kaufman (39)	Prospective nonrandomized trial	47	34	At 12 months of follow-up following cryoablation, 75% of FA were non-palpable
Li (40)	Retrospective review	1,578	35	3% recurrence risk, associated with larger lesion size, using vacuum-assisted percutaneous excision
Kovatcheva (41)	Prospective nonrandomized trial	42	32	US guided HIFU shows a 72.5% mean volume reduction of the FA at 12-month follow-up

FA, fibroadenoma; US, ultrasound; HIFU, high-intensity focused ultrasound.

If a biopsy proven FA is enlarging on imaging or clinical follow-up, there is still a very low risk of malignancy (42). For biopsy proven FA, surgical excision should be considered if there is associated atypia, unusual pathologic features, or symptomatic/cosmetic concerns (37).

The surgical removal of a biopsy proven FA is considered an excisional biopsy, which the American Medical Association assigns Current Procedural Terminology (CPT) code 19120 for billing purposes. This surgery can often be done using sedation and local anesthesia however occasionally requires general anesthesia, especially with larger lesions. Perioperative antibiotics are not required for these cases (43). For a palpable lesion without a radiologic marker, it is important for the patient and the surgeon to agree on the mass being removed and circle it on the skin pre-operatively, to avoid any confusion (*Figure 2A*). Aesthetic scar placement, one of the basic building blocks of oncoplastic breast surgery, is recommended to maximize the cosmetic outcomes (44). A biopsy proven FA can be safely enucleated and margins are not recommended (45). Even very large FA can often be enucleated and leave the patient

with an excellent aesthetic result as long as surrounding breast parenchyma is not resected with the FA (*Figure 2B*). However, if there are concerns for long-term cosmetic outcomes, reconstructive plastic surgery should be consulted and a combination procedure can be considered (46).

Alternative management

Alternatives to surgical excision exist but they should only be considered in patients with a core biopsy proven FA. US guided cryoablation is one alternative for FA that has shown significant decrease in lesion size after treatment, with 75% of lesions being non-palpable at 1 year of follow-up (39). US guided vacuum-assisted percutaneous excision can also be performed for FA, with good patient satisfaction. Recurrence occurs approximately 4% of the time with this modality and is more likely in patients with multiple lesions, a larger lesion size, and a hematoma at the time of the procedure (40). There are preliminary studies using percutaneous US ablation for FA, such as high-intensity focused ultrasound (HIFU), that have shown



Figure 2 (A) Pre-operative and (B) 2-week post-operative images of a 34-year-old patient undergoing an excisional biopsy for a symptomatic FA of the right breast using aesthetic scar placement in the periareolar position. FA, fibroadenoma.

Table 2 Fibroadenoma clinical pearls

Initial imaging: ultrasound (mammogram if over 40 years old)
Biopsy modality: core biopsy
Asymptomatic FA management: observation
Symptomatic FA management: surgical excision
FA management with concern for malignancy: surgical excision
FA, fibroadenoma.

promising results. One European multicenter study using HIFU showed a 72.5% volume reduction of the lesion at 1 year follow-up of the procedure, with minimal transient side effects (41). Clinical follow-up by the performing physician is recommended in these patients due to the lack of long-term data on these emerging technologies.

Recommendations

FA is an extremely common benign breast lesion affecting younger women. The ideal approach for a patient with a breast mass suggestive of FA is to image with US +/- mammogram, confirm the lesion is an FA using percutaneous core biopsy, and conservative follow-up in the future. If the FA is causing concern for the patient or the physician has suspicion for malignancy, surgical excision is reasonable and should be performed in an oncoplastic fashion to maximize long-term aesthetic outcomes (*Table 2*).

Common clinical scenarios

- (I) A 14-year-old female is referred to you by her pediatrician who found a small, mobile, 1.5 cm mass in the patient's left breast on clinical exam. This is not bothering the patient. How would you manage this? Careful physical exam followed by ultrasound. If US shows imaging characteristics classic for FA, serial US every 6 months for 2 years and observation. If US shows concerning characteristics, perform core biopsy. If the pathology is FA, clinical surveillance is reasonable (47).
- (II) A 26-year-old patient comes to your clinic with a rapidly enlarging 3.5 cm mass in her right breast that is visible in her swimsuit and causing her distress. What do you recommend? Physical exam to confirm this is the only breast abnormality and then US. Due to the size and rapid enlargement of the mass, core biopsy is necessary to rule out malignancy. Surgical excision should be considered due to the symptomatic nature and rapid growth pattern of this lesion even if only FA is diagnosed on core biopsy, as the imaging and pathologic distinctions of phyllodes tumor and FA are nuanced (32).
- (III) A 45-year-old female presents with a screening mammogram finding of a 2.7 cm mass, the radiologist reports it has characteristics indicating it is likely a FA. She has no symptoms and a normal physical exam.

What are your next steps? Diagnostic mammogram and US followed by an US guided core biopsy. The core biopsy shows a “fibroadenoma with associated atypia and radial scar”. Surgical excision, with imaging localization prior to surgery, is recommended due to the patient’s age, the lesion size, and the associated atypia (37,38).

Conclusions

Breast surgeons will see numerous FA patients in their clinic during their career. An appropriate work-up and discussion with the patient will help determine the best options for treatment or surveillance. The ideal management of this condition relies on using evidence-based guidelines and taking into account the patient’s preferences.

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