ORIGINAL ARTICLE

# The management of incidental findings of reduction mammoplasty specimens

Jessica T Goodwin BSc, Chantelle DeCroff MD, Emilia Dauway MD, Amelia Sybenga DO, Raman C Mahabir MD

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Reduction mammoplasty is one of the most commonly performed procedures in plastic surgery. Occasionally, there are findings reported by pathologists that are unfamiliar to the treating surgeon. The aim of the present study was to determine the types of pathologies encountered in reduction mammoplasty specimens. From this list of diagnoses, a best practice guideline for management will be organized to better assist plastic surgeons in the management of patients with incidental findings on pathology reports. A total of 441 pathology reports from patients who underwent bilateral or unilateral reduction mammoplasty in the past three years were identified. A list of 21 different pathologies was generated from the pathology reports, along with supplemental data from recent texts and articles. Occult carcinomas were encountered in two cases (0.45%) and high-risk lesions were found in three cases (0.68%) at the authors' institution. An algorithm was then constructed to organize the pathologies according to risk of malignancy and assign them to a management guideline. There are many different lesions encountered incidentally in reduction mammoplasty specimens that may or may not confer some cancer risk. It is important for plastic surgeons to know which lesions need closer follow-up to provide the best care for their patients.

**Key Words:** *Breast; Incidental; Mammoplasty; Pathology; Reduction; Specimen*

## La prise en charge des observations fortuites dans des prélèvements de réductions mammaires

Les réductions mammaires font partie des interventions les plus exécutées en chirurgie plastique. Il arrive que le médecin traitant ne soit pas familier avec les observations du pathologiste. La présente étude visait à déterminer le type de pathologies observées dans des prélèvements de réductions mammaires. À partir de cette liste de diagnostics, des directives de pratiques exemplaires de prise en charge sont exposées pour mieux aider le plasticien à prendre en charge les patients présentant des observations fortuites dans le rapport de pathologie. Au total, les chercheurs ont trouvé 441 rapports de pathologie de patients qui ont subi une réduction mammaire bilatérale ou unilatérale depuis trois ans. Ils ont dressé une liste de 21 pathologies différentes à partir des rapports de pathologie, de même que d'autres, tirées de textes et articles récents. Dans l'établissement des auteurs, on a observé deux cas de carcinomes occultes (0,45 %) et trois cas de lésions à haut risque (0,68 %). Un algorithme a ensuite été construit pour classer les pathologies d'après le risque de malignité et leur accoler une directive de prise en charge. Il existe de nombreuses lésions observées fortuitement dans les échantillons de réductions mammaires qui peuvent ou non s'associer à un risque de cancer. Il est important pour le plasticien de savoir quelles lésions doivent faire l'objet d'un suivi plus étroit pour dispenser les meilleurs soins aux patients.

In 2012, more than 110,000 reduction mammoplasties were performed in the United States (1). A relatively safe and increasingly common procedure, reduction mammoplasty has been proven to be effective and beneficial in appropriate patient populations. These benefits include improved pain, skeletal stability, lung function and sleep, as well as providing a stimulus for weight loss, healthy eating habits and exercise (2). All patients >30 years of age undergoing breast reduction at our institution undergo mammography before their operation. Breast reduction specimens are sent intraoperatively for permanent pathological and histological evaluation. These reports contain descriptions of histological diagnoses found in the tissue, which can include arbitrary benign findings, inflammatory disorders, potentially precancerous lesions or even incidental carcinomas. Examples of these findings include mastitis, duct ectasia, fat necrosis, fibrocystic changes, proliferative breast disease with or without atypia, ductal carcinoma in situ, lobular carcinoma in situ, invasive ductal or lobular carcinoma or a variety of other cancers (3). With the exception of nonmelanoma skin cancer, breast cancer is the most common cancer affecting women in the United States (4); it is not surprising that malignancies are occasionally found in mammoplasty specimens. Therefore, plastic surgeons need to know how to interpret and manage the results of various pathological diagnoses.

The incidental finding of a malignancy in a clinically and radiologically negative breast should prompt a referral to surgical oncologist and/or breast cancer team. While the management of frank malignancy is more straightforward, there may be other diagnoses that are not as clear. These diagnoses are no less important and may necessitate longer follow-up or even a change in management. In one study, 13 of 26 radical mastectomy patients with diagnoses of lesions with uncertain malignant potential were lost to follow up (5). Yet, despite the frequent performance of this procedure, after a review of the literature, very little data or discussion exists regarding medical or surgical management of patients when high risk, precancerous or cancerous lesions are discovered during histopathological examination.

By reviewing the possible histological diagnoses found in the pathology reports for breast reduction mammoplasties at our institution, each diagnosis is placed into a category of management and follow-up. Our aim is to create an algorithm to assist plastic surgeons with a best practice guideline so they can accurately direct the management of their patients based on the pathology report.

## METHODS

### Specimen processing (6)

Once the tissue from reduction mammoplasty leaves the operating room, it undergoes several steps of processing, the first of which is is grossing (Figure 1). The specimen is weighed, measured and an external description of the tissue's appearance is documented. The tissue is palpated for fibrosis, nodules and masses. It is then cut into sections approximately 3 mm to 5 mm thick, and each section is examined for fibrosis, nodules, masses, other tissue texture abnormalities and colour changes. Nodules and masses are measured, described and sampled. Areas with abnormal appearance or texture are described and sampled. Additionally, areas of normal appearing tissue are sampled. If no abnormalities are noted, representative samples are taken. Although not a requirement, three sections for women <30 years of age, and five

*Division of Plastic Surgery, Department of Surgery; Scott and White Healthcare and Texas A&M Health Sciences Center College of Medicine, Texas, USA*

*Correspondence: Dr Raman C Mahabir, c/o Department of Surgery, 2401 South 31st Street, Temple, Texas 76508, USA. Telephone 254-724-2321, fax 254-724-0315, e-mail rmahabir@sw.org*

  


**Figure 1)** *Bilateral breast reduction gross specimen as received by the pathology department*

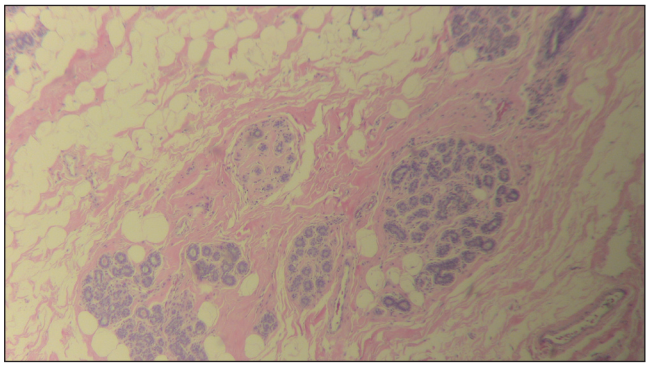

**Figure 2)** *Benign breast tissue. Hemotoxylin and eosin stain, original magnification ×4*

samples for women >50 years of age is recommended; however, this is at the discretion of the individual performing the gross examination (6). A minimum of two sections each from different areas of the specimen is required. Each sample is cut to a maximum thickness of 3 mm and placed in a cartridge. The cartridges are soaked in 10% formalin for a minimum of 6 h and not more than 48 h, at which point histological sectioning is performed. The remaining breast tissue is stored in the event additional samples are required.

Once the samples are adequately fixed in formalin, a block of each sample is made by placing the sample in melted paraffin wax. The samples are set to cool. Once cool, the samples are sliced on a microtome from which slices 3 µm thick are taken. The best slice is removed from the microtome, placed in a water bath and retrieved on a glass slide. The slide is then placed on a warming tray to dry and to allow the remaining paraffin to melt away. The remaining portions of block are then stored. Hematoxylin and eosin staining is then performed on each slide (Figures 2, 3 and 4).

After processing, the slides are returned to the pathologist, who examines each slide under a microscope to search for various pathologies. If breast carcinoma is noted, additional slides are ordered for immunohistochemistry.

### Data

A retrospective review was performed from the pathology reports of the breast reduction mammoplasties performed at the Scott and White Healthcare and Texas A&M Health Sciences Center (Texas, USA) from the past three years to acquire a list of different pathological histologies. After institutional review board approval, the data were obtained in a de-identified fashion that displayed only the diagnosis on the pathology report. The final list of possible diagnoses was supplemented using recent literature and texts regarding pathologies found in mammoplasty specimens (7,8). Male breast reduction (gynecomastia), mastopexy and mastectomy specimens were excluded.

The pathological diagnoses were then divided into groups according to cancer risk with the help of the 1998 update to the Cancer Committee of the College of American Pathologists Consensus statement (9). In conjunction with the expertise of the institutions'

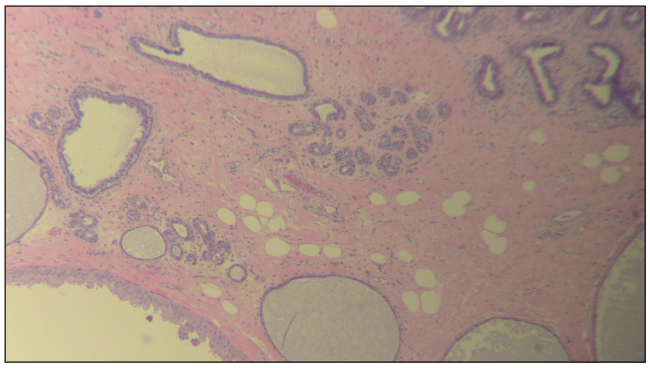

**Figure 3)** *Hemotoxylin and eosin stain demonstrating fibrocystic change with adenosis. Original magnification ×4*

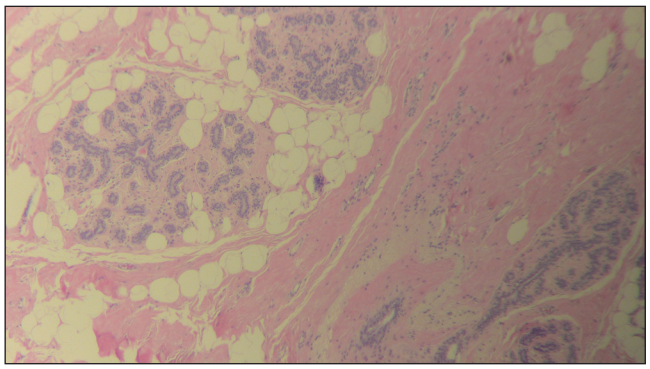

**Figure 4)** *Hemotoxylin and eosin stain demonstrating sclerosing adenosis. Original magnification ×4*

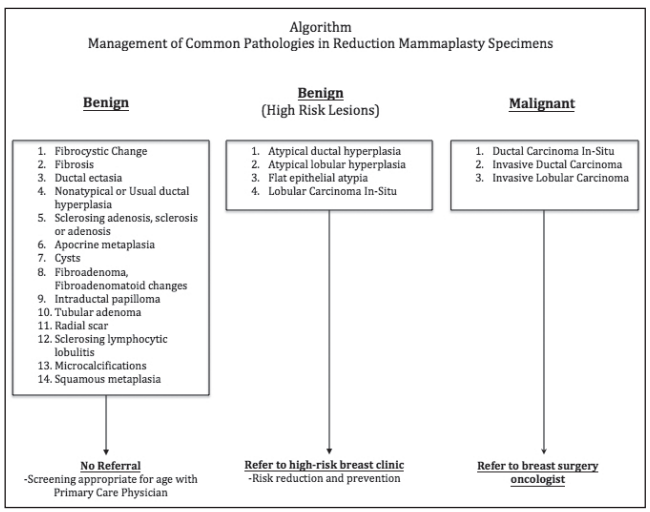


**Figure 5)** *Management algorithm based on information from the Cancer Committee of the College of American Pathologists*

National Accreditation Program for Breast Centers-certified breast cancer team, an algorithm was organized to delineate the standard management of care for each diagnosis (Figure 5).

## RESULTS

A total of 441 breast reduction pathology reports from specimens collected over the past three years were used for the present study, with 872 specimen blocks submitted to pathology. A total of 1676 individual diagnoses were tabulated, indicating that a significant number of reported cases contained multiple histological diagnoses. One case of invasive carcinoma and one case of ductal carcinoma in situ were found in the 441 cases, which corresponds to a 0.45% incidence of frank cancer in the past three years. There were three high-risk lesions

encountered: one lobular carcinoma in situ and two atypical ductal hyperplasia diagnoses, corresponding to an incidence of 0.68%. Many benign lesions were also found, including fibrocystic change, nonatypical ductal hyperplasia, apocrine metaplasia, sclerosing adenosis, papillomas, chronic inflammation and microcalcifications, among others. Each diagnosis was included in the final list of possible lesions from which the algorithm was constructed. The following algorithm was then assembled to delineate proper management of each of these lesions.

## DISCUSSION

The incidence of histological findings in reduction mammoplasty specimens has been well reviewed. Typically, the incidence of occult cancer in breast reduction mammoplasties is very low. One recent study published in 2012 (10) found that there was a 4.4% incidence in finding high-risk lesions and a 0.86% incidence of carcinoma in patients who underwent reduction mammoplasty. Freedman et al (10) also found that the likelihood of malignancy was highest in women >40 years of age with contralateral malignancy who were undergoing reduction to match the reconstructed breast, and that these patients should undergo more rigorous breast screening. In 2011, a study by Rai et al (11) found that one in five contralateral prophylactic mastectomies already had pathological evidence of malignant or premalignant lesions.

A study by Clark et al (12) focused on the incidence of precancerous lesions at a single institution over a five-year period and found that atypical ductal hyperplasia and lobular hyperplasia represented 4.4% of patients. They also found a 0.7% incidence of lobular carcinoma in situ and 1.1% incidence of ductal carcinoma in situ. From their data review, 13.3% of patients were categorized as having a slightly increased risk (1.5% to 2.0%) of breast cancer, and 6.2% had findings portending a fourfold higher risk of breast cancer.

Further investigations have been performed that included other variables such as history of breast cancer in the patient. One study from the General State Hospital of Athens (Athens, Greece) (13) evaluated the incidence of premalignant and cancerous lesions not detected by preoperative clinical and mammographic assessment in two groups of patients with and without a history of breast cancer. They found an incidence of 2.38% occult carcinoma in the group with a history of cancer seeking reconstructive reductions compared with 1.55% in the group not associated with a history of breast cancer seeking reductions for macromastia. They suggested that the variability of incidence among studies could be explained by differences in submission of surgical specimens for pathological examination, histological methodology, exclusion of lobular in situ carcinomas from the results of several studies and heterogeneity of the examined populations.

The incidence of carcinoma in breast reduction surgeries encountered at our institution was comparatively lower (0.45%). The incidence of high-risk lesions was also slightly lower than reported in other studies (0.68%). These results may be institution specific and geographically distinct; therefore, they do not necessarily represent national trends. Some limitations of our study include data originating from a single institution and that our definition of terms may vary from other institutions describing similar pathologies.

Interestingly, the likelihood of discovery of a malignant lesion in a patient under thirty years of age with no family history is virtually zero (14). Some authors have suggested eliminating section submission for any patient under 30 years of age if gross examination reveals no suspicious lesions and there is no family history of breast cancer (12). A cost benefit or cost utility analysis would be needed to answer this question.

We have provided a best practice guideline for proper management of incidental pathological findings at the time of breast reduction for plastic surgeons to use. Based on the algorithm provided, we hope to streamline and optimize the process of making a management decision based on less common and potentially confusing results from pathology reports. While management of frankly benign or invasive carcinoma is relatively straightforward, it is the high-risk column that requires the most clarification. Due to their significant increased risk, they will require a closer follow-up with a breast cancer physician as well as more frequent screening for early detection. It is important to understand which lesions are not commonly associated with an increased risk of cancer and do not require more extensive monitoring and those that do to provide effective and efficient guidance and care for our patients.

Both the National Accreditation Center for Breast Centers and the National Comprehensive Cancer Network mandate counselling regarding risk reduction with imaging, chemoprevention and/or prophylactic surgery (15,16). For surgeons comfortable with that process and discussion, they should continue their current practice. For those who would prefer, referral to a high-risk breast cancer program may be the best option for providing comprehensive, personalized care.

Early detection of malignancy can have a dramatic effect on morbidity and mortality. It is important for the lives of our patients that we continue to develop and improve methods of prevention, diagnosis, and management with competency and efficiency.

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