

Post-operative Seroma Causing Spontaneous Nipple Discharge: Diagnosis by Galactography

Ivan E. Ramirez-Hernandez¹, Rulon L. Hardman², Aaron D. Kirkpatrick¹, Joseph Sutcliffe^{1,2*}

1. Brooke Army Medical Center, Department of Diagnostic Radiology, Fort Sam Houston, Texas, USA

2. University of Texas Health Science Center in San Antonio, San Antonio, Texas, USA

* **Correspondence:** Joseph Sutcliffe, MD, University of Texas Health Science Center in San Antonio, Department of Radiology, 7703 Floyd Curl Dr. MC 7800, San Antonio, Texas 78229, USA
(✉ josut@sbcglobal.net)

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ABSTRACT

Nipple discharge is a common breast complaint in women. Discharge in the post-operative patient for breast cancer is especially concerning, as these women are at higher risk for recurrent or new breast cancer. Galactography is a reliable method to evaluate nipple discharge, attempting to identify a mass that may cause the discharge within the duct of concern. We present two cases of women with spontaneous nipple discharge after lumpectomy for breast cancer. In both cases, evaluation with galactography demonstrated a post-operative seroma that communicated with a native breast duct, causing nipple discharge. This presentation of a post-operative seroma is important to recognize by breast surgeons and breast imagers. Galactography can play an important role in the work up of these patients, demonstrating etiology of the nipple discharge with greater confidence than other imaging modalities.

CASE REPORT

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The first case is of a 49-year-old female who underwent lumpectomy for invasive ductal carcinoma of the left upper outer breast with negative sentinel node biopsy. Radiation planning CT at that time demonstrated a small postoperative seroma at the 3 o'clock position in the middle depth breast tissues (Figure 1). She subsequently underwent radiotherapy and was started on tamoxifen therapy. She had no complications until almost a year later when she reported to her clinician new onset intermittent clear to yellow discharge from a single ductal opening in her right nipple. Her mammogram showed findings in the lumpectomy bed compatible with post-surgical/post-radiation change and resolving seroma (Figure 1). We performed a standard galactogram, which demonstrated contrast filling several normal appearing thin branching ducts. One of these ducts communicated with a 1.5 cm oval, smooth-walled cystic cavity at the 3 o'clock position, middle depth tissues. Contrast from the intraductal injection partially filled the cystic cavity forming a contrast-fluid level (Figure 1). This collection was at the same location as her known post-lumpectomy seroma seen on prior CT. The connection between the native breast ducts

and the cavity was confirmed on multiple views (Figure 1). The tip of the cannula was not deep enough to have resulted in an inadvertent direct intra-cavitary injection. Given her history and concern that the cystic cavity could represent a recurrence of her malignancy, the patient consented to undergo ultrasound guided core biopsy of the cavity walls. An ultrasound was then done immediately, with the intraductal cannula still in place. Ultrasound demonstrated the 1.5 cm fluid filled cavity (Figure 1). Contrast was gently injected through the cannula while continuously sonographically monitoring the cavity. Gentle swirling of fluid within the cavity during injection confirmed inflow of contrast from the cannula, through the native duct and into the cavity. The walls of the cavity were smooth, without septations or mural nodularity and there was no sonographic evidence of malignancy. Color Doppler images demonstrated no increased blood flow within the walls of the cavity. Over the next several months, her nipple discharge resolved.

The second case is of a 57-year-old female who underwent lumpectomy, axillary node dissection, radiation and chemotherapy for invasive ductal carcinoma of the left lower outer breast, with reconstruction and implant placement one

year later. Four months after this surgery, she presented to the surgery clinic with a 3-day history of bloody nipple discharge. Diagnostic mammogram demonstrated her intact implant and associated surgical changes to include an oval to lobular circumscribed mass in the surgical bed (Figure 2). Her mammogram was otherwise unremarkable. Ultrasound examination of the left breast revealed a 7.3 x 2.6 x 3.3 cm fluid filled cavity with smooth walls consistent with a postoperative seroma. Ultrasound also demonstrated prominent subareolar ducts. During the ultrasound exam, we noted that gentle pressure applied with the ultrasound probe directly over the seroma resulted in the production of scant amber nipple discharge from a single duct. The patient subsequently underwent a galactogram to further evaluate the ductal system and to confirm the seroma as the source of nipple discharge. Galactogram confirmed a direct connection of the seroma with the native breast ducts in a similar manner to the first case. Contrast injected through the cannula that had been placed in the offending breast duct at the nipple traversed native breast ducts and partially filled the seroma (Figure 2). No intraductal filling defect was identified. This patient later received a CT of the chest for left chest wall pain, which also demonstrated the seroma with linear/ductal extension to the nipple (Figure 2). These findings were reviewed with her plastic surgeon and the patient subsequently underwent revision of her implant and resection of the seroma, with resolution of her nipple discharge. Surgical pathology demonstrated no evidence of malignancy within resected seroma.

DISCUSSION

Nipple discharge is a relatively common breast complaint accounting for up to 5% of referrals to breast clinics (3). Common causes of nipple discharge include intraductal papilloma, ductal ectasia, infection, central hormonal abnormality, and breast malignancy (4). Bilateral milky or greenish discharge is invariably benign, most often due to bilateral ductal ectasia, central hormonal or medication causes. However, serous, serosanguinous, or bloody discharge, particularly if arising from a single duct, is more concerning. Though benign intraductal papilloma or benign ductal ectasia remains the most common etiology in these cases, the incidence of malignancy in the setting of unilateral serous or bloody discharge is reported to range from 5% to 21% (5). The incidence of malignancy is sufficiently high to warrant thorough evaluation to identify the source of the nipple discharge. Evaluation options for suspicious nipple discharge include cytologic analysis, galactography, mammary ductoscopy, magnetic resonance imaging (MRI), and/or surgical excision of the offending ductal system. The diagnosis of seroma can usually be made by the imaging features of a seroma and clinical history, however, the differential diagnosis includes post-operative hematoma, abscess, intraductal hematoma, or invasive ductal carcinoma (See Table 2).

Mammographically, seromas tend to present as oval or round masses which are isodense or denser than the adjacent breast parenchyma. The margins of a seroma are typically circumscribed, but may be obscured by overlying

fibroglandular tissue or by the architectural distortion of the surgical scar. However, these features are very nonspecific and the differential diagnosis of a mass within the surgical bed includes seroma, hematoma, abscess or recurrent malignancy. Ultrasound is typically the next imaging step in the assessment of mass seen within the lumpectomy bed. If ultrasound demonstrates that the mass is cystic, the following features help narrow the differential. Seromas are typically anechoic, with mildly thickened walls, oval shape, circumscribed margins and enhanced through transmission. Hematomas and abscesses usually have thicker walls and tend to have heterogeneously hypoechoic internal cystic contents. Papillomas may present as a mural nodule within a cystically dilated duct but a papilloma near the surgical bed would be an incidental finding, not associated as a post-surgical complication. The most worrisome differential of a cystic mass within the lumpectomy bed is residual or recurrent malignancy. The most helpful sonographic feature to differentiate a recurrent malignancy from a seroma is the presence of a mural nodule or thickened septations, features worrisome for malignancy. MRI may be utilized for further imaging assessment of post-operative cystic masses, if diagnostic mammography and ultrasound fail to demonstrate definitely benign or definitely suspicious features. On MRI, seromas tend to have thin, minimally enhancing walls, demonstrate hyperintense T2 fluid signal internally and have no internal enhancement. Hematomas may have thicker walls, which minimally enhance. The internal contents of the hematoma will not enhance but will demonstrate heterogeneous T1 and T2 signal depending upon the age of the hematoma. Abscesses are typically thicker walled with avid enhancement of the wall and adjacent breast parenchyma. Similar to the hematoma, the internal contents of an abscess will not enhance and may also demonstrate heterogeneous T1 and T2 signal. The clinical presentation of an abscess with warm, extremely tender breast, possible fever and elevated white blood cell count help to clarify the diagnosis. Aspiration and culture may be necessary to confirm an abscess diagnosis. Papillomas and cystic malignancies typically demonstrate an enhancing mural nodule or mass in the wall of the cyst. CT is not typically utilized in the imaging assessment of a post-operative cystic breast mass. Breast seromas and other post-operative cystic breast masses are more often incidental findings on a chest CT which has been ordered for other purposes. Similarly, galactography is generally not an imaging modality used to evaluate seromas or other cystic breast lesions, but in these two cases, the communication of the offending breast ducts with seromas was an unexpected finding. The appearance of these entities is summarized in Table 2.

Galactography is a minimally invasive breast imaging technique, which involves the insertion of a 30 gauge, blunt tipped sialogram cannula into the offending duct at its nipple orifice, followed by the injection of a small amount of iodinated contrast (6). Mammograms are then immediately obtained to evaluate the ductal system. Normal ducts demonstrate multiple, branching, thin ducts or multiple dilated ducts with no filling defect. An abnormal galactogram usually demonstrates an intraductal filling defect or abrupt ductal cutoff (6, 7).

Postoperative seromas in the breast are accumulations of serous fluid in patients who have undergone excisional biopsy, mastectomy or breast conservation surgery for breast cancer or who have undergone breast augmentation, reduction or reconstruction. Seromas are common complications (15-81% of surgeries) and typically resolve within weeks of surgery, but often persist for prolonged periods (1). Post lumpectomy seromas are commonly seen on surveillance mammographic follow-up as dense, round or oval circumscribed masses in the lumpectomy bed. Ultrasound is often used to confirm these relatively thin walled, simple or complicated fluid collections, however, CT, MRI, core or excisional biopsy may be needed to confirm their benign nature. Seromas tend to appear as oval or round masses on mammography, and occasionally peripherally calcify. The seroma will have circumscribed margins on ultrasound, and be hypo- or anechoic. By CT, the seroma will demonstrate water density and can show mild, peripheral enhancement. MRI appearance demonstrates a round or oval mass with hypointense T1-weighted and hyperintense T2-weighted signal. Similar to CT, the seroma can have mild peripheral enhancement after gadolinium contrast administration, but should not show rapid washout kinetics. Seromas can be bothersome to patients as they can cause mass effect and tenderness and may be palpable as a lump, which mimics the recurrence of breast cancer. Nipple discharge as a complication of breast seroma, however, has not been well investigated. Complications with a seroma are reported in 15% of patients, and include infection of the collection, hematoma, delayed wound healing, tissue flap necrosis, delayed recovery after surgery, and delay in the initiation of adjuvant treatment. Treatment of seromas is typically compression dressings and often drainage if the seroma is affecting wound healing. There have been reports that Octreotide decreases the lymph production, and hence shows decreased seroma formation (2). Please see Table 1 for summary of the clinical and imaging features of post-operative seromas.

In these two cases the galactograms served to identify the source of suspicious nipple discharge as postoperative seromas. In each case the seromas were known to have been present for several months to one year prior to onset of spontaneous nipple discharge. In both cases, galactograms showed that normal appearing subareolar ducts connected directly to the seromas, which then partially filled with contrast. Although we are not able to definitively explain the mechanism of connection in these cases, we presume that both seromas fistulized to native breast ducts, possibly stimulated by inflammation associated with the seroma. Our review of the English language medical literature on this topic revealed only two papers that mentioned postoperative seroma as a cause of spontaneous nipple discharge. Simpson et al mentioned a ductoscope entering a seroma cavity during mammary ductoscopy for nipple discharge (7). Rovno et al described two cases of seroma as presumed cause of hemorrhagic nipple discharge when demonstrated by MR galactography (8). To the best of our knowledge, these are the first published case reports demonstrating the utility of galactography in proving the fistulous connection between postoperative seromas and native breast ducts as a cause of spontaneous nipple discharge. The occurrence of both cases in our breast imaging center

within a relatively short period of time might indicate that nipple discharge due to postoperative breast seroma may be a more common occurrence than has been reported.

In conclusion, seromas are common after lumpectomy. Spontaneous nipple discharge due to a seroma has been suggested in the literature, but is not a common complication after lumpectomy. Evaluating the etiology of spontaneous nipple discharge is important in women, but more critical in the woman with prior lumpectomy given the increased risk for cancer recurrence. Galactography is a tool that can be used to verify the communication of a seroma with a duct, causing spontaneous nipple discharge. Our two cases demonstrate findings of duct communication with seroma, the breast imager should be familiar with this presentation of post-lumpectomy complication.

TEACHING POINT

Galactography can diagnose if a seroma is the cause for a woman's spontaneous nipple discharge.

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FIGURES

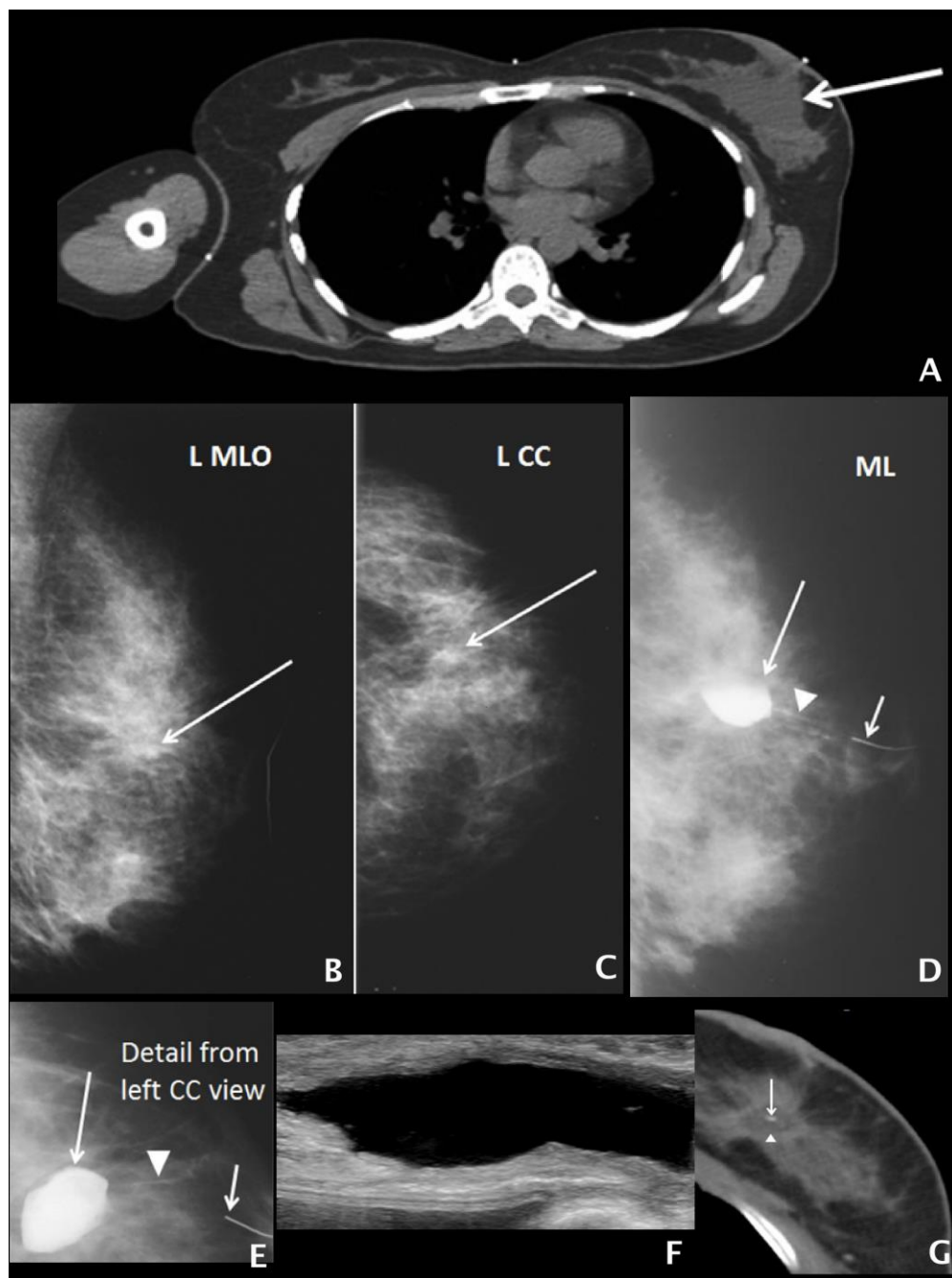


Figure 1: 49-year-old female with onset of spontaneous clear left nipple discharge, from a single duct, 1 year after lumpectomy for invasive ductal carcinoma.

a. Radiation therapy planning CT performed 1 year prior to onset of left nipple discharge demonstrates a small, post-lumpectomy seroma at the 3:00 axis of the left breast (arrow). Fluid within the seroma measured 8 Hounsfield units. (Philips Brilliance Big Bore 16 slice CT, slice thick 3mm, Kvp 120, MA 271, no IV contrast.)

b/c. Left craniocaudal (CC) and medial lateral oblique (MLO) views performed after onset of left nipple discharge demonstrate expected post-lumpectomy changes at the 3:00 axis of the left breast. An ill-defined focal asymmetry within the lumpectomy bed is consistent with a resolving seroma (arrows).

d/e. Left medial lateral (ML) view and detail from left CC view during galactogram demonstrates metal cannula (short arrow), which had been placed into the offending duct. Contrast injected through the cannula opacifies a thin breast duct (arrowhead), which communicates and partially opacifies an oval, circumscribed fluid collection (long arrow) forming a contrast-fluid level.

f. Sonographic assessment of the left breast performed during the galactogram, with cannula still within the offending duct, demonstrates a thin-walled, 1.5 cm, anechoic fluid collection. Contrast injected through the cannula during ultrasound examination causes visible swirling of fluid and expansion of the fluid collection, confirming this fluid collection corresponded to the layering fluid/contrast collection seen mammographically.

g. CT scan of the chest, performed a few days after the galactogram/biopsy for assessment of lung nodules, demonstrates the previously seen left breast seroma, now with biopsy clip (arrow) from the recent ultrasound guided biopsy within the center of the seroma. (Siemens Definition dual-source 32 slice scanner, 5 mm slice thickness, kvp 120, mas 280. No IV contrast).

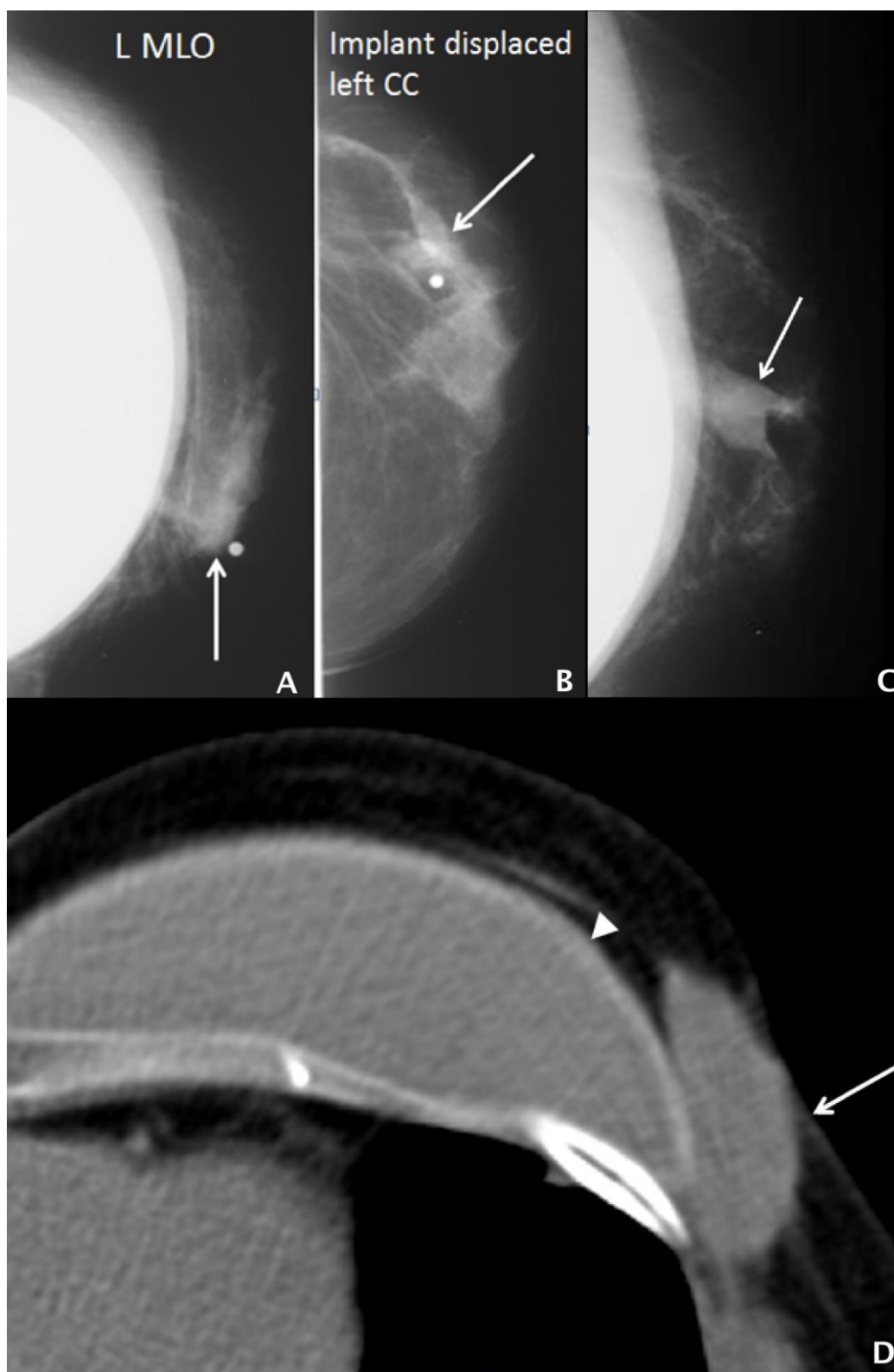


Figure 2: 57-year-old female with onset of spontaneous bloody left nipple discharge from a single duct, 4 months after lumpectomy for invasive ductal carcinoma. a/b. Medial lateral oblique (MLO) and implant displaced cranial caudal (CC) view performed prior to galactogram demonstrate intact implant and post-lumpectomy changes. An oval/lobular mass is present within the lumpectomy bed (arrow). BB marks nipple on both views.

c. Galactogram was performed of the offending duct. CC view of left breast after injection of contrast through the cannulated duct (cannula has been removed) demonstrates a 7.3 x 2.6 x 3.3 cm contrast filled cavity (arrow) in the lateral aspect of the left breast overlying the pectoralis muscle and subpectoral breast implant, within the mass seen on the preceding diagnostic mammogram, consistent with a post-operative seroma.

d. CT, obtained later for chest wall pain, incidentally demonstrates the post-operative seroma (arrow), in the lateral aspect of the left breast, overlying the pectoralis major muscle and breast implant (arrowhead). (Siemens Definition dual-source 32 slice scanner, 5 mm slice thickness, kvp 120, mas 280. No IV contrast).

Etiology	<ol style="list-style-type: none"> 1) Accumulation of fluid after surgery due to disruption of normal tissue planes 2) Fat necrosis- liquefaction of fat after trauma to tissue from surgery 3) Possible inflammatory response or fibrinolytic
Incidence	15-81%
Gender ratio	Predominately female - lumpectomy
Age predilection	None
Risk factors	<ol style="list-style-type: none"> 1) Wide dissection 2) Axillary lymphadenectomy 3) NO association with Age, obesity, tumor size, adjuvant therapy
Treatment	<ol style="list-style-type: none"> 1) Compression dressing 2) Drainage 3) Possible use of Octreotide
Prognosis	<p>15% complication rate</p> <ol style="list-style-type: none"> 1) Infection 2) Hematoma 3) Delayed wound healing 4) Flap necrosis 5) Delayed recovery 6) Delayed initiation of adjuvant treatment
Findings on Imaging	<p>Mammographic</p> <ol style="list-style-type: none"> 1) Mass or focal asymmetry 2) Coarse Calcifications <p>Ultrasound</p> <ol style="list-style-type: none"> 1) Hypoechoic or anechoic mass <p>CT</p> <ol style="list-style-type: none"> 1) Water density mass 2) May show mild enhancement early <p>MRI</p> <ol style="list-style-type: none"> 1) T1W – hypointense 2) T2W- hyperintense 3) Contrast- may have mild enhancement early

Table 1: Summary table for imaging features and clinical features of post-operative seromas.

	Mammography	Galactography	Ultrasound	CT	MRI
Seroma	Soft tissue density mass, may contain Ca++	Round mass communicating with the injected duct	Anechoic or hypoechoic round or oval mass	Round fluid density tissue mass, may demonstrate early contrast enhancement	T1W- hypointense, T2W -hyperintense May demonstrate early contrast enhancement at the margins, Delayed should not enhance
Hematoma	Round or oval mass, can show spiculation	No communication with duct	Anechoic to hypoechoic mass	High density mass	T1W- variable- based on age T2W- variable- based on age Contrast- No enhancement
Abscess	Ill-defined mass or focal asymmetry	May or may not communicate with duct	Hypoechoic, irregular mass	Low density mass Peripheral contrast enhancement	T1W- hypointense T2W- hyperintense Contrast- peripheral contrast enhancement
Papilloma	Often not visible Round or oval mass Course Ca++	Intraluminal filling defect	Intraductal mass Dilated ducts	Not visible	T1W- not seen T2W- hypointense mass in hyperintense duct Contrast- variable mild contrast enhancement
Invasive Ductal carcinoma	Round, oval, or speculated mass Microcalcifications	Intraluminal filling defect	Irregular, hypoechoic mass	Soft tissue mass	T1W- Isointense T2W- Hypointense Contrast- rapid, intense contrast enhancement

Table 2: Differential diagnosis table for post-operative seromas and their salient imaging features.

ABBREVIATIONS

Ca++ = calcium
 CC = craniocaudal
 CT = computed tomography
 MLO = medial lateral oblique
 MRI = magnetic resonance imaging
 T1W = T1 weighted MRI images
 T2W = T2 weighted MRI images

KEYWORDS

mammography; breast; post-operative; seroma; spontaneous nipple discharge; galactography

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