

TECHNICAL NOTE

Ultrasound-guided Percutaneous Galactography

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ABSTRACT

Galactography is an excellent tool for delineating and locating the cause of nipple discharge. The conventional approach involves cannulation of the secreting duct, followed by injection of contrast. However, it is sometimes difficult to identify the discharging duct due to intermittent discharge that has subsided at galactography. Inverted nipple is another obstacle, rendering identification of the discharging ductal orifice difficult and sometimes impossible. Under these circumstances, ultrasound-guided percutaneous galactography becomes a valuable alternative method for evaluating women with a non-lactational nipple discharge.

Key Words: Bodily secretions; Mammography; Nipples discharge; Ultrasonography, mammary

INTRODUCTION

Nipple discharge is a common presenting symptom, accounting for approximately 5% of women attending the breast clinic.¹ Galactography is the imaging tool of choice for investigating women with a non-lactational discharge because it enables demonstration of size, location, and extent of intraductal abnormalities. Moreover, galactography has a sensitivity of 94% and a specificity of 79% for the recognition of intraductal lesions.^{2,3} Most galactography procedures are performed via the conventional approach, which involves cannulation of the secreting duct followed by injection of contrast. This approach is widely practiced as it is economical, technically easy, and relatively non-invasive. However, for patients with subsided nipple discharge or inverted nipple, cannulation of the symptomatic ducts is impossible. For these situations, ultrasound-guided percutaneous galactography is a valuable alternative approach for evaluating women with a non-lactational nipple discharge.

TECHNIQUE

Eight percutaneous galactographies have been performed successfully in 8 patients (aged 34 to 76 years) at the Department of Radiology, Queen Mary Hospital,

Hong Kong, from June 2006 to April 2008. Prior to the procedure, ultrasound of the breasts was performed with a 10- to 13-MHz linear transducer. If ultrasonography revealed dilated mammary ducts, ultrasound-guided percutaneous needle puncture was then performed with a 25-G hypodermal needle connected to a 1-mL insulin syringe by an extension tube (Figure 1) under aseptic technique. Injection of Omnipaque 300 0.2 to 0.5 mL was monitored by real-time ultrasound, to avoid contrast extravasation. This stage was followed by 2 mammogram views.

CASE REPORTS

Patient 1

A 34-year-old woman was referred to the breast clinic in 2006 with left nipple discharge. Ultrasound showed dilated ducts at the 9 o'clock position of the left breast.



Figure 1. A 25-G hypodermal needle connected to a 1-mL insulin syringe by an extension tube.

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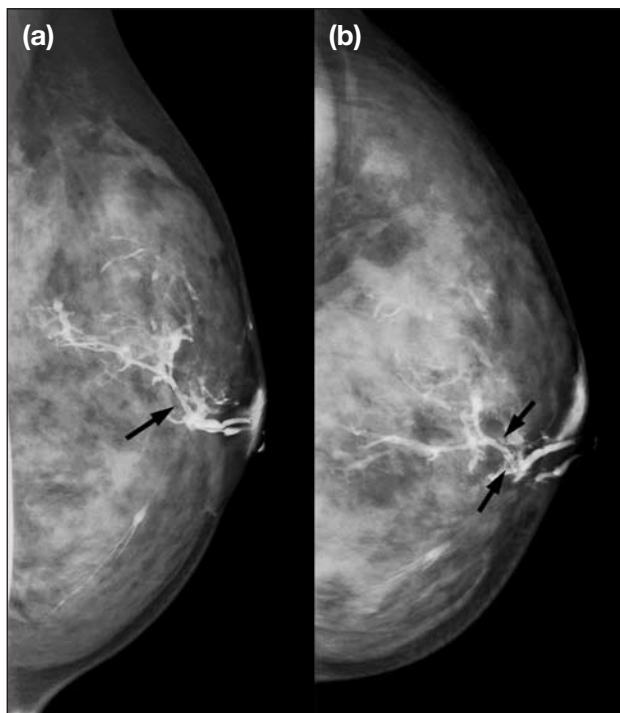


Figure 2. Ductogram. (a) Medial-lateral-oblique view; and (b) cranio-caudal view showing multiple intraductal filling defects (arrows).

Subsequent microdochectomy was performed in 2006. However, the patient still had persistent nipple discharge. Repeat ultrasound showed dilated lactiferous ducts at the 12 o'clock position of the left breast with the main duct measuring 3 mm. As there was only scanty nipple discharge, ultrasound-guided percutaneous puncture of the abnormally dilated lactiferous duct was performed using a 25-G dermal needle. Approximately 0.2 mL of contrast was injected. Blood-stained fluid was refluxed through the nipple during contrast injection, indicating that the symptomatic duct had been identified correctly.

Ductogram revealed a dilated lactiferous ductal system at the 12 to 1 o'clock position, with internal filling defects and abrupt termination of some other ducts (Figure 2). A radiological diagnosis of multiple papillomatosis was made based on the galactography findings. The patient was treated in a private hospital and defaulted follow-up at the breast clinic. Therefore, her histology report could not be obtained.

Patient 2

A 46-year-old woman presented in 2006 with bilateral nipple discharge, for which microdochectomy was performed. However, this patient had intermittent left nipple discharge after the procedure. Follow-up ultrasound showed an 8-mm cystic lesion at the 3 o'clock position on the left breast. A dilated 3-mm lactiferous

duct was seen extending from the cystic lesion towards the nipple. Since the left nipple discharge had completely subsided at the time of examination, ultrasound-guided percutaneous puncture of the cystic lesion was performed and a trace amount of contrast was injected. Subsequent mammogram showed a 1-cm contrast-filled cyst and a thin duct leading towards another segment of tortuous dilated ducts at the subareolar location. The patient underwent operation, and histology revealed an intraductal papilloma with ductal carcinoma in situ.

Patient 3

A 37-year-old woman presented in 2006 after 1 episode of whitish right nipple discharge. Tortuous dilated lactiferous ducts were seen at the 3 to 5 o'clock positions of the right breast at ultrasound. An 8-mm deep-seated nodule was also detected at the 5 o'clock position of the right breast, 2 cm from the nipple, and closely related to the dilated ducts. Since no nipple discharge could be expressed, percutaneous puncture of the dilated duct at the 3 o'clock position was performed using a 25-G hypodermal needle. Injection of a mixture of water-soluble contrast and methylene blue was performed under ultrasound guidance. Blue dye was refluxed from the nipple during the procedure, indicating that the symptomatic duct had been identified. Subsequent mammogram showed several dilated ductal branches with filling defects. The patient underwent operation immediately after the galactography and histology revealed a fibroadenoma with sclerosing adenosis.

Patient 4

A 43-year-old woman, with a past history of right breast cancer and modified radical mastectomy in 2004, presented in 2006 with left nipple discharge. Ultrasound revealed dilated lactiferous ducts up to 3 mm in diameter at the 8 o'clock position of her left breast. Clear discharge was demonstrated from the left nipple at the 8 o'clock orifice. This was successfully cannulated with a 25-G needle, and a mixture of contrast and methylene blue was injected. Mammogram showed a 1.3-cm long segment of a dilated duct within the nipple; peripherally, the lumen was completely occluded by a 3-mm wide lobulated intraductal mass. The peripheral branches were not opacified. Ultrasound-guided puncture of the dilated ducts at the 8 o'clock position with contrast and methylene blue injection was performed. This procedure outlined the adjacent ductal system, with abnormal tapering branches, which opened to the nipple at a separate orifice. The patient underwent operation and a histological diagnosis of intraductal papilloma was made.

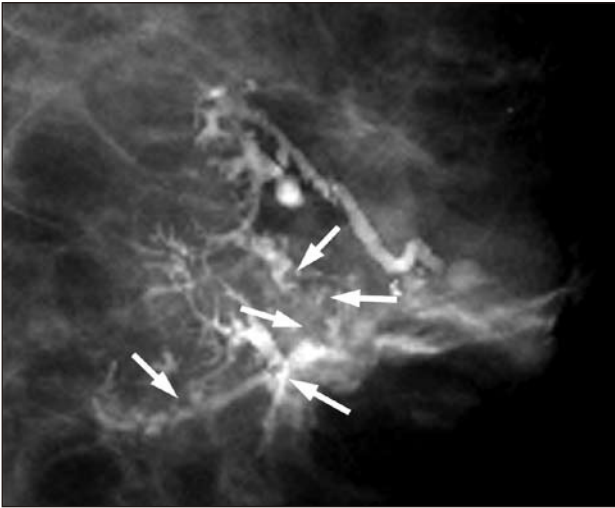


Figure 3. Magnified view of the mammogram in craniocaudal projection showing multiple intraductal filling defects (arrows), indicative of multiple intraductal papillomas.

Patient 5

A 64-year-old woman presented in 2007 with right nipple discharge since October 2006. Ultrasound identified a 2.9-mm dilated duct extending to the right nipple at the 8 o'clock position, with an 8-mm intraductal mass. The symptomatic ductal orifice could not be identified. Ultrasound-guided percutaneous puncture of the dilated duct was therefore performed. Approximately 0.2 mL of methylene blue and water-soluble contrast was injected. The subsequent right mammogram revealed a dilated duct with an intraluminal filling defect. The patient underwent operation and histology showed lymphocytic mastopathy.

Patient 6

A 55-year-old woman presented in 2007 with a yellowish discharge from her left nipple for 1 month. Ultrasound showed dilated lactiferous ducts up to 3 mm at the 12 to 1 o'clock positions of her left breast. Tiny

mural nodules were seen within these ducts, suggesting papillomas (Figure 3). Her left nipple was inverted, therefore the discharging ductal orifice could not be identified. Percutaneous puncture of a dilated duct at the 12 o'clock position was performed with a 25-G hypodermal needle. A mixture of water-soluble contrast and methylene blue was injected. Histology confirmed multiple intraductal papillomas.

Patient 7

A 76-year-old woman presented in 2008 with a history of encysted intraductal papillary carcinoma, for which she underwent excision in 1999. Follow-up ultrasound had detected dilated lactiferous ducts at the 6 to 8 o'clock position on her right breast (Figure 4a). Intraductal debris and nodules were also seen. However, there was no nipple discharge. Ultrasound guided percutaneous needle puncture of a dilated periareolar duct was performed (Figure 4b), and a mixture of water-soluble contrast and methylene blue was injected. Subsequent mammogram showed dilated ducts with blunted and truncated branches at the inferior aspect of the right breast. Intraductal filling defects were noted. Histology showed intracystic papillary carcinoma.

Patient 8

A 52-year-old woman presented in 2008 with bloody discharge from the right nipple for 4 months. The patient also had multiple bilateral breast masses. Ultrasound showed a 4-mm mass at the 7 o'clock position on the right breast, 3 cm from the nipple (Figure 5a). The mass was associated with dilated ducts up to 3 mm in diameter. Two hypoechoic masses, up to 1 cm, were detected at the 10 o'clock and 12 o'clock positions on the right breast. As the nipple discharge was completely subsided, ultrasound-guided percutaneous puncture of

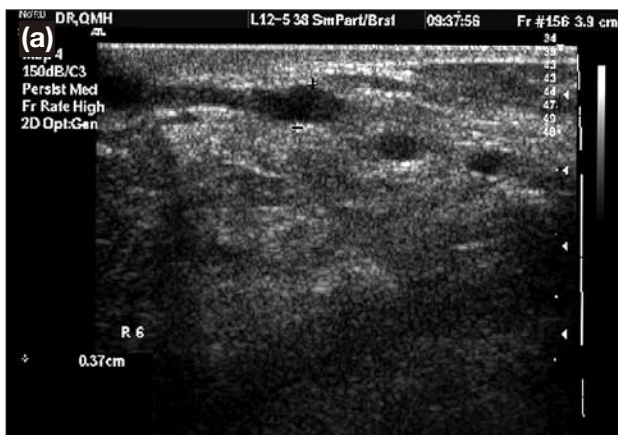


Figure 4. Ultrasound showing (a) dilated ducts up to 3.7 mm at the 6 o'clock position of the right breast; and (b) percutaneous needle puncture (arrow) of the dilated duct under real-time ultrasound guidance.

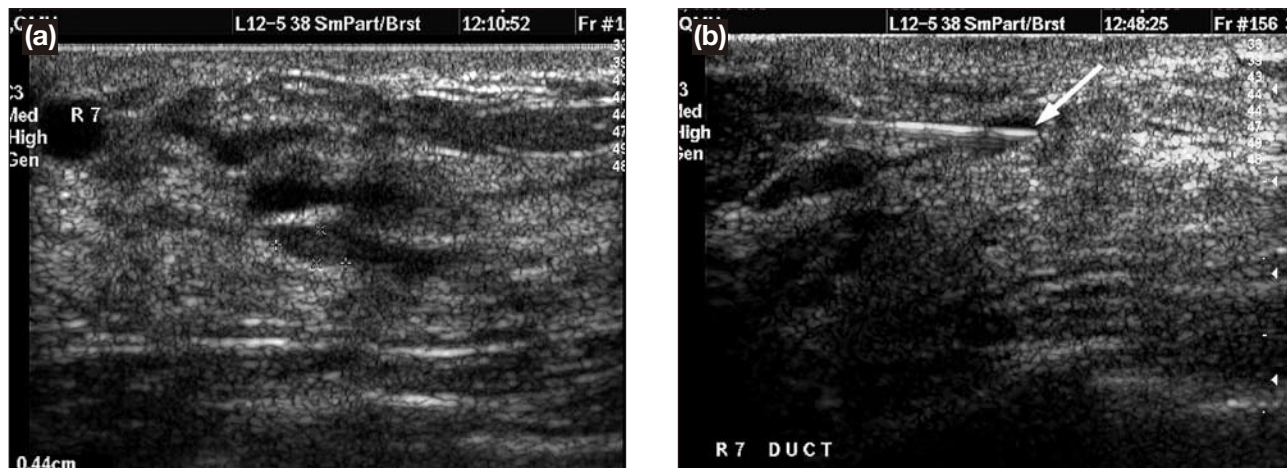


Figure 5. Ultrasound showing (a) a 4-mm intraductal mass at the 7 o'clock position of the right breast; and (b) percutaneous needle puncture (arrow) of the dilated duct under real-time ultrasound guidance.

the dilated duct at the 7 o'clock position was performed (Figure 5b). This was followed by injection of a mixture of water-soluble contrast and methylene blue. Subsequent mammogram revealed complete obstruction of a ductal branch by an intraductal nodule, corresponding to the mass seen on ultrasound. For the 2 lesions at the 10 and 12 o'clock positions on the right breast, ultrasound-guided hookwire insertion was performed. Histology confirmed intraductal papillomas.

DISCUSSION

No contrast extravasation or complications were encountered during these procedures. All the patients subsequently underwent surgery and there has been no recurrence of nipple discharge at follow-up. Seven of the 8 patients underwent surgery at the Queen Mary Hospital and one was followed up at a private hospital. Histopathology reports were traced for the 7 patients who underwent surgery at the Queen Mary Hospital (Table 1). There were 4 intraductal papilloma(s) (50.0%); 1 lymphocytic mastopathy (12.5%); 2 cancers (25.0%) — intracystic papillary carcinoma in 1 patient and ductal carcinoma in situ in 1 patient; and 1 fibroadenoma plus sclerosing adenosis (12.5%).

Ultrasound is an excellent and readily available adjunct to mammography and is frequently used as a complementary

Table 1. Histopathological diagnoses of 7 patients undergoing ultrasound-guided percutaneous galactography.*

Pathology	Number of lesions (%)
Intraductal papilloma(s)	4 (50.0)
Lymphocytic mastopathy	1 (12.5)
Intracystic papillary carcinoma	1 (12.5)
Ductal carcinoma in situ	1 (12.5)
Fibroadenoma with sclerosing adenosis	1 (12.5)

* One patient had 2 lesions.

investigation in the Department of Radiology. With high-frequency, high-resolution transducers, even 0.5-mm lactiferous ducts can be visualised in the retroareolar region. Therefore, ultrasound can be used to guide needle puncture of the dilated lactiferous ducts. For these patients, the free-hand technique was used during ultrasound-guided punctures, because the needle may be easily repositioned to reach the lactiferous ducts.

Papilloma is the commonest pathological finding in women with pathological nipple discharge, accounting for 40% to 70% of patients.¹ Women with papillomas have a 1.5- to 2.0-fold increased risk of invasive carcinoma developing according to the cancer committee of the American College of Pathologists.³ The incidence of malignancy (invasive or in situ) as a cause of non-lactational nipple discharge varies from 1% to 23%, depending on the series.^{1,4} In this series, breast cancer was detected in 2 patients (29%); 1 was an intracystic papillary carcinoma and 1 was ductal carcinoma in situ.

Solitary intraductal papilloma is usually mammographically occult, because of the relatively small size of the lesions and the similar density of the lesion to the breast parenchyma; thus it is easily obscured by overlapping dense breast tissue. For example, if a woman presenting with a non-lactational nipple discharge was followed up by mammography after a failed conventional galactography, there would be a 29% chance of missing breast cancer by not performing ultrasound-guided percutaneous galactography.

The role of magnetic resonance mammography (MRM) in comparison with galactography has been considered. Krämer et al found that papillomas displayed no or

below-the-threshold-lying contrast uptakes with no specific signs suggestive of papilloma on magnetic resonance imaging (MRI).² The sensitivity for detecting papillomas was not increased by combining galactography with MRM. However, MRM has a sensitivity of 89% for detecting malignancy. Therefore, the addition of MRI permits exclusion of malignancy with a high degree of certainty, so conservative management for patients with negative galactography and MRM findings is justified.^{1,2}

CONCLUSIONS

Ultrasound-guided percutaneous galactography is both a valuable and useful alternative approach to conventional galactography for selected patients. This technique shows

small but significant lesions that would otherwise be occult to conventional imaging. In this case series, 2 malignant lesions were detected.

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