

Multifocal Filling Defects on Galactography with Pathologic Correlation

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Galactography is a gold standard in evaluating abnormal nipple discharge. We introduce the role of galactography in patients with abnormal nipple discharge and review images and pathologic findings of diseases manifesting multifocal filling defects on galactography such as intraductal papilloma, other benign ductal pathology and malignant lesions including invasive ductal carcinoma and ductal carcinoma in-situ. The most common cause of multiple filling defects on galactography was intraductal papillomas. Malignant lesions showed some interesting galactographic findings such as irregular filling defect, luminal irregularity, and microcalcifications.

Index words: Galactography
Papilloma
Breast, neoplasms

INTRODUCTION

Galactography has been the “gold standard” in evaluating abnormal nipple discharge to identify and localize intraductal lesions (1). It is sensitive in detection of intraductal lesions, but cannot accurately distinguish between benign and malignant ductal tumors (2). If the focused lesions are multiple, differential diagnosis will become more confused. However, there have been no reports about evaluation of multifocal filling defects on galactography.

The purpose of this report is to show spectrum of disease manifesting multifocal filling defects on galactography and to illustrate the imaging findings on galactog-

raphy in correlation with pathologic results.

Normal Galactography

There are two patterns of normal galactography (3). The one shows repetitive arborization tapering including lactiferous sinus, segmental branch, sub segmental branch, peripheral branch, and terminal ductal lobular unit (TDLU). The other shows short side arms with blunt ends branching from the main duct. The lobular blush is also a normal galactographic finding meaning filling of TDLU's (Fig. 1).

Benign Diseases

Intraductal Papilloma

One of the most common causes of a serous or bloody nipple discharge is the large duct papilloma (3), a benign proliferation of ductal epithelium that projects into

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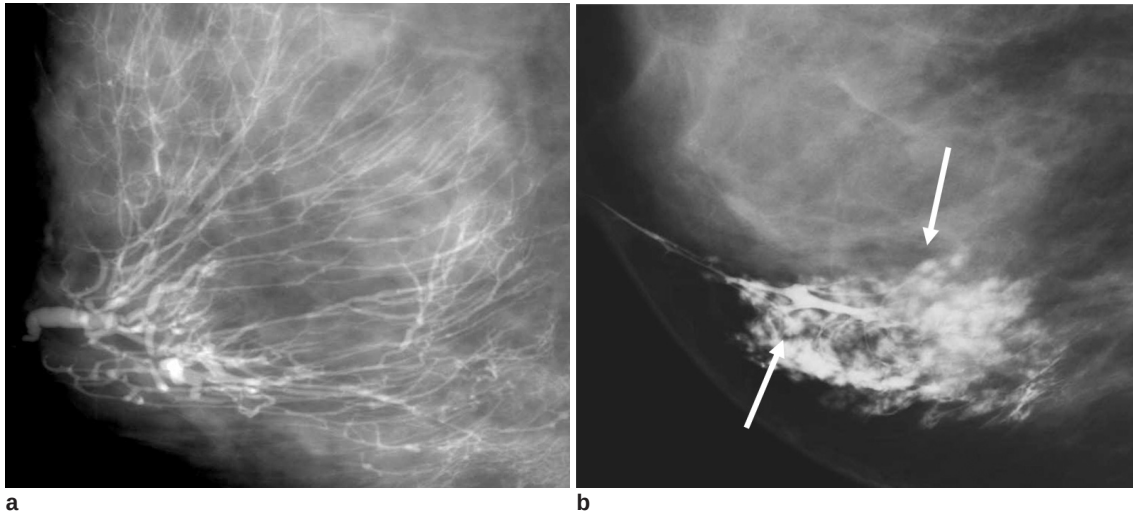


Fig. 1. Two patterns of normal galactogram.
a. Repetitive arborizing pattern
b. Short side arms with blunt ends pattern

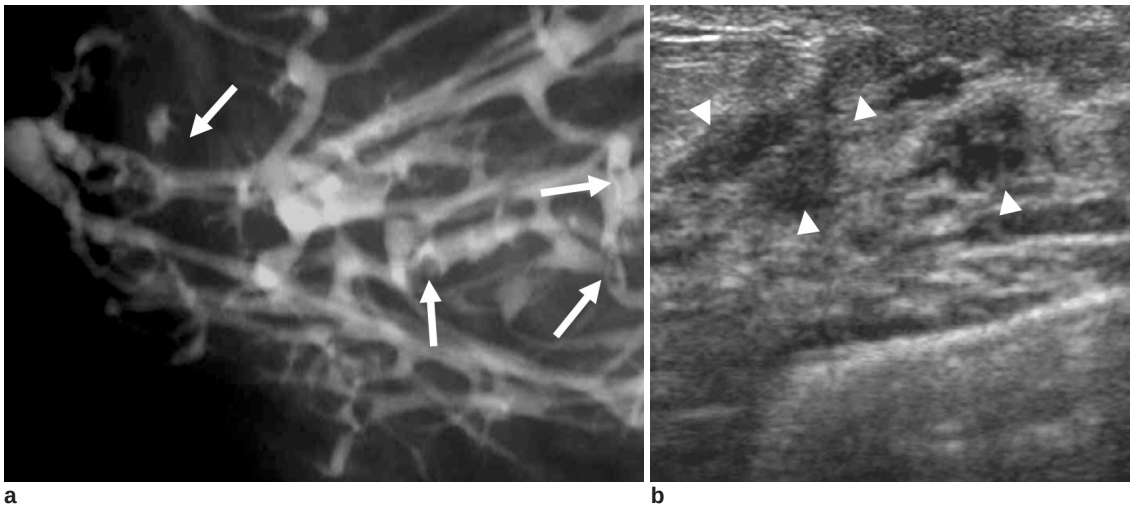
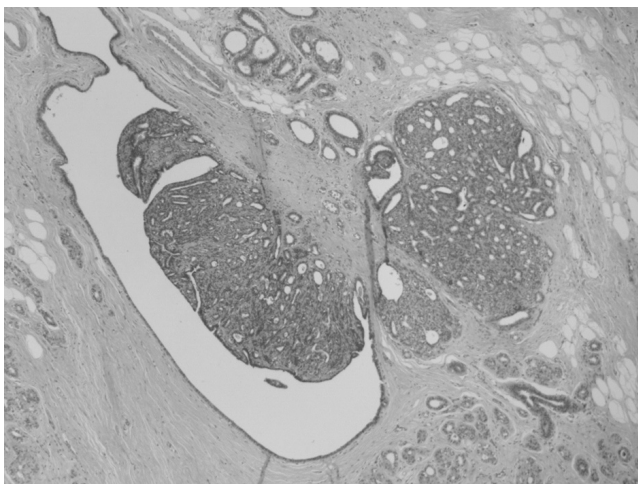


Fig. 2. Multiple intraductal papillomas

- a.** Multiple small filling defects in both central and peripheral ducts (arrows)
b. US findings are multiple small complex echoic nodules (arrowheads) rather than intraductal lesions.
c. Intraductal papillary growth in the lumen of dilated ducts (HE x40)



the lumen of the duct and is connected to the epithelium by a fibrovascular stalk. Intraductal papillomas are usually solitary, but they can be multiple (4). Papillomatosis is believed to be a different entity than the solitary papilloma. They are more peripheral and lacks fibro-vascular core. There are some reports about malignant tendency of multiple peripheral papillomas (5) (Fig. 2).

Some pathologists believe that their vascularity is fragile, which leads to areas of necrosis, infarction, calcification and bleeding (6). The duct around them can di-

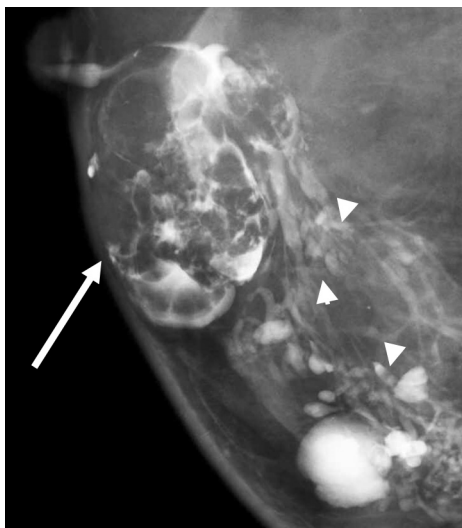


Fig. 3. Infarcted intraductal papilloma
A large filling defect (arrow) suggesting infarcted intraductal papilloma and underlying multiple intraductal papillomas (arrowheads). Multi-lobulating filling defect and multiple intra-cystic nodules make the diagnosis confused with malignancy.

late and form a cystic structure. Keratin plugs and abundant secretions of tumor make proximal duct dilated from the location of papilloma, paradoxically not distal (Fig. 3).

Fibrocystic Change

Fibrocystic change (FCC) is epithelial hyperplasia and fibrous change of the connective tissue. It consists of various microscopic changes such as cyst formation, stromal fibrosis, apocrine metaplasia, blunt duct adenosis, ductal hyperplasia and lobular hyperplasia (7). On galactogram, FCC shows multiple cysts connecting dilated or normal-sized ducts (2, 8). Sometimes inspissated secretions or extensive periductal and intraductal fibrosis cause galactographic findings similar to those of papillomas or malignancy (Fig. 4).

Hemorrhage

Bloody nipple discharge may be secondary to mammary ductal ectasia. The blood clots can show multiple filling defects in dilated ducts (Fig. 5). The causes of hemorrhage within dilated ducts are pregnancy, mechanical trauma, and chronic inflammation.

Periductal Inflammation

Periductal inflammation may cause ductal dilatation. The distended ducts are filled with fluid or thick, unresorbed secretions and cellular debris, and associated with periductal fibrosis (9). On galactogram, intraductal filling defects, obstruction, extravasation and distorted

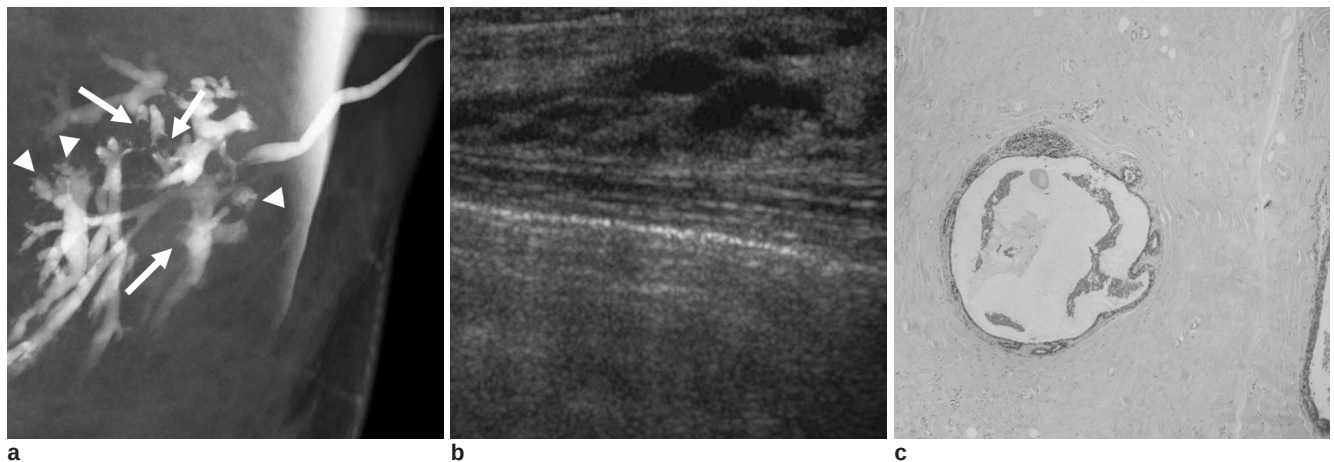


Fig. 4. Fibrocystic change
a. Multiple lobulating filling defects (arrows) with irregular cystic ductal dilatations (arrowheads)
b. Focal duct ectasia in the same central site of ultrasonography
c. Stromal fibrosis and cystic dilation of ducts on microscopic examination (HE X40)

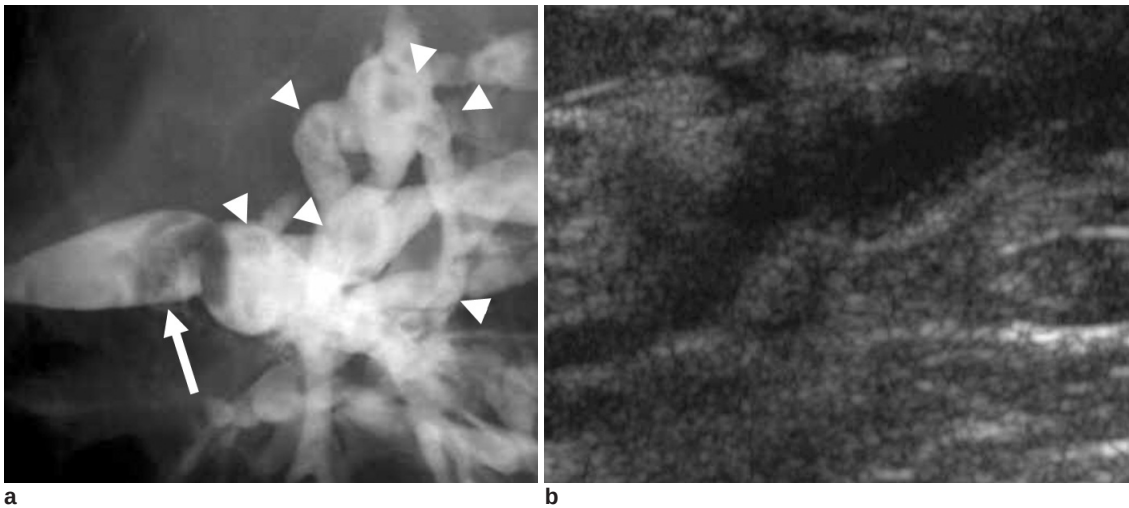
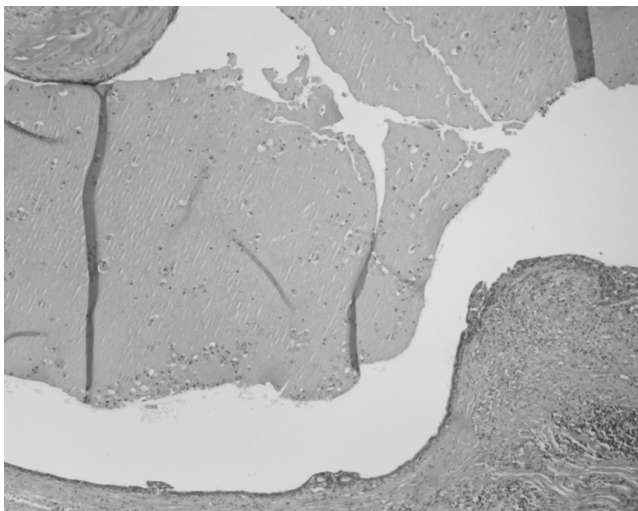


Fig. 5. Multiple filling defects due to blood clots

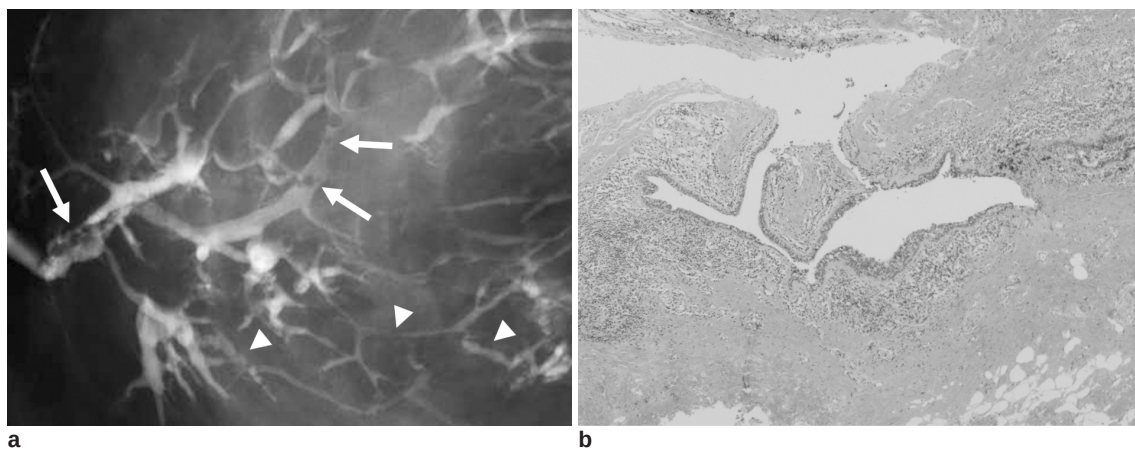
a. Galactogram shows multiple small filling defects (arrowheads) with dilatation of central and peripheral ducts. It was unclear whether the large filling defect (arrow) in lactiferous duct is mass or blood clot.

b. Irregular ductal dilatation and wall thickening are detected on US.

c. There were many scattered small cysts filled with blood clots through the specimen (not shown). Markedly dilated duct containing macrophages, and chronic inflammation in the surrounding tissue (HE $\times 40$).



c



a

b

Fig. 6. Periductal inflammation

a. Multifocal filling defects (arrows) and ductal wall irregularities (arrowheads) on galactogram

b. Dilated ducts and chronic inflammatory cell infiltration in the periductal tissue (HE $\times 40$)

duct system can be seen (Fig. 6). Chronic aseptic inflammation or recurrent subacute infection is presumed to be the cause of duct ectasia. The patients often complain white sticky or weak bloody discharge.

Malignancy

Some galactographic findings are suggestive of breast cancer, which are complete duct obstruction with mass,

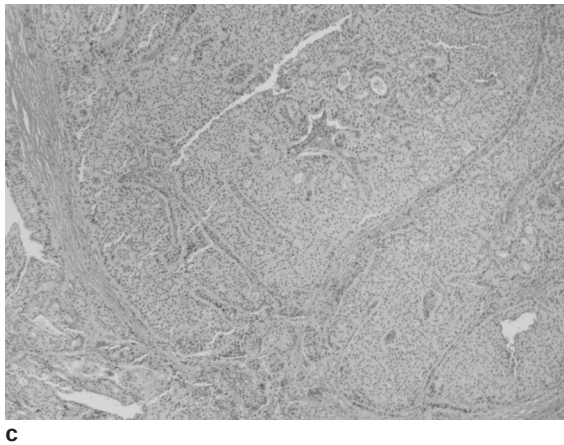
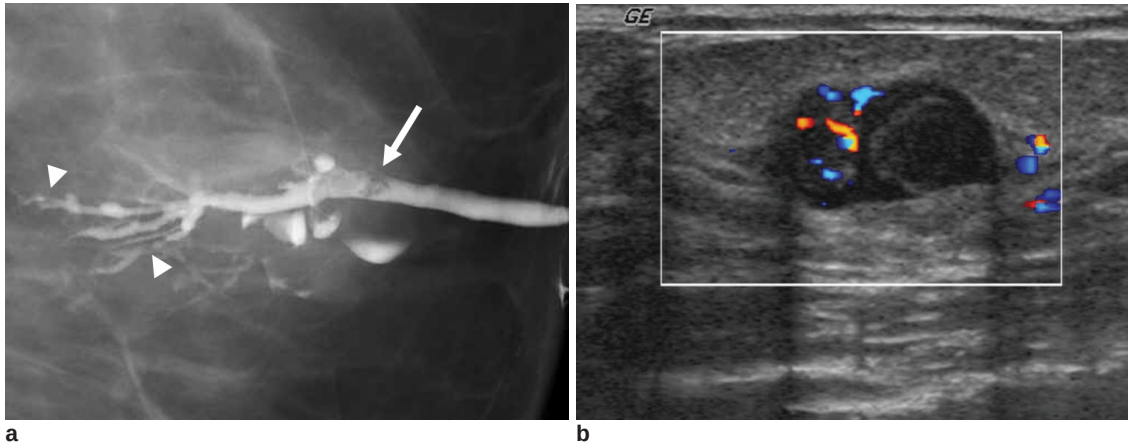


Fig. 7. Ductal carcinoma in-situ, solid and cribriform type
a. Lobulating filling defect (arrow) and ductal wall irregularities (arrowheads) with cystic ductal dilatation are noticed on galactography.
b. Multiple intracystic masses with increased vascularity are detected on US.
c. Intraductal solid and cribriform proliferation of malignant cells with occasional cystic spaces (HE × 40)

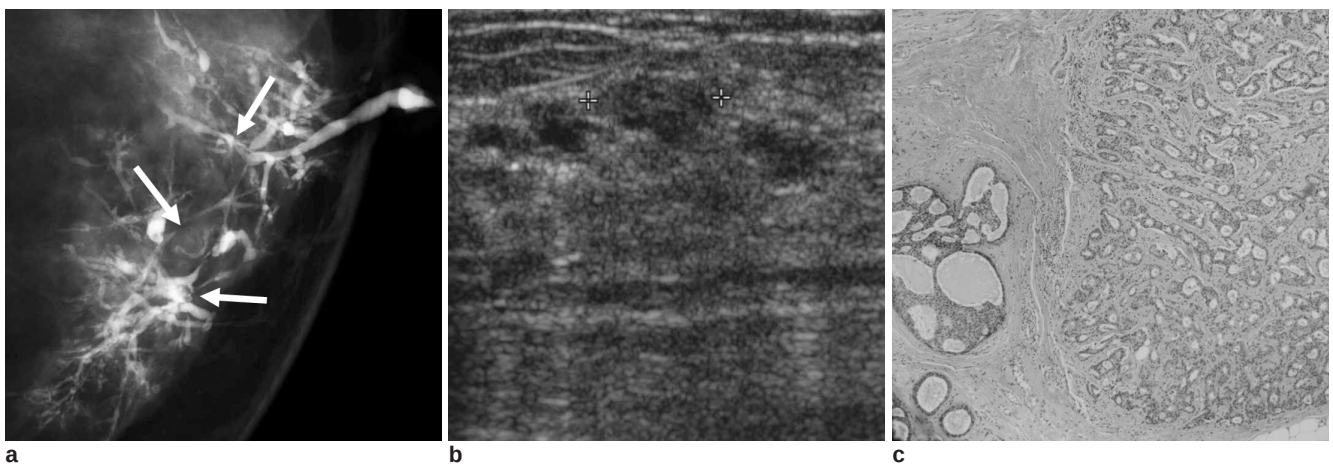


Fig. 8. Invasive ductal carcinoma with extensive intraductal component
a. Multiple small filling defects (arrows) with severe ductal wall irregularities suggest a suspicious malignancy.
b. In the same site, multiple small low echoic lesions are found on US.
c. Invasive ductal carcinoma and intraductal carcinoma of cribriform type (HE × 40)

irregular filling defect, irregular ductal wall change, extravasation and distortion of normal ducts (8). The features of breast carcinoma at galactography may imitate those of papilloma (2, 8). And the shape of intraductal filling defect are not helpful in differentiating malignancy from benign intraductal lesions (2). Additional evidence of carcinoma may be present in tissue adjacent to abnormal ducts. Extravasation may be due to technical factors, or to epithelial destruction by invasive carcinoma. Extensive multifocal or multicentric intraductal abnormalities that can show multiple filling defects may be understaged, especially if they are peripherally located.

Ductal Carcinoma In-situ

Sometimes, breast cancer manifests by spontaneous nipple discharge without palpable mass or mammo-

graphic abnormality (10). Ductal carcinoma in-situ may show normal galactographic finding with or without microcalcifications in same of secreting duct. Sometimes microcalcifications are present in other quadrant of the same breast (10). Multiple filling defects, ductal distortion, or ductal amputations are visible. Sometimes, multiple filling defects are very similar to those of papillomatosis (2) (Fig. 7, 8).

Invasive Ductal Carcinoma

Galactography may show complete ductal obstruction in conjunction with a mass at the point of obstruction, irregular filling defects, focal or diffuse ductal wall irregularity, and extravasation of the contrast due to ductal obstruction by tumor (Fig. 9). Architectural distortion can also be associated with ductal abnormalities (2),

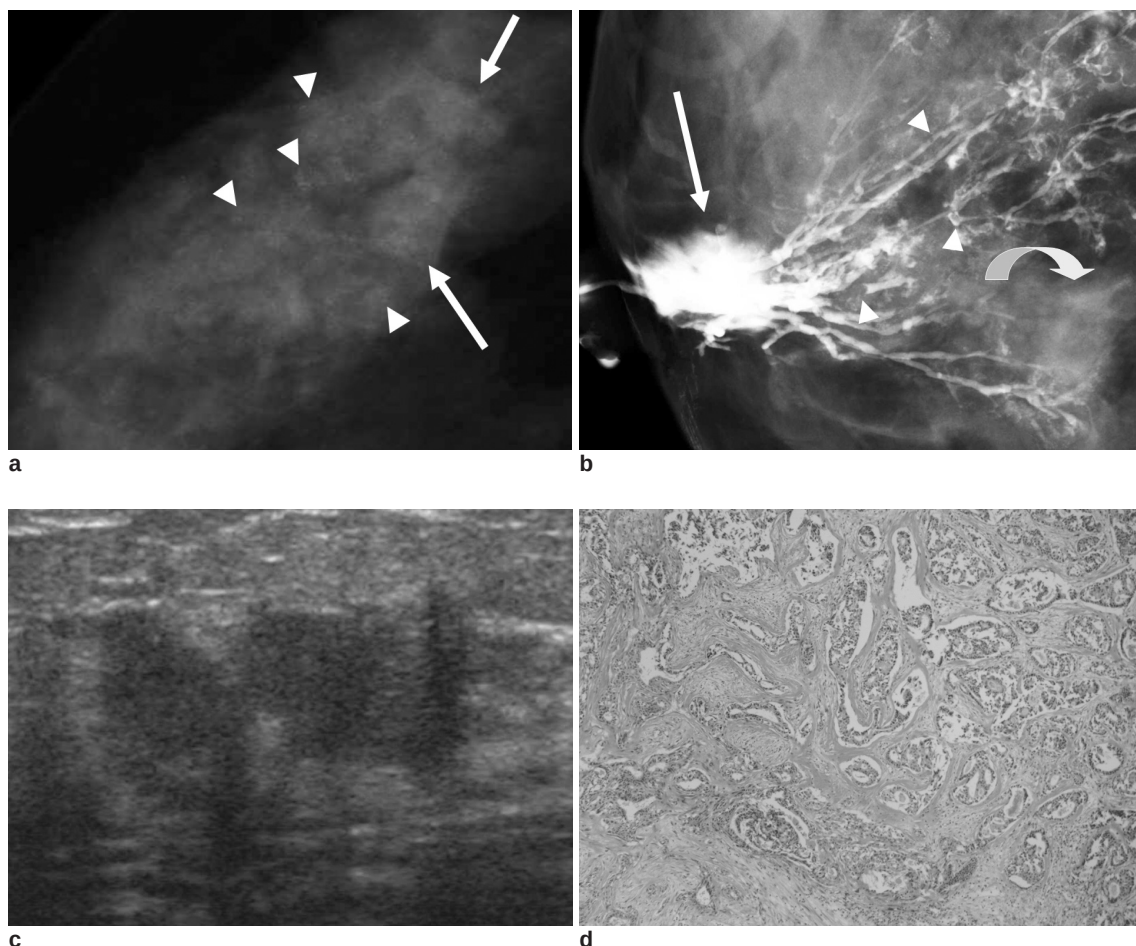


Fig. 9. Multiple invasive ductal carcinomas

- a.** Segmental distributed amorphous microcalcifications (arrowheads) and two hyperdense (arrows) masses are noted in the outer portion of right breast.
- b.** Galactogram shows multiple filling defects (arrowheads), ductal irregularities and extravasation (arrow), in addition to irregular mass (curved arrow) in the periphery.
- c.** Two irregular hyperechoic masses represent suspicious malignancies on US.
- d.** Infiltrative growth of malignant glands is found on microscopic examination (HE $\times 40$).

and only displacement of surrounding ducts without other abnormality can be seen in some cases (8, 10).

CONCLUSION

Multiple filling defects on galactography can be caused by diffuse disease spectrum from benign to malignant breast lesions. Some galactographic findings such as irregular filling defects, luminal irregularity, associated microcalcifications or architectural distortion can suggest the possibility of malignant lesions, but many findings overlap in benign and malignant lesions.

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유선조영술에서 보이는 다발성 충만 결손들: 병리소견과의 비교

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유선조영술은 이상 유두 분비물을 검사하는 가장 좋은 검사 방법이다. 저자들은 본 논문에서 이상 유두 분비물을 가진 환자들에서 유선조영술의 역할과 유두종, 다른 양성 유선 병변들, 유방암 등 유선조영술에서 여러 개의 결손들을 보일 수 있는 병변들의 영상과 조직학적 소견들을 살펴보고자 한다. 유선조영술에서 여러 개의 결손들을 보이는 가장 흔한 질환은 유두종이었다. 악성 유방 병변들의 유선조영술 소견은 불규칙한 결손이나 불규칙한 내강, 동반된 미세석회화 등이 있었다.

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