



Diagnostic accuracy of abnormal galactographic and sonographic findings in the diagnosis of intraductal pathology in patients with abnormal nipple discharge



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ABSTRACT

The purpose of the study was to compare the diagnostic accuracy of the combination of galactography and ultrasound in patients with pathologic nipple discharge. Fifty-six patients with pathologic nipple discharge were included in the study. Sensitivity, specificity, and positive (PPV) and negative predictive value (NPV) for each method and the combination of both were calculated. Both methods together had a sensitivity, specificity, PPV, and NPV of 91%, 17%, 61%, and 57%. The combined sensitivity of galactography and ultrasound for intraductal pathologies is higher than either modality alone, with a low specificity. No specific signs exist to predict benign or malignant lesions.

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1. Introduction

Unilateral spontaneous nipple discharge is in most cases associated with benign breast disease but can also be a sign of malignancy [1,2]. Imaging of milk ducts with intraductal contrast media application is called galactography and was performed first by Ries in 1930 to evaluate the milk ducts in women with pathologic unilateral breast secretion [3]. After cytological analysis, galactography is currently performed after injection of nonionic contrast media to visualize and diagnose intraductal pathologies in women with abnormal unilateral nipple discharge [4]. Signs of intraductal pathology in galactography are exophytic intraductal opacities in some cases causing a distension or obstruction of the affected duct. The latter leads to cysts distal to the obstruction [5].

There are contradicting results of the potential of galactography to diagnose benign or malignant disease of the breast in patients with abnormal nipple discharge [4,6–8]. The consensus of all studies is that galactography is helpful to localize ductal abnormalities, but the reported sensitivity and specificity of galactography are within a wide range [9]. Ultrasound (US) of the breast has been described as a good method for localizing intraductal abnormalities [10]. Duct ectasia, intraductal mass, or focal mass is a suspicious sonographic sign for intraductal pathologies [11]. Most studies evaluate the sensitivity and specificity of either galactography or US or magnetic resonance (MR) mammography

to detect intraductal pathologies, with different and a wide range in sensitivity and specificity [9]. Although not defined in the European guidelines, in most specialist breast units, galactography is usually performed in combination with US to detect underlying benign or malignant pathologies in patients with abnormal nipple discharge, but the combined diagnostic accuracy of both methods never has been defined.

In the current study, we therefore evaluated and compared the diagnostic potential of galactography and/or US alone and the combination of both methods to predict intraductal pathology. In a second step, the predictive value to distinguish between benign and malignant intraductal pathologies was evaluated to show whether those imaging techniques could distinguish between benign or malignant breast pathology.

2. Materials and methods

2.1. Patients

After positive vote of the local ethics committee, retrospective analysis of the daily records of the specialist breast care unit of the University Hospital Düsseldorf was performed and revealed 118 women referred for galactography between January 2008 and October 2013 due to abnormal unilateral nipple discharge. Clinical breast examination and exfoliate cytology were performed prior to galactography. A cannulation of the secreting duct was not possible in 14 patients. Forty-seven patients were excluded due to normal galactography with missing follow-up or missing histologic result due to surgery in a different hospital. Fifty-six patients (aged 31–81 years, mean age 50.5 years) were included in the study. All patients reported spontaneous secretion from one duct over a period of 4–6 weeks previous to the galactography.

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2.2. Mammography

Patients without recent mammography underwent routine mammography with either a computed radiography mammography or a digital full-field mammography unit [GE Senographe DMR with Philips Computed Radiography (PCR) Eleva, Philips Healthcare, Hamburg, Germany, or GE Senographe Essential CESM, GE Healthcare, Solingen, Germany] prior to galactography in order to demonstrate suspect microcalcifications, which could be overlaid by the contrast media.

2.3. Galactography

Galactography was performed as computed radiography or full-field digital mammography in two planes with a mammography unit (GE Senographe DMR with PCR Eleva, Philips Healthcare, Hamburg, Germany, and GE Senographe Essential CESM, GE Healthcare, Solingen, Germany) following catheterization of the secreting milk duct with a blunt cannula visualizing the milk ducts by injection of 0.3–0.5 ml of water-soluble contrast medium (Solutrast 300, Bracco Imaging Deutschland, Konstanz, Germany). A modified scheme as previously proposed [4,6] was used to evaluate galactography. Pathologic findings comprised duct ectasia with enlargement of the duct over a diameter of 2-mm width, ductal filling defect, and filling stop (Fig. 1).

2.4. Ultrasound

An Aixplorer Supersonic US system (Supersonic Imaging, Munich, Germany) or Toshiba Aplio MX (Toshiba Medical Systems, Neuss, Germany) was used for second-look US prior to biopsy or surgery. Three gynecologists with 5–12 years of experience in US evaluated the breast with knowledge of galactographic findings. Pathologic findings comprised duct ectasia, intraductal mass, and suspicious lesion (Fig. 2). After second-look US, 56 patients (aged 31–81 years, mean age 50.5 years) subsequently underwent diagnostic biopsy ($n=22$) or surgery ($n=34$). Pathological results were retrospectively taken out of the patient chart. Statistical analysis was performed using R v3.0.2 [12]. McNemar test was used to calculate the sensitivity, specificity, and positive predictive value (PPV) of pathologic galactographic, pathologic sonographic, and pathologic galactographic and sonographic findings together.

3. Results

3.1. Clinical examination and cytology

Clinical breast examination revealed a palpable mass in three patients; one woman showed benign histologic results, one woman had papilloma in combination with ductal carcinoma in situ (DCIS), and histology of one lesion showed a papilloma. One woman reported pain in the breast with histologic result of papilloma and fibroadenoma (Table 1). The secretion was sanguineous in 36 women, 16 women had yellowish/greenish discharge, and 4 women had serous nipple discharge. Cytology showed malignant cells in one woman with DCIS, and suspicious cells for an underlying papilloma were found in seven patients. Four patients had papilloma, and one patient had invasive cancer with in situ carcinoma. No pathologic results were found in the other two patients.

3.2. Breast imaging

Galactography revealed abnormal findings in 39 patients; in 27 patients, pathologic galactographic findings correlated with abnormal US findings, and 10 patients with normal galactography showed abnormal US findings (Table 1). Benign breast lesions (papilloma/fibroadenoma) were found in 28 patients, with 2 patients showing a papilloma and a fibroadenoma in the breast. In seven patients, malignant lesions of the breast were found; four patients had DCIS; one patient had invasive carcinoma; and two patients presented with invasive cancer and additional in situ carcinoma (Table 1). Chronic inflammation, fibrocystic mastopathy, and/or ductal hyperplasia were found in the remaining 21 women with abnormal features in either galactography or US. One DCIS and one invasive cancer with surrounding DCIS were overseen with both methods.

3.2.1. Findings of galactography

Galactography showed duct ectasia in 14 women, ductal filling defect in 14 women, and ductal filling stop in 21 patients (Table 2). The most frequent sign in patients with benign or malignant lesion in the breast was ductal filling stop in 13 patients, followed by 11 patients with duct ectasia and 10 patients with ductal filling defect. Galactographic detected filling stop was found in nine patients with benign and four patients with malignant breast tumor. With the same frequency, duct ectasia was

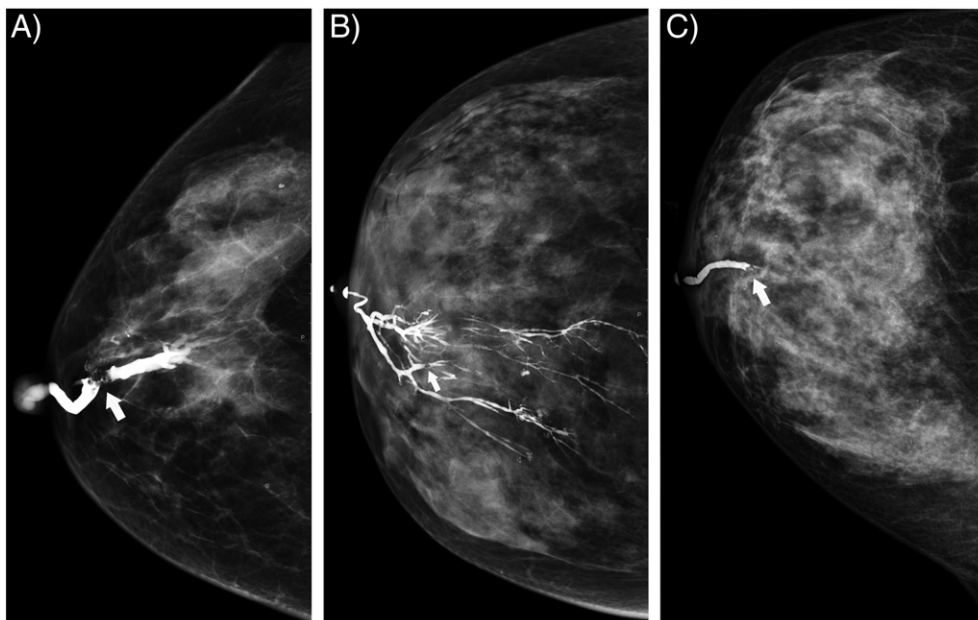


Fig. 1. Pathological galactographic signs. (A) Duct ectasia and intraductal filling defect (arrow). (B). (C) Ductal filling stop.

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