International Journal of Research in Medical Sciences
Dhull V et al. Int J Res Med Sci. 2016 Jul;4(7):2878-2882
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20161969

Research Article

Case series: imaging features of intraductal papillomas in patients presenting as nipple discharge

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Received: 17 May 2016
Accepted: 09 June 2016

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ABSTRACT

Background: The purpose of this study was to evaluate imaging spectrum of intraductal papillomas on breast ultrasonography (US), mammography and contrast enhanced magnetic resonance imaging (CE- MRI) in patients presenting as nipple discharge.
Methods: Our study was a prospective study of female patients presenting with the history of pathological nipple discharge. After taking detailed patient history, thorough clinical examination was conducted followed by multimodality imaging approach. The initial imaging work up began with ultrasonography and mammography, then followed by CE-MRI. Provisional diagnosis was given and compared with the final diagnosis achieved by surgery/ fine needle aspiration/ biopsy or clinical and imaging follow up.
Results: 7/25 patients had intraductal papilloma as proven by surgery/ FNA. Mass lesion was identified in all 7 cases on sonography and MRI while it was detected in only 3 cases on mammography. Dilated ducts were demonstated in all 7 cases on sonography, in 6 cases on CE- MRI and 5 cases on mammography respectively.
Conclusions: Mammography has limited diagnostic accuracy in patients with unexplained nipple discharge and MRI should be considered the diagnostic technique of choice in this clinical setting, with relevant corresponding area focussed on sonography.

Keywords: Papillomas, Nipple discharge, Dilated ducts

INTRODUCTION

Breast papillomas consist of a variety of lesions which have papillary configuration on gross or microscopic examination. They include solitary intraductal papillomas, multiple papillomas and papillomatosis or juvenile papillomatosis.

The solitary intraductal papillomas are tumors of major lactiferous ducts seen most frequently in 30-50 years old females. They present with serous or serosanginous discharge.[1] Breast discharge is a symptomatic problem that causes both discomfort and anxiety to many women. It is the third most common breast complain after breast pain and breast lump, with a reported prevalence of 4.8-7.4%.[2] It is a true, direct drainage from the mammary duct or ducts, which appears on the surface of the nipple.

Nipple discharge is usually physiological but can be due to underlying disease. It is considered as clinically significant when it is spontaneous, persistent, and non-lactational discharge.[3]

Clinically pathological discharge is from a single duct, clear, watery, serous or bloody in appearance. The pathological discharge is usually benign in its origin (typically an intraductal papilloma and/or ductal ectasia), but an underlying malignant lesion can be found in upto

21% case.[2] Thus it is of utmost importance to exclude the presence of a malignant lesion in a patient of nipple discharge.

The most common cause of clinically significant discharge is intraductal growth of the ductal epithelium, due to hyperplasia, micro papillary proliferation, solitary papillomas and/or ductal carcinoma (both in situ and invasive).[4] The various radiological and imaging modalities to assess patients with breast discharge are mammography, ultrasonography, ductography and magnetic resonance imaging.

Mammography is usually the first line radiological technique used especially for screening purposes as it helps to detect carcinomas at an earlier stage and when they are of smaller size and thus reducing the mortality from breast cancer. However, it should be remembered that a negative mammogram does not exclude underlying pathology as it has low sensitivity in patients with nipple discharge because the malignant lesions are usually very small, without calcifications and completely intraductal or may be obscured in patients with dense breasts.[4]

Ultrasonography is an indispensable complementary diagnostic tool in investigation of breast abnormalities. It is sensitive to detect intraductal lesions, which are frequently responsible for nipple discharge. Colour and power doppler raise its specificity and diagnostic accuracy to 100%. US guided fine needle biopsy is minimally invasive technique in confirming the diagnosis of suspicious mass.[4]

More recently MR imaging has been proved to be able to identify both benign and malignant causes of nipple discharge offering a non-invasive alternative to ductography.[2] MRI has been reported to be an useful adjunct in diagnosis of intraductal papilloma in breast.[5] Recent studies have demonstrated that MRI is more accurate than mammography in assessing invasive cancers for assessing local extent of disease.[6]

Major duct excision is still considered the gold standard to exclude an underlying malignancy, but some authors have suggested that MRI might allow improved patient selection and treatment planning compared with conventional imaging (i.e. mammography and sonography) and ductography.[7]

We planned this study to compare the accuracy of mammography, ultrasonography and magnetic resonance imaging in patients with nipple discharge, focussing on sensitivities and imaging spectrum for intraductal papilloma.

METHODS

The present study was done in the department of Radiodiagnosis at Pt B. D. Sharma PGIMS, Rohtak. Female patients who presented with either pathological breast discharge or dilated ducts on sonography were included in the study. The patients presenting with milky discharge from the breast and in whom MRI is contraindicated i.e. those with implanted medical devices containing ferromagnetic object like cardiac pacemakers, internal defibrillator devices, orthopaedic implants, etc were excluded from the study group.

After initial clinical assessment, sonography was performed using a broadband linear array transducer (5-13 MHz). Mammograms were done on the Siemens Mammomat 3000 Nova with AGFA CR 75 digitizer and contrast enhanced MRI was done on Philips Gyroscan Intera Nova 1.5 Tesla MRI. A provisional diagnosis was suggested after the imaging investigations and these findings were correlated with final diagnosis achieved by fine needle aspiration or excision biopsy.

RESULTS

The present study included 7 female patients of intraductal papillomas between the ages of 22 to 65 years. All patients presented with unilateral discharge which was bloody in 86% patients and serous in 14% patients. The nipple discharge was uniorificial in 5 (71%) patients and multiorificial in 2 (29%) patients. Mastalgia was present in 4 (57%) patients and lump in 2 (29%).

Two patients had history of breast cancer in a first degree relative. Skin erythema was seen in one patient. Tenderness, visible discharge and palpable lump were noted on clinical examination in 71%, 57% and 43% of patients respectively (Table 1).

On sonography, dilated ducts were seen in all 7 patients. The dilated ducts were unilateral in 6 (86%) out of 7 patients. Two patients (29%) had a single dilated duct on sonography, while 5 (71%) had multiple dilated ducts. The ducts were anaechoic in 6 (86%) out of 7 patients. One patient showed echogenic contents in the dilated ducts without any flow on color Doppler suggestive of secretions.

All patients showed well defined and hypoechoic intraductal masses. 6 out of 7 intraductal lesions were round/oval in shape while 1 was irregular in shape.

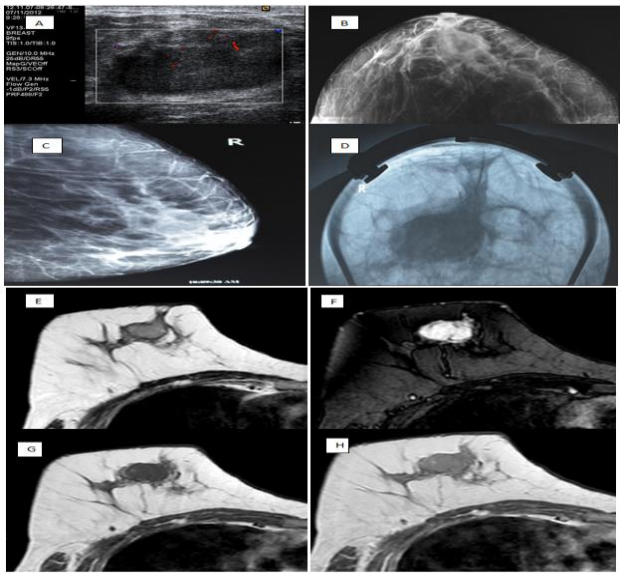
Two patients had 2 intraductal lesions both of which proved to be intraductal papillomas on histopathological examination of the surgical specimen. The majority of lesions i.e. 6 (86%) demonstrated flow on colour Doppler studies seen as a vascular stalk.

It was an important finding suggestive of intraductal papillomas. One patient had a small intraductal lesion of size 4 mm, 3 mm which failed to show flow on color doppler. Axillary lymph nodes were seen in 3 (38%) patients. One patient had few small cysts in ipsilateral breast.

The mammographic examination showed single dilated duct in unilateral breast in 5 (71%) of total 7 patients. Mass lesions were seen in 3 (43%) patients. The masses were oval and well circumscribed. Axillary lymph nodes were seen in 2 (29%) patients.

Table 1: Comparative evaluation of imaging investigations in intraductal papillomas (n=7).

	Mammography	Sonography	CE-MRI
Dilated ducts	5	7	6
Laterality U/l	5	6	5
B/l	-	1	1
Number Single	5	2	2
Multiple	-	5	4
Content	-	1 -echogenic contents	-
Intraductal /mass lesion	3	7	7
Shape oval/round	3	6	6
Irregular	-	1	1
Margin well defined	3	7	7
		Hypoechoic- 7 Color Flow - 6	T1 hypointense-6 T2 hyperintense-5 Hypointense-1 Enhancement-7
Calcification	-	-	-
Axillary lymph nodes	2	3	4
Associated finding cysts	-	1	1



A: Color Doppler with ultrasound image shows an oval hypoechoic lesion with color flow. B: Cranio-caudal (CC) view, and C: Mediolateral Oblique (MLO) view of right breast shows a well-defined, oval mass lesion in right upper and outer quadrant. D: Spot view shows an oval well defined mass along with a dilated duct**; E**: T2 weighted axial image shows a well-defined oval hyperintense mass in right breast. F: T2 weighted fat suppressed axial image shows a well-defined oval mass which is hyperintense to breast parenchyma. G: T1 weighted axial image shows a well-defined oval hypointense mass in right breast. H: On contrast enhanced T1 weighted axial image, lesion is showing homogenous contrast enhancement.

Figure 1: A 50 year old lady with intraductal papilloma (case 1).

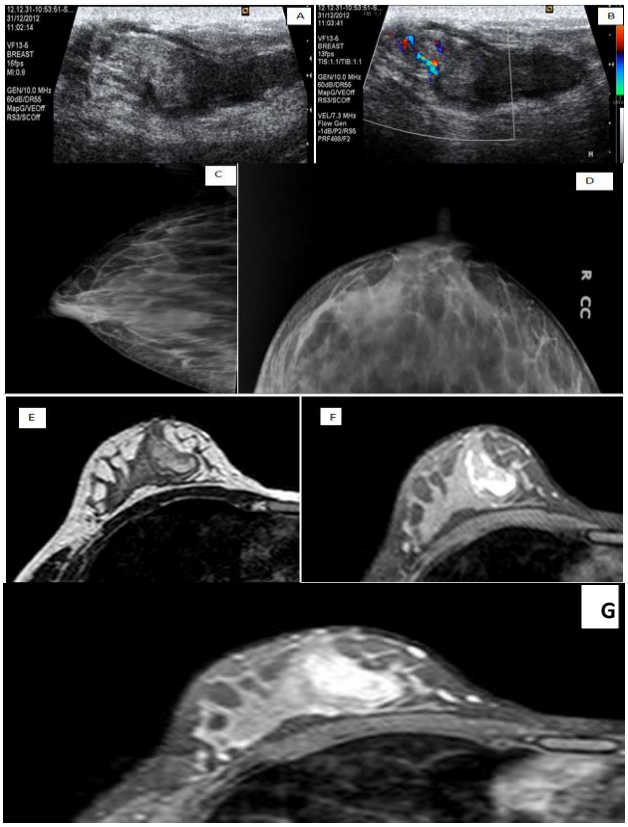
The contrast enhanced magnetic resonance imaging was done for all cases. Dilated ducts were visualized in 6 (86%) out of 7 patients on MRI and all of these had intraductal lesions. Dilated ducts were unilateral in 5 patients (83%). Two patients (33%) had a single dilated duct on MRI, while 4 (67%) had multiple dilated ducts. The intraductal mass was hyperintense on T1 and T2 weighted images as compared to breast parenchyma in majority 6 (86%) of these 7 cases. While it was hyperintense on T1 weighted and hypointense on T2 weighted image in one patient.

All intraductal masses showed contrast enhancement. One case showed a retroareolar mass which was hypointense on T1 and hyperintense on T2 weighted images with enhancement on contrast administration. Dilated ducts could not be identified in this case on MRI however was seen on sonography. Axillary lymph nodes were seen in 4 patients (57%). Associated finding i.e. cysts were seen in one case.

Intraductal papillomas were seen as intraductal/ mass lesions in all patients on sonography and MRI, while were seen in only 3 patients (43%) on mammography. Thus sonography was 100% sensitive in detecting dilated ducts in patients with intraductal papilloma, followed by CE-MRI (86%) while mammography was 63% sensitive in detecting dilated ducts.

Sonography also showed more number of dilated ducts. MRI was better in showing vascularity in the papillomas as all patients had enhancement on contrast

administration. Color Doppler revealed vascular stalk in 6 out of 7 patients (Figures 1 and 2).



A: Ultrasound image shows a dilated duct with an intraductal well-defined hypoechoic lesion in right breast. B: Color doppler image illustrates vascular stalk in the intraductal lesion suggestive of intraductal papilloma C: A mediolateral oblique view and, D craniocaudal view shows well circumscribed lesion in right lower and inner quadrant.E: T2 weighted axial image shows a well-defined oval hyperintense intraductal mass lesion. F: T1 weighted fat suppressed axial image shows a well-defined oval hyperintense intraductal mass lesion. G: Contrast enhanced T1W fat suppressed axial image shows enhancement in the intraductal lesion.

Figure 2: 22 year old female with intraductal papilloma (case 3).

DISCUSSION

Breast discharge is a problem that causes both patient anxiety and physician concern. It is the third most common breast complain after breast pain and breast lump, with a reported prevalence of 4.8-7.4%. The pathological discharge is usually benign in its origin (typically an intraductal papilloma and/or ductal ectasia), but an underlying malignant lesion can be found in upto 21% case.[2]

Thus it is of utmost importance to exclude the presence of a malignant lesion in a patient of nipple discharge. Over the past decade, significant advances in magnetic resonance imaging and its wider availability have led to increased usage in diagnostic evaluation of breast discharge patients.

The present study included 7 female patients of intraductal papillomas between the ages of 22 to 65 years. All patients presented with unilateral discharge which was bloodstained in 86% patients and serous in 14% patients.

The nipple discharge was uniorificial in 5 (71%) patients and multiorificial in 3 (29%) patients. Mastalgia was present in 4 (57%) patients and lump in 2 (29%). Two patients had history of breast cancer in a first degree relative. Skin erythema was seen in one patient. Tenderness, visible discharge and palpable lump were noted on clinical examination in 71%, 57% and 43% of patients respectively.

Intraductal papillomas were seen as intraductal/ mass lesions in all patients on sonography and MRI, while were seen in only 3 patients (43%) on mammography. Sonography was 100% sensitive in detecting dilated ducts in patients with intraductal papilloma, followed by CE-MRI (86%) while mammography was only 71% sensitive in detecting dilated ducts. MRI was better in showing vascularity in the papillomas as all patients had enhancement on contrast administration. Color Doppler revealed vascular stalk in 6 out of 7 patients.

Hamed ST et al assessed the role of grey -scale ultrasonography (USG) and the colour doppler in diagnosis of intraductal papillomas in 107 patients presenting either with uniorifical breast discharge (54 cases) or multi-orifical discharge (53 cases).[4] USG was found to be highly sensitive (100%) but less specific (82.4%) in diagnosis of intraductal pathology.

Color and power doppler are sensitive (94%) in detecting flow in intraductal echogenic masses to differentiate them from insipissated secretions. Color and power doppler raise specificity and diagnostic accuracy to 100%. They concluded that sonography is a mandatory complement to mammography in cases of breast discharge. Their results are very similar to our results as diagnostic accuracy of sonography was 100% in our study as well.

S Ganesan et al studied 42 cases of intraductal papillary neoplasms using sonography and mammography.[8] They observed that intraductal papillary neoplasms (IPNs) of breast form a wide spectrum from benign intraductal papilloma to papillary carcinoma and are broadly classified into central and peripheral types.

Three basic patterns of IPNs were recognized on ultrasound- intraductal mass with or without ductal dilatation, intracystic mass and a predominantly solid pattern with the intraductal mass totally filling the duct. Benign papillomas can exhibit calcifications which tend to be extremely dense and coarse. A distinct vascular pedicle was identified within the central core of IPNs, with branching vessels arborising within the mass. The majority of patients in our study were recognized on ultrasound as intraductal mass with ductal dilatation and

solid pattern with intraductal mass filling the duct and vascular stalk was seen in 7 out of 8 patients.

Lam et al conducted a study in 40 patients with 56 papillary lesions to assess the role of imaging and core biopsy in the patients with papillary lesions of breast.[9] Combined interpretation of mammography and sonography gave a sensitivity of 61%, specificity of 33%, PPV of 85%, and NPV of 13%.

They concluded the overall sensitivity for detection of papillary lesions on mammography is low (37.5% in this series). A higher proportion of malignant lesions showed associated micro-calcification (62.5%). The presence of dilated ducts is a common sonographic finding that is often associated with a visible intraluminal echo. The margin of the lesion and the echo pattern appeared to be useful sonographic signs for differentiating benign and malignant lesions.

However histopathological diagnosis with core biopsy was more sensitive and specific as compared to imaging findings. The sensitivity of mammography in our study was 38% which matches closely with this study while sonography had higher sensitivity in our study. Eiada et al described the appearances of papillomas on mammography, sonography and MRI.[10] On mammography, small papillomas can be occult, particularly when located in the retroareolar regions because of the breast density and relative lack of compression in that area.

Larger lesions may appear as a round- or oval-shaped mass with well-circumscribed margins. On ultrasound, intraductal papillomas may appear as well-defined solid nodules or mural-based nodules within a dilated duct. On color Doppler imaging, flow may be detected within the papilloma arising from a vascular feeding pedicle. On MRI, small intraductal papillomas may be occult whereas larger papillomas may appear as enhancing nodules with or without intraductal components. The findings and appearances in our study match closely with this study except that MRI was able to identify small lesions and showed contrast enhancement in papillomas distinguishing them from secretions.

CONCLUSION

Summarising, in our study though sonography diagnosed all the lesions, it was the best modality for detecting the presence and number of dilated ducts. CE-MRI was better for differentiating intraductal secretions from intraductal papillomas (later showed contrast enhancement) and detecting smaller lesions more confidently than sonography and mammography. Mammography was the best modality for detecting calcifications. Thus we conclude that mammography has limited diagnostic accuracy in patients with unexplained nipple discharge and MRI should be considered the diagnostic technique of choice in this clinical setting, with relevant corresponding area focussed on sonography.

ACKNOWLEDGEMENTS

Authors owe sincere thanks to all members of radiology department especially mammography and MRI technicians for their support and contribution.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Dhull V, Sen J, Yadav R, Drall N. Case series: imaging features of intraductal papillomas in patients presenting as nipple discharge. Int J Res Med Sci 2016;4:2878-82.