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Original Article

A Descriptive Study on Benign Ductal Disorders of Breast

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ABSTRACT

Background: There are not much information available about benign breast problems like duct ectasia (DE) and periductal mastitis (PDM) even among surgeons and general physicians. The current study aimed to analyse clinical features, procedures as well as surgical modalities associated with these benign breast problems for better understanding of the disease progression and treatment

Methodology: This is a prospective study with sample size of 42 patients conducted in M S Ramaiah teaching hospital, Bangalore conducted between October 2020 to September 2022.

Results: In this study, patients presented with nipple discharge, breast lump, itching over nipple areolar complex, nipple retraction and breast pain were included. Based upon the symptoms, appropriate investigations like USG, Mammography, FNAC, Cytology of nipple discharge and MRI breast was done. Patients were diagnosed with, Duct ectasia, Duct papilloma, Periductal mastitis and Pituitary adenoma. Appropriate treatment like wide local excision, Microdochectomy, Hadfield's procedure, conservative treatment were given. A correlation between symptoms, diagnosis and management was done to analyse BBDDs.

Conclusion: Ductal diseases are considered as benign breast problems with unknown etiology. Nipple discharge, breast lump and breast abscess are some of the most common symptoms associated with these problems. In most of these BBDDs conservative management has been proved as the appropriate modality of treatment. With an appropriate guide to diagnosis and management, most ductal diseases can be treated accurately.

Key Words: *Ductal, abscess, breast, dilatation, mastitis*

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INTRODUCTION

The female breast is considered to be amongst the most dynamic structure to go through immense developmental changes throughout the female reproductive phases including puberty, pregnancies, lactation, and menopause. All these changes take place due to normal growth as well as modulations in hormonal levels [1, 2]. Different problems associated with the breast which are encountered by many women include lumps, bumps, breast pain, nipple discharges, or skin irritation with similar kinds of symptoms. Most of the breast lesions or abnormalities are not cancerous. However, these breast problems are commonly encountered as compared to incidence to malignancies [3-5].

Nipple discharge contributes 5-10% of the total breast related issues [6]. Even though the nipple discharge is caused due to benign problems, the primary agenda of every physician is to rule out all the cancer-related possibilities and then treat the symptoms [7, 8]. Even the physicians and surgeons have limited information about the most frequently occurring benign breast problems like duct dilatation, duct ectasia, periductal mastitis and duct papilloma. Ductal diseases of the breast are classified under Aberrations in the Normal Development and Involution of the breast (ANDI) spectrum of diseases. They are classified under Involution (35-55 years) where duct dilatation is normal, duct ectasia is the disorder and periductal mastitis is the disease. Periductal fibrosis is a sequelae of periductal mastitis and may result in nipple retraction. They are also the second most common cause of benign breast disorders next to breast cysts [9, 10].

The treatment of choice for most of these breast problems has been the use of antisecretagogues even though it is highly inappropriate to use them. Patients with breast related problems have also been incorrectly diagnosed as cancer. This may happen due to the confusing nature of clinical and radiological investigations due to associated similarities between periductal mastitis and breast cancer [11, 12]. Dueto insufficient knowledge of the treating physician, these patients are exposed to excessive stress and unnecessary radical examinations in mostcases. Untilnow, the treatment for this condition hasbeensurgeries like microdochectomy, fistulectomy and major mammary duct excision [13-15]. Therefore, a detailed understanding about the disease process becomes relevant to surgery in order to have a complete

perception of these benign breast diseases, which in turn is important for minimising the panic related to cancer and provide proper treatment against these benign breast problems. The present study deals with clinical features, procedures used as well as surgical modalities associated with these benign breast problems.

OBJECTIVES OF THE STUDY

1. To estimate the incidence of various types of Benign Ductal Disorders of Breast.
2. To classify the Benign Ductal Disorders of Breast according to the age wise Distribution.
3. To estimate and classify the Benign Ductal Disorders according to the clinical Presentation.
4. To assess the different treatment modalities in various types of Benign Ductal Disorders.

MATERIALS AND METHODS

Source of Data

Data was systematically gathered from the inpatients and outpatients frequenting the General Surgery department at a tertiary care center. The objective was to meticulously analyze and understand the clinical profile of individuals encountering benign ductal disorders of the breast.

Study Design

A cross-sectional study was orchestrated to facilitate the methodical collection of data concerning benign ductal disorders in female patients. This approach allowed for a detailed and diverse snapshot of the current cases within the timeframe of the study.

Study Settings

The study was conducted within the conducive environment of the General Surgery department at a recognized tertiary care center, known for its specialized healthcare services and facilities.

Study Procedure

The subjects for the study were judiciously chosen after applying specified inclusion and exclusion criteria, thus ensuring a focused and relevant dataset. Information from each patient was collected through a prepared proforma, facilitating a streamlined process of data accumulation.

Duration of Study

The study spanned from October 2020 to September 2022, providing a substantial period for in-depth analysis and research.

Inclusion Criteria

The study predominantly focused on female patients aged above 18 years who reported complaints such as breast pain, lump formation, nipple discharge, recurrent abscesses, itching, and changes in the Nipple Areola Complex (NAC). The inclusion was further narrowed down to patients where mammography, ultrasonography or MRI depicted benign ductal pathology of the breast.

Exclusion Criteria

The research excluded female patients presenting with clinically evident malignant diseases and other benign conditions of the breast apart from benign ductal disorders, thus ensuring a specialized focus on benign ductal anomalies.

Methodology

Step 1: Clinical Examination

Patients enrolled in the study underwent detailed history-taking followed by a rigorous clinical examination. The subjects were classified into several categories based on their symptoms and examination findings, such as swelling, tenderness, breast pain, infection, inflammation, palpable lumps, nodularity, nipple discharge, and NAC alterations. Consequently, a tentative clinical diagnosis was established, incorporating a variety of benign ductal disorders, including Ductal Ectasia, Periductal Mastitis, Intraductal Papilloma, Sclerosing Adenosis, Atypical Ductal Hyperplasia, and Mammary Fistula.

Step 2: Radiological Investigations

The study further enlisted a series of radiological investigations such as sonomammogram, mammography, and MRI to corroborate the initial clinical findings.

Step 3: Pathological Investigations

Pathological investigations, including cytology of nipple discharge, FNAC, core biopsy, and excision biopsy were conducted to finalize the diagnosis, which was substantiated by the outcomes of the radiological investigations.

Step 4: Treatment and Follow-up

Following the cumulative insights from the clinical, radiological, and pathological investigations, individualized treatment plans were developed and implemented for each patient. The post-operative phase saw a close monitoring of the patients, with particular attention given to the histopathological examination (HPE) reports of post-operative specimens.

Informed Consent

Prior to the enrolment, informed consent was obtained from each participant in their vernacular language, ensuring comprehensive understanding and voluntary participation.

Sample Size

Drawing reference from a pertinent study "Duct Ectasia and Periductal Mastitis in Indian women"(3), it was established that a minimum of 42 women needed to be recruited to the study to achieve a representative sample with a confidence level of 95% and a precision of 13%.

Statistical Analysis

All gathered data was subjected to a meticulous statistical analysis. Quantitative parameters, such as the age of the patients and the duration of symptoms, were described using mean and standard deviation or median with interquartile range. Meanwhile, categorical variables like breast lump, nipple discharge, and breast pain were elucidated in percentages. The SPSS 18.0 software was employed for data analysis, adopting various statistical tests to evaluate the significance of the associations and differences observed, with a p-value of less than 0.05 considered statistically significant.

RESULTS

Table 4: DIAGNOSIS- frequency distribution of patients studied

DIAGNOSIS	No. of Patients	%
DUCT ECTASIA	24	57.1
DUCT PAPILLOMA	6	14.3
PERIDUCTAL MASTITIS	7	16.66
INCONCLUSIVE	2	4.8
SIMPLE BREAST CYST	2	4.8
PITUITARY ADENOMA	1	2.4
Total	42	100.0

Patients diagnosed with Duct ectasia, Duct papilloma, Periductal mastitis, Pituitary adenoma as well as simple breast cyst. Out of these patients, 2 patients despite the investigations, diagnosis couldn't be made out, hence classified as inconclusive.

Duct ectasia being the most common disorder found in our study representing 57.1%.

Table 5: Age in years- frequency distribution of patients studied

Age in Years	No. of Patients	%
<30	4	9.5
30-40	15	35.7
41-50	13	31.0
>50	10	23.8
Total	42	100.0

Mean ± SD: 43.23±10.88

Benign Ductal Disorders presented in various age groups. Among that, the most common age group in which they presented were 30-40 years representing 35.7%.
Only 4 patients i.e, 9.5% presented under the age group of 30 years.

Table 6: SYMPTOMS- frequency distribution of patients studied

SYMPTOMS	No. of Patients	%

NIPLE DISCHARGE	22	52.4
BREAST LUMP	7	16.7
BREAST PAIN	4	9.5
NIPPLE ITCH	4	9.5
RECURRENT BREAST ABSCESS	4	9.5
NIPPLE RETRACTION	1	2.4
Total	42	100.0

Patients presented with Nipple discharge, Breast lump, nipple itching over nipple areolar complex, Nipple retraction and Breast pain. Out of these patients, 52.4% presented with nipple discharge whereas none had shown ductal fistula in this study.

Table 7: Association between symptoms and diagnosis

	Breast lump	Breast pain	Nipple discharge	Nipple itch	Nipple retraction
DUCT ECTASIA (24)	4 (16.6%)	4 (16.6%)	12 (50%)	3 (12.5%)	1 (4.16%)
DUCT PAPILLOMA (6)	-	-	5 (83.33%)	1 (16.6%)	-
PERIDUCTAL MASTITIS (7)	3 (42.8%)	4 (52.7%)	-	-	-
SIMPLE BREAST CYST (2)	-	-	2 (100%)	-	-
INCONCLUSIVE (2)	-	-	2 (100%)	-	-
PITUITARY ADENOMA (1)	-	-	1 (100%)	-	-

Patients who had Duct ectasia and Duct Papilloma had nipple discharge as the most common symptom.

Table 8: INVESTIGATIONS- based on symptoms

Symptoms/ Signs	USG	MAMO	MRI breast	FNAC	CYTO	Prolactin	MRI brain
Sanguinous nipple discharge(3)	1 (33.3%)	2 (66.6%)	3 (100%)	-	3 (100%)	-	-
Non sanguinous nipple discharge (19)	11 (57.8%)	9 (47.3%)	6 (31.5%)	-	13 (68.4%)	2 (10.5%)	1 (5.2%)
Recurrent breast abscess (4)	3 (75%)	1 (25%)	1 (25%)	3 (75%)	1 (25%)	-	-
Lump (7)	5 (71.4%)	2 (28.5%)	2 (28.5%)	5 (71.4%)	1 (14.2%)	-	-
Pain (4)	4 (100%)	2 (50%)	-	-	-	-	-
Itch (4)	-	4 (100%)	2 (50%)	-	-	-	-
Nipple retraction (1)	-	1 (100%)	1 (100%)	-	-	-	-

The patients were investigated using Ultrasound, Mammography, MRI breast, fine needle aspiration cytology, Nipple discharge cytology, Serum prolactin levels. Distribution of patients done as per investigations based upon symptoms has been represented in the above table.

The main manifestations of periductal mastitis (PDM) include breast lumps, abscesses and fistulas around the areola. Some lumps were painful due to redness and swelling of the skin. Some of them were just painless lumps without any discomfort.

Non sanguinous nipple discharge was the most common symptom found in the patients of which 11 were diagnosed to have Duct ectasia and 3 Duct papilloma. One patient who had milky nipple discharge was with diagnosed with pituitary adenoma.

Sanguinous nipple discharge was found in 3 of the patients, all had undergone MRI breast, 2 of which were found to be duct papilloma and 1 patient to be Duct ectasia. Nipple itch and nipple retraction were found only in patients with Duct ectasia and Duct papilloma.

Breast pain was found in 8 of the patients, 4 of which also gave a history of being treated multiple times for recurrent breast abscess. Their investigations revealed Periductal mastitis and another four was evaluated and found to have Duct ectasia.

The above symptom of breast pain and history of recurrent breast abscess in non lactating women warrants high index of suspicion in such patients for the diagnosis of PDM or Duct ectasia.

Breast lump was found in 7 patients, 4 of which was duct ectasia, 2 periductal mastitis and one recurrent breast abscess.

Table 9: INVESTIGATIONS- based on diagnosis

Diagnosis	USG	MAMO	MRI Breast	FNAC	CYTO	Prolactin	MRI Brain
Duct ectasia (24)	14 (58.3%)	11 (45.8%)	8 (33.3%)	2 (8.3%)	10 (41.6%)	1 (4.1%)	-
Duct Papilloma(6)	3 (50%)	5 (83%)	4 (66.6%)	-	5 (50%)	-	-
Inconclusive (2)	1 (50%)	1 (50%)	1 (50%)	-	1 (50%)	-	-
Periductal mastitis (7)	5 (71.4%)	2 (28.5%)	1 (14.2%)	6 (85.5%)	1 (14.2%)	-	-
Pituitary adenoma (1)	-	-	1 (100%)	-	-	1 (100%)	1 (100%)
Simple breast cyst (2)	1 (50%)	2 (100%)	-	-	1 (50%)	-	-

Distribution of patients done as per investigations based upon the diagnosis. In patients with Duct ectasia, the most common investigation was USG of the breast and Mammography in patients aged above 45 years. MRI was done in 8 patients, of which in 3 patients MRI was required for diagnosis as the USG and Mammography was inconclusive, despite the continuous nipple discharge. Nipple discharge was sent for cytology in 10 patients, all of which showed benign findings.

Of the 6 patients diagnosed with Duct papilloma, 3 had been diagnosed with USG and 5 with mammogram. MRI breast was done to see precisely how many ducts were involved in 4 patients. 5 of the above patients underwent cytology of nipple discharge all of which were benign.

The patient with Periductal mastitis, 5 had been diagnosed with USG and 6 had been diagnosed with FNAC. The one patient who had pituitary adenoma had come with milky nipple discharge and also had elevated serum prolactin levels, MRI breast was unremarkable, X ray skull – sella turcica, MRI brain showed pituitary adenoma. Hence it is important to be aware of other causes of nipple discharge.

Table 10: TREATMENT GIVEN- frequency distribution of patients studied

TREATMENT GIVEN	No. of Patients	%
CONSERVATIVE MANAGEMENT	22	52.3%
WIDE LOCAL EXCISION	6	14.2%
MICRODOCHECTOMY	6	14.2%
HADFIELD'S PROCEDURE	7	16.6%
INCISION AND DRAINAGE	1	2.3%

Different treatment modalities like, conservative management, Hadfield's procedure, Incision and drainage, Microdochectomy as well as wide local excision was given to the patients.

Table 11: Diagnosis: Most common treatment

Diagnosis	Conservative management	Hadfields procedure	Incision and drainage	Microdochectomy	Wide local excision

Duct ectasia (24)	15 (62.5%)	3 (12.5%)	-	4 (16.6%)	2 (8.3%)
Duct papilloma (6)	-	3 (50%)	-	2 (33.3%)	1 (16.6%)
Inconclusive (2)	2 (100%)	-	-	-	-
Periductal mastitis (7)	2 (28.5%)	1 (14.2%)	1 (14.2%)	-	3 (42.8%)
Pituitary adenoma (1)	1 (100%)	-	-	-	-
Simple breast cyst (2)	2 (100%)	-	-	-	-

On studying the association between the diagnosis and most common treatment given, it was found that the conservative management was the most preferred mode of treatment for Benign Ductal diseases of breast. In these 24 patients who had duct ectasia, conservative management was the preferred modality of treatment. Only the patients who had copious nipple discharge, had a large breast lump, or who were found to be suspicious of malignancy underwent surgical procedures like Hadfield's, microdochectomy and wide local excision. Another patient with persistent nipple discharge gave the history of chronic H2 blocker consumption. On stopping the drug, the patient had resolution of symptoms.

Of the 6 patients with duct papillomas, 3 underwent Hadfield's, 2 microdochectomy and 1 wide local excision. The inference from the above shows that duct papillomas most commonly requires surgical intervention. Of the 7 patients with periductal mastitis, 2 underwent conservative management, 1 underwent Hadfield's, 1 underwent incision and drainage, 3 underwent wide local excision.

Post operatively the excised specimen sent for Histopathology and the results of which were all found to be benign. Those who had undergone Hadfield surgery, Wide local excision and Microdochectomy were satisfied with results and had no recurrence of symptoms.

DISCUSSION

The exact pathogenesis of duct ectasia (DE) and Periductal mastitis (PDM) remains somewhat elusive. Historically, the dominant perspective proposed by Haagensen and Ewing94 held hormonal influences leading to duct dilatation as the central event, subsequently inducing epithelial ulcers, secretion leakage into surrounding tissue, and thereby triggering inflammation, bacterial infections, and ductal fibrosis. Conversely, Dixon et al. argue for the separate entity classification for DE and PDM, contending that PDM doesn't invariably precede DE [16]. These contrasting theories necessitate a deeper dive into the clinical characteristics of DE and PDM, a primary focus of the current study.

In this investigation, the predominant presenting symptoms in patients were masses, abscesses, or nipple discharge, which are thought to represent different stages of PDM progression. It is hypothesized that the inception phase is characterized by breast lumps accompanied by subtle inflammatory alterations. This escalates to the emergence of isolated or multiple inflammatory masses, progressing to abscess formation if unchecked. The standard initial intervention for subareolar abscesses encompasses antibiotic administration coupled with abscess drainage. Nevertheless, recurrent abscess manifestations at the same site, possibly leading to spontaneous areolar border drainage, are not uncommon if underlying periductal mastitis remains unaddressed [17, 18]. The recurrence of nipple discharge, notorious for obstructing drainage and fostering substantial material accumulation within the ducts, tends to distort breast morphology and impede lactation [19]. This study observed nipple discharge as a prevalent symptom, albeit without a direct correlation to specific diagnoses, contrasting the findings of Ramalingam et al., who documented increased nipple discharge prevalence in cases of periductal mastitis relative to ductal ectasia [20].

Therapeutic approaches necessitate a nuanced consideration of disease severity and extent. The treatment protocols adopted were contingent on symptom prevalence, aiming to minimize recurrence rates. In cases of Type 1 PDM (characterized by mass formation without accompanying abscess or fistula), non-surgical treatments, including antibiotic therapy, are generally favored when preemptive cytological or histological diagnoses are attainable [21]. This aligns with our observations where conservative treatment predominantly featured as the chosen approach. While wide excisions have historically been the norm, concerns regarding potential disfigurement and the necessity for subsequent reconstructive procedures cast doubts on its universal applicability. In particular, large lesions might lead to breast contour distortions, and notwithstanding the invasive nature of the procedure, disease recurrence remains plausible. Hence, wide excisions are now reserved for cases promising cosmetically satisfactory outcomes, a trend reflected in our study.

Despite providing insightful preliminary results, this study is not without limitations. Its single-centered nature and limited sample size perhaps restrict the broader applicability of the findings. Future research directions should encompass multicenter studies with larger cohorts to affirm these initial observations robustly. Moreover, the recurrent nature of these breast conditions calls for extended follow-up durations to facilitate more effective patient management strategies.

CONCLUSION

Ductal conditions, generally regarded as benign breast disorders, exhibit unclear etiology, often presenting with symptoms such as nipple discharge, breast lumps, and recurrent breast abscesses.

The study underscores the significance of closely monitoring duct papillomas, given their precancerous nature, necessitating heightened vigilance compared to other ductal ailments. In our analysis, breast MRI emerged as a pivotal diagnostic tool in pinpointing duct papilloma, thereby facilitating early interventions.

Recurrent breast abscess in non-lactating women serves as a potent indicator for potential PDM, urging clinicians to adopt a discerning approach towards diagnosis. Leveraging comprehensive investigative methods including mammography, breast MRI, and histopathological examinations, can significantly streamline the differentiation between Periductal mastitis and other recurrent breast abscess etiologies such as tuberculosis of the breast or granulomatous mastitis.

Notably, our findings reinforce the preference for conservative management as the primary treatment avenue for these ductal diseases, reserving surgical interventions like wide local excision, microdochectomy, and Hadfield's procedure for more severe manifestations. This strategic approach to treatment selection not only aligns with the clinical severity but also augments the prospects of minimizing recurrence rates, fostering better long-term outcomes for patients.

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