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ORIGINAL RESEARCH

Clinical Characteristics of Non-Lactational Mastitis of Accessory Breast: A Case-Series Study

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Background: Non-lactational Mastitis of Accessory Breast (NLM-AB) is a rare condition with limited research, leading to diagnostic challenges. Its clinical and demographic characteristics are poorly defined, and it is often confused with non-lactational mastitis (NLM), hindering effective diagnosis and treatment.

Objective: This study aims to clarify the features of NLM-AB, distinguish it from NLM, and address key knowledge gaps to improve clinical diagnosis and patient management.

Methods: We retrospectively analyzed data from 31 NLM-AB patients treated at Beijing Hospital of Traditional Chinese Medicine from January 2014 to September 2024. A 1:1 matched case-control study was conducted, comparing NLM-AB (case group) with 31 NLM patients (control group).

Results: NLM-AB patients had a mean age of 36.68 ± 7.17 years and BMI of 23.10 ± 3.52. Most were married (83.87%) and had given birth (58.06%). All had axillary masses, with 85.19% showing skin changes. Statistically significant differences were found in marital status, reproductive history, breastfeeding duration, tumor size, and nipple retraction ($P < 0.05$). No significant differences were observed in nipple discharge, ulcer occurrence, or prolactin levels ($P > 0.05$).

Conclusion: This study addresses a key clinical gap by identifying distinguishing features of NLM-AB, such as consistent axillary masses without nipple retraction and associations with reproductive history. These findings can directly support clinicians in early recognition and differential diagnosis of NLM-AB, avoiding unnecessary interventions targeting primary breast tissue. Incorporating these patient characteristics into diagnostic pathways may reduce misdiagnosis rates and guide more tailored treatment strategies, ultimately improving patient outcomes.

Keywords: non-lactational mastitis, non-lactational mastitis of accessory breast, clinical characteristics, retrospective analysis, case series study

Introduction

Non-lactational mastitis (NLM) is a benign, non-specific inflammatory condition that typically occurs in women during the non-lactating period. Its clinical presentation includes non-cyclical breast pain, lumps, abscesses, and, in more advanced stages, skin breakdown leading to ulcers, sinus tracts, or fistulas.[1] NLM is characterized by dilation of the mammary duct and plasma cell infiltration in areas of localized chronic inflammation on pathology. The most common pathological types are plasma cell mastitis and granulomatous lobular mastitis.[2] NLM is an insidious condition with an unknown etiology. It is difficult to treat, prone to recurrence, and slow to heal. Most patients with NLM are of reproductive age. Several factors, including immune system dysfunction, prolactin abnormalities, changes in breast microbiota, breast trauma, obesity, and smoking, may contribute to the development of NLM.[3] The incidence of NLM among breast diseases has been increasing in recent years and significantly threatens patients' quality of life.

Accessory breasts are extra breast tissues that develop alongside the normal pair of breasts. These structures result from the incomplete regression of part of the primitive mammary ridge during embryonic development.[4] The incidence of accessory breast tissue is about 1% to 6%,[5] with common locations including the axilla and other parts of the body.

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The structure of accessory glands is similar to that of normal mammary tissue, and they may undergo hormonal changes during puberty, pregnancy, and other special periods, resulting in swelling, enlargement, and tenderness. Similar to normal breast tissue, accessory glands can also develop a variety of breast diseases. Non-lactational Mastitis of Accessory Breast (NLM-AB) is a rare form of non-lactating breast inflammation that occurs in the accessory breast tissue. Its clinical features include lumps, pain, and abscesses in the affected area.[6] The pathological characteristics are similar to those seen in other forms of NLM, including plasma cell mastitis and granulomatous lobular mastitis.[7] NLM-AB is a relatively rare condition and current research is primarily focused on clinical case reports. There are no large-scale clinical studies available on the disease. Due to the limited number of studies on the clinical features of NLM-AB, our understanding of the disease is significantly constrained. It is difficult to accurately assess the incidence and prevalence, and the natural history of the condition remains unclear. Furthermore, the exploration of its etiology is limited, making it challenging to establish causal relationships. The underlying multi-factorial mechanisms are not well understood. Additionally, evaluating the accuracy of diagnosis is difficult due to the limitations of diagnostic criteria and the uncertainty surrounding reliability of differential diagnosis.

This study investigates the pathogenetic features of non-lactating mastitis of the accessory breast (NLM-AB) by analyzing the clinical diagnosis and treatment data from 31 affected patients. The findings provide deeper insights into the clinical characteristics of NLM-AB, which may enhance our ability to guide and improve clinical management of the disease.

Materials and Methods

Study Design

In this retrospective study, we reviewed the medical records of patients diagnosed with NLM-AB. The data were sourced from Beijing Hospital of Traditional Chinese Medicine, Capital Medical University, and included demographic and comprehensive clinical data such as symptoms, treatment outcomes, imaging findings, and histopathological reports. Data extraction was performed from the medical records. For comparative analysis, patients with non-lactational mastitis from the same period were selected as the control group, matched in a 1:1 ratio. The corresponding clinical data were collected to evaluate and compare the clinical characteristics between the two cohorts.

Case Selection

Our study included patients treated at the Beijing Hospital of Traditional Chinese Medicine, Capital Medical University, between January 2014 and November 2024. Inclusion criteria for this study were as follows: (1) Participants in the case group had a pathological diagnosis of NLM-AB, while those in the control group had a diagnosis of NLM; (2) Participants with complete clinical data; (3) Individuals without severe dysfunction of the heart, lungs, liver, or kidneys.

Exclusion criteria included: (1) Incomplete medical records or missing data exceeding 30%; (2) Presence of cancer or other serious illnesses; (3) Diagnosis of other autoimmune conditions, such as systemic lupus erythematosus or rheumatoid arthritis.

Data Collection

Clinical data from both patient groups were meticulously collected. First, general clinical information was gathered, including age, sex, height, weight, family history, and maternity history. For female patients, detailed lactation history was also recorded, including whether they had breastfed and, if so, the duration of lactation (in months). This information is valuable for exploring potential links between lactation behavior and the disease.

In addition, the clinical characteristics of the patients were systematically documented. The site of onset was recorded for both groups. For patients with a palpable mass, the size of the mass was noted, either through imaging (eg, ultrasound) or physical examination (eg, palpation combined with measurement tools). The size was recorded in square centimeters, providing a quantitative measure to assess disease severity and explore correlations between mass size and other clinical features or prognosis. The condition of nipple was assessed visually, categorizing it as either non-inverted or inverted. This observation helps determine whether the disease affects nipple shape and provides insights into its

relationship with other clinical factors. Nipple discharge was assessed by asking the patient directly and reviewing physical examination findings in the medical record. Since nipple discharge can be a significant clinical symptom, its documentation facilitates further analysis of its association with disease characteristics. Lastly, the presence of ulceration was determined through physical examination by inspecting the skin at the lesion site, recording it as either present or absent. Ulceration often indicates advanced disease progression and is crucial for understanding the severity of the condition and its prognosis.

Through this systematic, standardized, and detailed data collection process, the integrity, accuracy, and scientific rigor of the data were ensured, providing a solid foundation for subsequent analysis, discussion, and conclusion.

Statistical Analyses

Statistical analysis was conducted using IBM SPSS Statistics version 26.0 software. Continuous data were expressed as means ± standard deviations or medians, depending on the distribution. Normality was assessed using the Shapiro–Wilk test and homogeneity of variance was tested using Levene's test. Between-group comparisons were performed using the independent *t*-test or non-parametric test, as appropriate. Categorical data were presented as frequencies and percentages and analyzed using the chi-square test. A p-value of < 0.05 was considered statistically significant.

Results

Baseline Characteristics and Clinical Features of NLM-AB Patients

We retrospectively reviewed the medical records of 31 patients diagnosed with non-lactational mastitis of the accessory breast (NLM-AB). The clinical characteristics of all subjects are presented in Table 1. The demographic data of the 31 patients are summarized as follows: The patients' ages ranged from 20 to 50 years, with a mean age of 36.68 ± 7.17 years. Regarding marital status, 26 patients were married (83.87%), and 5 were single (16.13%). In terms of fertility, 18 patients (58.06%) had given birth. The mean duration of lactation was 16.17 ± 7.94 months (n = 16). Additionally, 5 patients (18.52%) had a history of non-puerperal mastitis. (Table 1)

Patients with NLM-AB are primarily characterized by the presence of an axillary mass. In this study, all patients exhibited a palpable axillary mass. In terms of mass distribution, unilateral axillary masses were more common. Of the patients, 17 had a mass in the left axilla (54.84%), while 8 had a mass in the right axilla (25.81%). Additionally, 6 patients (19.35%) had bilateral axillary masses. Regarding mass size, the median area of the axillary mass was approximately 4 cm^2. As for concomitant symptoms, many patients experienced varying degrees of additional symptoms. Specifically, 18 of 29 patients (69.23%) had changes in breast skin and subcutaneous abscesses. Skin ulcers were observed in 23 patients (85.19%). Additionally, only 1 patient (3.23%) experienced nipple discharge, which may also be linked to the axillary mass. No patients had nipple retraction. (Table 2)

Table 1 Demographic Data of Patients with NLM-AB

Characteristics	Cases
Age (years), Mean ± SD	36.68±7.17
Marriage	
Married	26(83.87%)
Single	5(16.13%)
Gestation history	
Yes	18(58.06%)
No	13(41.94%)
Lactation time(months), Mean ± SD,n=18	16.17±7.94
Previous history of NLM	
Yes	5(16.13%)
No	26(83.87%)

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Table 2 Clinical Characteristics of Patients with NLM-AB (n = 31)

Characteristics	Cases (%)
Lesions Involving Site	
Left	17(54.84%)
Right	8(25.81%)
Both sides	6(19.35%)
Mass Area (cm^2), Median, n=26	3.00
≤10	20(76.92%)
>10 and≤30	5(19.23%)
>30	1(3.85%)
Nipple Inversion	
Yes	0(0%)
No	31(100%)
Nipple Discharge	
Yes	1(3.23%)
No	30(96.77%)
Subcutaneous Abscesses, n=29	
Yes	18(62.07%)
No	11(37.93%)
Ulceration, n=29	
Yes	25(86.21%)
No	4(13.79%)

Comparison of Baseline Characteristics Between NLM-AB and NLM Patients

There were differences in demographic characteristics between the NLM-AB patient group and the matched NLM patient group. The median age of patients in the NLM-AB group was 36.68 years, compared to 34.48 years in the NLM group. However, this age difference was not statistically significant ($P > 0.05$). There was a significant difference in marital status between the two groups ($P = 0.020$). In the NLM-AB group, 26 patients (83.87%) were married, and 5 patients (16.13%) were single. In the NLM group, all 31 patients were married, and none were single. A significant difference was also found in pregnancy history between the two groups ($P = 0.000$). In the NLM-AB group, 18 patients (58.06%) had a history of pregnancy, while 13 patients (41.94%) had no pregnancy history. In the NLM group, 30 patients (96.77%) had a history of pregnancy, and 1 patient (3.23%) had no pregnancy history. Significant differences were observed in lactation duration between the two groups ($P = 0.025$). The median lactation duration in the NLM-AB group was 16.17 months, compared to 11.04 months in the NLM group. The NLM-AB group had significantly longer lactation durations. No significant differences were found between the two groups in family history of breast cancer ($P > 0.05$) or history of mastitis ($P > 0.05$). (Table 3)

Clinical Characteristics of the NLM-AB and NLM Patient Groups

The clinical characteristics of the NLM-AB and NLM patient groups were compared, and several significant differences were observed, particularly in mass size and nipple retraction. The masses in the NLM-AB group were significantly smaller than those in the NLM group, with a median mass area of 3.00 cm^2 (range 0.6 to 9.0 cm^2) in NLM-AB, compared to 25.00 cm^2 (range 7.0 to 56.0 cm^2) in NLM ($P < 0.01$). This indicates that NLM-AB patients typically present with smaller masses, which may aid in differentiating it from NLM.

A striking difference was also noted in nipple retraction: none of the patients in the NLM-AB group had nipple retraction, whereas 41.94% of patients in the NLM group did ($P < 0.01$). This suggests that nipple retraction is more strongly associated with NLM than with NLM-AB.Although differences in lesion site distribution approached statistical significance ($P = 0.086$), with more unilateral lesions in both groups, there was no significant difference in the occurrence of nipple discharge between the two groups ($P = 0.554$). Similarly, ulceration was more common in the NLM group

Table 3 Comparisons of Demographic Features Between NLM-AB and NLM Groups, n (%)

Characteristics	NLM-AB Patients (n = 31)	NLM Patients (n = 31)	*P*-value
Age (years), Mean ± SD	36.68±7.17	34.48±5.27	0.175
Marital status			0.020*
Married	26(83.87%)	31(100%)	
Single	5(16.13%)	0(0%)	
Gestation history			0.000**
Yes	18(58.06%)	30(96.77%)	
No	13(41.94%)	1(3.23%)	
Lactation time(months), Mean ± SD	16.17±7.94 (n=18)	11.04±6.86 (n=28)	0.025*
Family history of breast disease			0.313
Yes	0(0.00%)	1(3.23%)	
No	31(100.00%)	30(96.77%)	
History of mastitis			0.279
Yes	6(19.35%)	3(9.68%)	
No	25(80.65%)	28(90.32%)	

Notes: *$p < 0.05$, ** $p<0.01$.

(29.03% vs 9.68%), though this difference did not reach statistical significance (P = 0.054).Prolactin levels did not differ significantly between the groups (P = 0.111). Normal prolactin levels were observed in all NLM-AB patients (100%), while 17.39% of NLM patients had abnormal prolactin levels.These findings highlight key differences between NLM-AB and NLM, with mass size and nipple retraction being the most clinically relevant. These differences may help clinicians in distinguishing between the two conditions, but further research is needed to confirm these findings. Regarding pathological features, granulomatous mastitis was observed in 80.65% of NLM-AB patients and 87.10% of NLM patients, with no significant difference between the groups (P = 0.490). Plasma cell mastitis was found in 19.35% of NLM-AB cases, while only 12.90% of NLM patients exhibited plasma cell mastitis. These pathological findings suggest that the two conditions share similar inflammatory patterns, but the proportion of plasma cell mastitis appears somewhat higher in NLM-AB, which may offer additional insights into distinguishing these two entities. (Table 4)

Table 4 Comparisons of Clinical Characteristics Between NLM-AB and NLM Groups [n (%)]

Characteristics	NLM-AB Patients (n = 31)	NLM Patients (n = 31)	*P*-value
Lesion Site Distribution,			0.086
Single side	26(83.87%)	30(96.77%)	
Both side	5(16.13%)	1(3.23%)	
Mass Area (cm^2), Median (range)	3.000(0.6,9.0)	25.000(7.0,56.0)	0.000*
Nipple inversion, n (%)			0.000*
Yes	0(0%)	13(41.94%)	
No	31(100%)	18(58.06%)	
Nipple discharge			0.554
Yes	1(3.23%)	2(6.45%)	
No	30(96.77%)	29(93.55%)	
Ulceration			0.054
Yes	3(9.68%)	9(29.03%)	
No	28(90.32%)	22(70.97%)	
Prolactin levels	n=13	n=23	0.111
Normal	13(100.00%)	19(82.61%)	
Abnormal	0(0.00%)	4(17.39%)	
Ultrasound features			
Cystic type	3(14.29)	2(9.52)	0.887

(*Continued*)

Table 4 (Continued).

Characteristics	NLM-AB Patients (n = 31)	NLM Patients (n = 31)	*P*-value
Ductal dilatation type	6(28.57)	6(28.57)	
Solid mass type	12(57.14)	13(61.90)	
Pathological Features			
Granulomatous mastitis	25(80.65%)	27(87.10%)	0.490
Plasma cell mastitis	6(19.35%)	4(12.90%)	

Notes: *$p < 0.05$, ** $p<0.01$.

Discussion

In the field of breast diseases, non-lactating mastitis (NLM) is a distinct group of conditions that is gaining increasing attention. NLM refers to benign, non-specific inflammatory disorders that occur in women outside of the lactation period. In recent years, its incidence has been rising due to various factors, including changes in lifestyle and environmental influences. NLM is often asymptomatic in its early stages, and more importantly, its exact cause remains unclear. Several hypotheses have been proposed regarding the underlying causes of NLM. The autoimmune hypothesis suggests that the immune system may mistakenly attack breast tissue, triggering inflammation. The hormone imbalance hypothesis has also gained attention, proposing that fluctuations in estrogen and progesterone levels may disrupt the normal physiology of breast tissue, thereby increasing susceptibility to inflammation. Additionally, the infection hypothesis suggests that certain pathogens may contribute to the development of NLM. Other factors, such as pregnancy, breastfeeding, and alpha-1antitrypsin deficiency, have also been linked to an increased risk of NLM. For example, although pregnancy and breastfeeding are normal physiological processes, they can alter bodily functions and potentially increase the risk of breast diseases. Alpha-1 antitrypsin deficiency may impair immune regulation and tissue repair, reducing the breast tissue's ability to resist inflammation. NLM includes several subtypes, such as plasma mastitis, granulomatous mastitis, and mammary duct dilatation, each with distinct clinical characteristics. Generally, the most common clinical manifestation of NLM is a breast mass, which may progress to breast pain, further enlargement of the mass, abscess formation, and, in severe cases, ulceration and fistula formation. However, NLM occurring in the accessory breast is extremely rare. Current case reports suggest that NLM-AB typically presents with painful lumps in the accessory milk tissue, which may progress to more severe symptoms, such as rupture and pus discharge. It is important to note that most studies on accessory breast NLM have been limited to case reports, and there has been no comprehensive, systematic analysis of its clinical features. This lack of in-depth research has significantly hindered our understanding of this rare disease. In the comparison of ultrasound features between NLM-AB (Non-lactational Mastitis of Accessory Breast) and NLM (Non-lactational Mastitis), we observed notable differences in the distribution of ultrasound characteristics. The cystic type was slightly more common in NLM-AB patients (14.29%) compared to NLM patients (9.52%), though the difference was not statistically significant ($p = 0.887$). Both groups exhibited similar frequencies of ductal dilatation (28.57% in NLM-AB and 28.57% in NLM), indicating no significant variation between the two conditions in terms of this feature. However, a higher proportion of NLM-AB patients (57.14%) presented with solid masses compared to NLM patients (61.90%), suggesting that solid mass formation might be more prevalent in the NLM group, though the difference remains subtle. These findings highlight some differences in ultrasound features between NLM-AB and NLM, particularly in terms of solid mass presence, which warrants further clinical investigation. To further highlight the unique characteristics and findings of this study, the following table provides a comparison between the clinical features observed in our cases and those reported in existing literature on non-lactating mastitis (NLM), particularly in the context of accessory breast involvement. This comparison underscores key differences and emphasizes the need for further research into this rare condition. (Table 5)

Recent studies have demonstrated that granulomatous mastitis, such as in cases of idiopathic granulomatous mastitis (IGM), shares some similar inflammatory processes with NLM-AB, particularly regarding autoimmune and inflammatory components. Generally, the most common clinical manifestation of NLM is a breast mass, which may progress to breast

Table 5 Comparison Between Our Study and Recent Literature (Last 5 Years) on NLM-AB

Comparison Dimension	Our Study	Literature 1[7]	Literature 2[6]	Literature 3[8]
Study Type	Retrospective case-control study	Case report	Case report	Case Report
Sample Size	31	1	1	1
Age Range	20–50	39	24	35
Main Clinical Features	Mass, pain, discharge	Mass, pain	Mass, pain	Pain and whitish serous discharge
Treatment Methods	Surgery	Surgery	Surgery	Antibiotics, Hormone therapy
Pathological Features	Granulomatous mastitis	Granulomatous mastitis	Granulomatous mastitis	Granulomatous mastitis

Notes: Statistical significance: $P < 0.05$ indicates statistical significance; $P < 0.001$ indicates very strong significance.*$P < 0.05$, ** $P<0.01$.
Abbreviations: NLM-AB, Non-lactational Mastitis of Accessory Breast; NLM, Non-lactational Mastitis.

pain, further enlargement of the mass, abscess formation, and, in severe cases, ulceration and fistula formation.[9] However, NLM occurring in the accessory breast is extremely rare. Current case reports suggest that NLM-AB typically presents with painful lumps in the accessory milk tissue, which may progress to more severe symptoms, such as rupture and pus discharge. It is important to note that most studies on accessory breast NLM have been limited to case reports, and there has been no comprehensive, systematic analysis of its clinical features. This lack of in-depth research has significantly hindered our understanding of this rare disease. To address this gap, we conducted a study involving 31 cases of NLM-AB patients, which represents the largest sample size reported for this condition to date. The primary goal of this study was to provide a comprehensive description of the demographic and clinical features of NLM-AB. While previous studies have provided valuable insights into NLM-AB, they are often limited by small sample sizes. Our study offers robust evidence to support the clinical management of NLM-AB. By analyzing a large sample, we help fill gaps in the existing literature and hope that this research will provide a solid foundation for future studies, ultimately improving the clinical management of this rare condition.

In this study, we analyzed the age characteristics of patients with NLM-AB. The results showed that the patients' age ranged from 20 to 50 years, with a mean age of 36.68 years. This average age is consistent with that reported in numerous previous studies on NLM.[10] Although there was some variation in the age of onset between the two groups, the difference was not statistically significant. This suggests that the age characteristics of patients with NLM-AB are similar to those of NLM patients, with young and middle-aged women being the primary at-risk group for both conditions.[11] Based on these findings, we conclude that age is correlated with the onset of NLM-AB. Physiologically, young and middle-aged women are in a more active phase of their reproductive cycles, with frequent fluctuations in hormone levels. For example, during the menstrual cycle, pregnancy, and lactation, hormones such as estrogen, progesterone, and prolactin undergo significant cyclical changes. These hormonal fluctuations may contribute to continuous irritation of the accessory breast tissue, leaving it in a relatively unstable state and increasing the risk of developing NLM-AB.[12] In addition, lifestyle and social factors may also play a role.[13] Young and middle-aged women often face various stressors, such as work pressures and family responsibilities. Chronic stress can disrupt the endocrine system, impair immune regulation, and reduce the breast tissue's ability to resist both external pathogens and autoimmune abnormalities. This creates an environment conducive to the development of NLM-AB.

The results of this study reveal significant differences in marital status, childbirth history, and breastfeeding history between patients with NLM-AB and those with NLM. Specifically, 83.87% of patients with NLM-AB were married, compared to 100% of NLM patients. Regarding childbirth history, 58.06% of NLM-AB patients had given birth, while 96.77% of NLM patients had done so. Furthermore, there was a notable difference in lactation history. The average lactation duration for NLM-AB patients was 16.17 ± 7.94 months ($n = 18$), compared to 11.04 ± 6.86 months ($n = 28$) for NLM patients. The lactation period was significantly longer in the NLM-AB group. These findings suggest that childbirth and lactation have a more pronounced effect on breast tissue than on accessory breast tissue. During pregnancy and lactation, breast tissue undergoes complex physiological changes, including the proliferation and differentiation of glandular tissue, as well as functional adjustments to prepare for breastfeeding.[14] These changes result in the expansion of the ducts and significant acinar hyperplasia, creating an active state in the breast. This active state alters the breast's structure and microenvironment, making it more susceptible to external factors such as milk stasis and bacterial

infections, which increase the risk of NLM in the primary breast. In contrast, while accessory breast tissue is also influenced by pregnancy-related hormones, it remains relatively underdeveloped. Throughout pregnancy and lactation, the physiological changes in accessory breast tissue are less pronounced than those in the primary breast tissue.[15] The ducts in the accessory mammary glands are typically smaller, and the number of acini is fewer. Due to these anatomical characteristics, even if the accessory breast tissue experiences issues such as milk stasis, the limited capacity of the ducts and acini to transport and secrete milk reduces the likelihood of inflammation.[8] This may explain why a higher proportion of patients with NLM-AB have not given birth, as childbirth and lactation do not impact accessory breast tissue as extensively as they do primary breast tissue.

The most prominent clinical feature of NLM-AB is the axillary mass. In clinical observations, most axillary masses in NLM-AB patients are located in the unilateral accessory breast. Throughout the course of the disease, the breast tissue in these patients typically shows no significant abnormalities. In contrast to common NLM patients, those with NLM-AB do not experience nipple retraction or nipple discharge. Prolactin levels in these patients are within the normal range.[16]

Previous studies on NLM patients suggest that nipple retraction and discharge play a key role in the pathogenesis and manifestation of the disease. Nipple retraction is often associated with mammary duct blockage. The mammary duct system is essential for maintaining normal breast function, including the transport of milk. When the ducts become blocked, it can trigger pathological changes such as local inflammation.[17] As a result, nipple retraction is a common symptom of NLM. Nipple discharge, another typical manifestation of NLM,[18] occurs when inflammation or immune responses disrupt the breast ductal system, preventing normal secretion flow and causing abnormal discharge.[19] However, NLM-AB patients exhibit a different pattern. Most do not have nipple retraction or discharge, suggesting that the pathogenesis of NLM-AB may not be closely related to the pathological processes seen in NLM. Accessory breast tissue, a remnant of incomplete breast development during embryogenesis, has significant anatomical differences from the normal breast tissue.[20] In the normal breast, mammary tissue is widely distributed, and the duct system is complex and directly connected to the nipple.[21] This close connection means that blockage or other pathological changes can more easily affect the nipple, leading to retraction or discharge. In contrast, accessory breast tissue is generally smaller and located primarily around the armpit. Its duct system is simpler and less developed than that of the normal breast, with a weaker and more indirect connection to the nipple.[22] When NLM-AB occurs, even if inflammation or tissue proliferation takes place the accessory tissue, these changes do not directly affect the nipple, as they would in the primary breast. A key difference between NLM-AB and NLM is the size of the breast mass. Statistical analysis revealed that the median mass size in NLM-AB patients was 3.0 cm^2, compared to 25.0 cm^2 in NLM patients, with a significant difference between the two groups. This difference can be attributed to the location and size of the disease sites. Accessory breast tissue, located near the armpit, is smaller and more limited than the main breast. As a result, the growth and expansion of masses in NLM-AB are restricted by the smaller spatial area. Pathological changes, such as the infiltration of inflammatory cells and tissue hyperplasia, are less likely to occur on a large scale due to the limited space, which in turn restricts mass formation and development. Additionally, local physiological processes, such as blood circulation and lymphatic drainage, may be impaired, further limiting the growth and spread of diseased tissue, leading to relatively smaller masses in NLM-AB patients. The most prominent clinical feature of NLM-AB is the axillary mass. The presence of an axillary mass in patients with NLM-AB, especially when accompanied by the absence of nipple retraction and nipple discharge, is clinically significant for differential diagnosis. This feature aids clinicians in distinguishing NLM-AB from other common forms of mastitis, particularly non-lactational mastitis (NLM), which typically presents with larger masses and more frequently involves nipple retraction or discharge.

The smaller mass size in NLM-AB patients, with a median size of 3.0 cm^2 compared to 25.0 cm^2 in NLM patients, provides a clear diagnostic clue. Clinicians can use this size difference to prioritize less invasive treatment options, such as anti-inflammatory therapy or localized drainage, rather than opting for more aggressive interventions like surgical excision or extensive drainage, often required for larger abscesses or more severe inflammation seen in NLM. Early identification of axillary masses allows for targeted therapy, potentially avoiding unnecessary surgeries and reducing complications such as abscess formation or rupture.Additionally, the absence of nipple retraction in NLM-AB patients contrasts with NLM, where nipple retraction is a more frequent symptom. This distinction is crucial, as nipple retraction is often associated with more aggressive forms of mastitis or even malignancy. In the case of NLM-AB, knowing that

nipple retraction is absent can lead clinicians to avoid unnecessary imaging or biopsy procedures, streamlining the diagnostic process. By focusing on the identification of axillary masses and the exclusion of nipple retraction, clinicians can make more accurate and timely diagnoses, avoid overdiagnosis, and initiate the appropriate treatment earlier. This also has implications for patient prognosis, as a correct and early diagnosis can lead to less invasive treatments, a faster recovery time, and a lower risk of recurrence or complications. By comparing the clinical features of NLM-AB with those of NLM, we can clearly identify several significant differences. These differences not only aid in the accurate diagnosis and differentiation of the two diseases but also provide valuable insights into their respective pathogenesis. Understanding these distinctions is crucial for developing targeted treatments and prevention strategies. Ultrasound plays a crucial role in diagnosing NLM-AB (Non-lactational Mastitis of Accessory Breast) by providing valuable insights into the characteristics of the breast tissue. In the comparison between NLM-AB and NLM (Non-lactational Mastitis), ultrasound findings suggest that solid mass formations are more commonly observed in NLM-AB patients (57.14%) compared to those with NLM (61.90%). This higher prevalence of solid masses in NLM-AB suggests that ultrasound could be useful in identifying this condition, particularly in distinguishing it from NLM, where such masses are slightly less common. The ability of ultrasound to detect cystic formations and ductal dilatation also supports its diagnostic utility, even though no significant differences were found in these categories between the two conditions. Overall, ultrasound appears to be an effective tool for identifying NLM-AB, especially in detecting solid masses, and may aid in differentiating this condition from other types of mastitis. In conclusion, ultrasound is a valuable diagnostic tool for distinguishing NLM-AB (Non-lactational Mastitis of Accessory Breast) from NLM (Non-lactational Mastitis). The ultrasound findings, particularly the identification of solid mass formations, suggest that solid masses are more commonly associated with NLM-AB, although the difference between the two conditions is subtle. Additionally, the detection of cystic type features and ductal dilatation provides further insight, though no significant differences were observed between the two groups in these categories. Overall, ultrasound proves to be a useful, non-invasive imaging method for diagnosing NLM-AB, offering key insights into the nature of the lesions and assisting in the differentiation from other forms of mastitis.

From a pathological perspective, granulomatous mastitis was the predominant pathology observed in both groups, with 80.65% of NLM-AB patients and 87.10% of NLM patients exhibiting this feature. The similarity in the frequency of granulomatous mastitis between the two groups suggests that this form of inflammation is common in both NLM-AB and NLM, which might complicate the diagnostic process. However, the study did reveal a slight difference in the frequency of plasma cell mastitis. In NLM-AB, 19.35% of cases presented with plasma cell mastitis, while only 12.90% of NLM cases exhibited this feature. This difference, although not statistically significant, may indicate a possible association between plasma cell mastitis and NLM-AB, and could represent a distinguishing pathological feature.

These pathological findings suggest that, despite clinical differences, NLM-AB and NLM share many similarities in their underlying inflammatory patterns, which may further complicate the differentiation between these conditions. The higher incidence of plasma cell mastitis in NLM-AB could offer some additional diagnostic insight, but further research with larger sample sizes and more diverse populations is necessary to validate this finding.

Conclusion

Although this study provides important insights into NLM-AB, several limitations must be considered when interpreting its findings. The retrospective design inherently introduces biases such as selection bias and recall bias, which can affect the validity of the results. Selection bias is a concern because the patients included in the study were selected based on available medical records from a single center, which may not represent the broader population with NLM-AB. Additionally, recall bias may have impacted the accuracy of the data, especially regarding the onset and progression of symptoms, as the data were collected retrospectively.

Moreover, the sample size in this study is relatively small, which may limit the statistical power to detect subtle differences or trends. As a result, some findings might not reach statistical significance, and further validation with larger sample sizes is needed to confirm these results. The absence of long-term follow-up data is another significant limitation. Without such data, it is difficult to assess the long-term outcomes, recurrence rates, and potential complications of NLM-AB. This lack of follow-up also limits the ability to evaluate the effectiveness of different treatment approaches over

time. Furthermore, the lack of diversity in a single-center study may affect the external validity of the findings, as the sample may not capture the full spectrum of NLM-AB cases in different populations or settings.

To address these limitations, future prospective, multi-center studies with larger sample sizes and long-term follow-up are essential. Such studies would help reduce the biases inherent in retrospective designs, enhance the statistical power, and provide a more comprehensive understanding of the disease's long-term outcomes.

Data Sharing Statement

The original contributions presented in this study are included in the article. Further inquiries can be directed to the corresponding authors.

Ethics Statement

This retrospective study was approved by the Beijing Hospital of Traditional Chinese Medicine, Capital Medical University Ethics Committee (No: 2023BL02 −076-01). The requirement for informed consent was waived because: (1) the study used existing anonymized data, (2) obtaining retrospective consent was impracticable for long time span (3) the research posed no more than minimal risk. All data were de-identified prior to analysis following ISO 25237:2017 standards. The study complies with the Declaration of Helsinki principles for medical research involving human subjects, particularly Articles 23-25 regarding confidentiality protections.

Author Contributions

All authors made substantial contribution to the work reported, including the conception, study design, execution, data acquisition, analysis, and interpretation. They participated in drafting, revising, or critically reviewing the article. All authors gave final approval of the version to be published, agreed on the journal to which the article has been submitted; and are accountable for all aspects of the work.

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Disclosure

The authors declare no conflicts of interest related to this work.

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