

## Assessment of Frequency and Contributing Risk Factors Associated with the Development of Mammary Fistula After Incision and Drainage in Cases of Breast Abscess: A Single-Center Experience

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**Abstract:** A breast abscess is a localised collection of pus within the breast parenchyma, typically developing under the skin. In most cases, it occurs as a result of a bacterial infection. Management includes oral and IV antibiotics, percutaneous needle aspiration, ultrasound-guided aspiration, and incision and drainage. U/S guided aspiration is currently the standard treatment. A mammary fistula is a complication of breast surgery or other therapeutic interventions. A Mammary Fistula is defined as an abnormal communication between the lactiferous duct and breast skin. Treatment options include fistulectomy, primary closure and total duct excision. Postoperative wound infection is a primary factor in fistula recurrence. **Objective:** This study aims to determine the frequency of mammary fistula following incision and drainage in patients with breast abscesses. And also characterise the associated risk factors. **Methods:** A retrospective chart analysis was conducted at Khyber Medical Centre, Peshawar, Pakistan, from March 2023 to November 2023. Patients presenting with breast abscesses, irrespective of type, confirmed on clinical examination and radiologic findings, were included in the study. Abscesses in patients with breast cancer or suspicious of malignancy, and post-oncological surgical procedures, were a part of the exclusion criteria. Data was collected from patients' records using a self-administered data collection tool. The data were analysed using SPSS version 26. **Results:** The Mean age of the population was 27.8 years, with an average range between 20 and 37 years. Among the types of breast abscesses, lactational abscesses were the most common, affecting 35 (85.4%) patients. The peri-areolar incision group had a milk fistula in 7 out of 9 patients. Only two cases were reported with radial incisions. All patients with fistula had a stab incision and drainage (100%), while no case was reported in patients with incision drainage with penrose drain insertion. **Conclusion:** Mammary Fistula is not a common complication of therapeutic incision and drainage. It primarily affects young lactating women and is a sequel to breast abscess. The location of the abscess and the incision site are contributing factors. Peripherally placed incisions are safer than central incisions.

**Keywords:** Breast Abscess, Incision and Drainage, Mammary Fistula, Fistulectomy

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### Introduction

A breast abscess is a localised collection of pus within the breast parenchyma, typically developing under the skin. In most cases, it results from a bacterial infection (1). Breast Infections are classified into lactational and non-lactational types, the former being the most common (2-3). Staphylococcus Aureus is the most common microorganism identified in culture and sensitivity tests in lactating women, while the mixed flora with S. aureus, Streptococcus, and anaerobic bacteria causes the non-lactational variety (4-5). 2-3% of lactating women suffer from mastitis, among them only 5-11% develop abscess (6). Etiological factors include recurrent episodes of mastitis, discontinuation of breastfeeding on the affected side, maternal age > 30 years, primigravida, gestational age ≥41 weeks and acute weaning (1). Non-lactational abscesses are associated with periductal mastitis, idiopathic granulomatous mastitis (IGM), and tuberculous mastitis (7).

Management includes oral and IV antibiotics, percutaneous needle aspiration, ultrasound-guided aspiration, and incision and drainage. U/S guided aspiration is currently the standard treatment (7). Incision and drainage are usually performed in cases of unresolving recurrent episodes of mastitis, deep-seated multiloculated abscess and failure of guided aspiration. A mammary fistula is a complication of breast surgery or other therapeutic interventions.

A Mammary Fistula is defined as an abnormal communication between the lactiferous duct and breast skin. It is also sometimes referred to as a milk fistula. Fistula formation is linked to invasive procedures and the proximity of the intervention to the nipple-areolar complex (NAC). Another factor considered responsible is the cessation of lactation on the affected side. The majority of these factors have not been specifically evaluated (8).

Atkins hypothesised that its development is associated with obstruction of the duct secondary to nipple inversion (9-10). A rare condition with a reported incidence of 1% to 3% in literature (11). A study conducted by Farhat Arsalan reported a total incidence rate of Mammary Fistula of 5%, affecting 4 out of 80 patients; all patients were younger than 30 years of age (12). Treatment options include fistulectomy, primary closure and total duct excision. Postoperative wound infection is a primary factor in fistula recurrence. Excision of the fistulous tract, combined with total duct excision and antimicrobial prophylaxis, can be considered a treatment option for complex mammary duct fistulas (13).

This study aims to estimate the frequency of mammary fistulae following incision and drainage in patients with breast abscesses. And also characterise the associated risk factors.

### Methodology

**Study Design:**

A retrospective review chart analysis was performed.



**Study Setting:** The study was conducted at Khyber Medical Centre, Peshawar, Pakistan, from March 2023 to November 2023, reviewing data collected during this period. A formal permission form from the institutional head and ethical approval were obtained before commencing the study.

**Inclusion Criteria:**

Patients presenting with breast abscess, irrespective of type, confirmed on clinical examination and radiologic findings, were included in the study. Ultrasound was used as the primary imaging tool in all patients. It was used to quantify underlying collection, site of the abscess and detect concomitant breast parenchymal disease. The first follow-up was scheduled for 1 week after all post-incision drainage patients. Those who developed mammary fistula or were on treatment had a prolonged follow-up. Those who developed milk discharge from the wound on their 1st follow-up visit after 1 week were labelled to have a mammary fistula.

**Exclusion Criteria:**

Abscesses in patients with breast cancer or suspicious for malignancy and post-oncological surgical procedures were a part of the exclusion criteria. Patients who presented with a burst breast abscess, autoimmune disorders, on medications like immunosuppressants, oral anticoagulants and those who did not have incision drainage as a therapeutic intervention were excluded from the study.

**Data Collection:**

After formal permission from the institutional head and ethical approval, the data collection process was initiated. Data were collected and recorded using a self-administered semi-structured proforma after reviewing the previous patient record. The confidentiality of patient demographic data, such as age, residence, and occupation, was maintained. A detailed history, examination, workup, perioperative, and follow-up records were scrutinised to collect data.

**Statistical Analysis:**

Data was analysed using SPSS 24. Mean ± SD values were calculated for continuous variables, such as age and interval presentation of mammary fistula. Frequencies and percentages are calculated for categorical variables. For categorical variables, the chi-square test was used for statistical analysis.

**Results**

A retrospective chart review analysis was performed. Data was analysed using SPSS 24. In our study, a cumulative total of 41 patients were deemed eligible on the established inclusion criteria. We examined the clinical, radiological, and perioperative characteristics of the patients.

The mean age of the population was 27.8 years, with an average range between 20 and 37 years. Among the types of breast abscesses, lactational abscesses were the most common, affecting 35 (85.4%) patients. The peri-ductal type was only present in 6 (14.6%) cases.

In this study, a total of 9 out of 41 patients, i-e, 22%, developed mammary fistula after incision and drainage. All patients who had developed a fistula were lactating females younger than 37 years of age and presented with clear milk discharge.

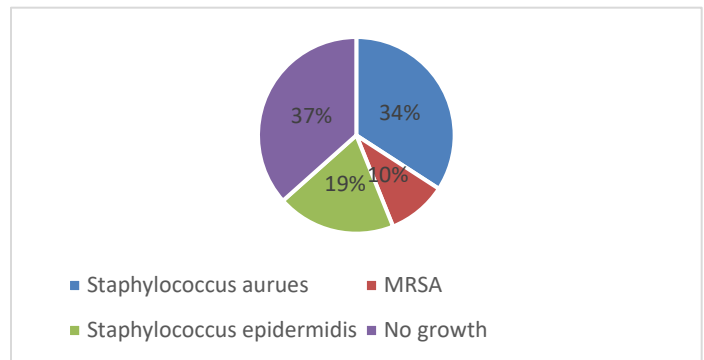
**Table 4: Number of Episodes of Abscess Formation and Frequency of Mammary Fistula**

	Frequency	Percentage (%)	Mammary Fistula Frequency	Percentage (%)
Single	35	85.4	4	44.4%
Two	4	9.8	3	33.3%
Three or more	2	4.9	2	22.2%
Total	41	100	9	100

In general, most patients presented with a single episode of breast abscess, comprising 35 (85.4%) out of 41 cases. Four (9.8%) had two episodes, and two (4.9%) suffered from three or more episodes. In the group of single episodes of breast abscess, 4 (44.4%) developed milk fistula. In the sub-groups of two and more than three episodes of abscess formation, 3 (33.3%) and 2 (22.2%) cases were reported. This shows that multiple episodes can lead to fistula formation.

We also studied the relationship between abscess location and the development of mammary fistula. The retro-areolar site was the most common location of fistula formation in 7 (77.8%) patients. The upper and lower outer quadrants are comprised of a single case each. In general, the Upper outer quadrant was the most common site of abscess, 43.9%. The impact of the incision site on the development of the fistula was also analysed. The peri-areolar incision group had a milk fistula in 7 out of 9 patients. Only two cases were reported with radial incisions. All patients with fistula had a stab incision and drainage (100%), while no case was reported in patients with incision drainage with penrose drain insertion. Staphylococcus aureus was the most common microorganism identified on culture and sensitivity testing.

In our study, the maximum number of patients presented with fistula after the 7<sup>th</sup> postoperative day. A total of 7 cases were given after the first week, with a mean of 9.56 days and a standard deviation of 2.59 days.



**Figure 1: Frequency of growth of micro-organisms on Culture and Sensitivity**

**Table 2: Frequency of Types of Breast Abscess**

	Frequency	Percentage (%)	Cumulative Percentage (%)
Lactational	35	85.4	85.4
Peri-ductal	6	14.6	100
Total	41	100	100

**Table 3: Frequency of Mammary Fistula**

	Yes	No	Valid Total
	9	32	41
Total (%)	22	78	100

**Table 5: Frequency of Mammary Fistula in terms of Location of Breast Abscess**

Abscess Location	Frequency	Percentage (%)	Fistula (N)	Percentage (%)
Retro-areolar	15	36.6	7	77.8
Upper outer quadrant	18	43.9	1	11.1
Lower outer quadrant	4	9.8	1	11.1
Lower inner quadrant	3	7.3	0	0
Total	41	100	9	100

**Table 6: Frequency of Fistula Formation concerning Incision Site**

Incision	Fistula Formation		
	No	Yes	Total
1. Curvilinear	4	0	4
2. Peri-areolar	9	7	16
3. Radial	16	2	18
4. Transverse	3	0	3
Total	32	9	41

**Table 7: Frequency of Interval Presentation of Mammary Fistula**

Interval Presentation (Days)	Number of Patients (N)	Percentage (%)
7 days	2	22.22
8 days	3	33.33
10 days	2	22.22
14 days	2	22.22
Total	9	100

**Discussion**

Although it is widely acknowledged that the conventional methodology of surgical incision drainage is no longer the preferred therapeutic intervention, it is still common in practice. Definitive protocols in the management of breast abscesses are still deficient. Hence, the available evidence on breast abscess treatment remains inconclusive, with no widely accepted guidelines for drainage, antibiotic use or follow-up management (14). As a result, patients can be deprived of standard treatment, leading to complications. The development of a mammary fistula is a complication of incision and drainage that can occur due to faulty technique, inadequate drainage, and an underlying diseased ductal system (13).

The majority of the patients developing mammary fistula have a lactational variety of breast abscesses, with an average age of less than 30 years. Helen et al reported a 2.8% prevalence of milk fistula, with an incidence of 1.4% within 1 week of intervention. Most patients underwent one or two invasive procedures (8).

In another study, performed by Soni and colleagues, a prospective survey of incision drainage and ultrasound-guided suction drainage for the management of breast abscesses reported that 4 out of 26 patients developed a milk fistula after incision and drainage (15). Odiya S et al documented 2 cases out of 51 patients dealt with breast abscesses undergoing incision and drainage. Ultrasound-guided suction drainage was labelled as a superior management option (16).

Continuation of breastfeeding has been associated with a better outcome in breast abscess. A study performed by Alipour et al recommended continuing breastfeeding throughout the process until healing occurs (17). Another study, conducted by Farhat Arsalan, reported a 5% rate of mammary fistula in 4 out of 80 patients. 60% of patients were primigravida. All patients were lactating mothers. The majority of patients, i.e., 45%, were between the ages of 21 and 30 years, while 30% were less than 20 years of age, thus affecting the primarily young population.

As this study was conducted at a single healthcare facility, the findings may not be generalised to other institutions or populations with different clinical practices or healthcare resources.

The study relies on retrospective data, which may be subject to incomplete or missing records, recall bias, and limitations in data standardisation.

As the sample size is small, it may limit the statistical power and ability to detect significant associations between contributing factors.

**Conclusion**

Mammary Fistula is not a common complication of therapeutic incision and drainage. It primarily affects young lactating women and is a sequel to breast abscess. Multiple factors can contribute to the formation of a fistula. It can develop due to faulty technique, inadequate drainage and an underlying diseased ductal system.

The location of the abscess and the incision site act as contributing factors. Retro-areolar abscess is the most common site for fistula formation due to the presence of the underlying ductal system. Peripherally placed incisions are safer than central incisions as they cause less damage to the lactiferous ducts.

Patients should have a follow-up between 7 and 14 days post-operatively, as the majority of fistulas typically develop during this period. The absence of fistula formation in patients managed with stab incision and drainage, along with the insertion of a Penrose drain, can be considered in large abscesses.

There is a lack of significant literature and research on standard unified treatment options and contributing factors. Hence, this leads to different management protocols in healthcare facilities, which can contribute to fistula formation.

**Declarations**

**Data Availability statement**

All data generated or analysed during the study are included in the manuscript.

**Ethics approval and consent to participate**

Approved by the department concerned. (IRB-KMC-112)

**Consent for publication**

Approved

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**Conflict of interest**

The authors declared the absence of a conflict of interest.

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*Review of Literature, Data entry, Data analysis, and drafting an article.*

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*Critical Input, Manuscript Revision*

*All authors reviewed the results and approved the final manuscript version. They are also accountable for the integrity of the study.*

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