

Lactational phlegmon: A distinct clinical entity affecting breastfeeding women within the mastitis-abscess spectrum

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Abstract

We aimed to describe the presentation and treatment of lactational phlegmon, a unique complication of mastitis in breastfeeding women that may require surgical management. We retrospectively analyzed medical charts of breastfeeding women treated by a single breast surgeon for lactational phlegmon or the related conditions of abscess or uncomplicated mastitis (UM) from July 2016 to October 2018. Demographic variables and treatment details were analyzed using ANOVA and Pearson's Chi-square test. Ten women with lactational phlegmon (19.2%), 15 women with abscess (28.8%), and 27 women with UM (51.9%) were identified. Phlegmon presented as a tender, erythematous, and nonfluctuant mass in a ductal distribution. Ultrasonography demonstrated an ill-defined, complex fluid collection. Epidemiologically, women with phlegmon were similar to patients with abscess and UM. Women with phlegmon reported more intense deep breast massage than patients in the other two groups, but significantly lower rates of breast pump use than women with abscess (30.0% vs 80.0%, $P < .05$). Relative to women with UM, patients with complicated mastitis (CM, defined as phlegmon or abscess) reported greater utilization of nipple shields (36.0% vs 11.1%, $P < .05$). Treatment of phlegmon entailed effective milk removal, antibiotics (range 10-30 days), and close follow-up until both clinical and radiographic resolution (range 8 days to >3 months), with biopsy of persistent masses. Antibiotic duration was significantly longer for patients with phlegmon compared to those with UM (mean 15.0 days vs 9.7 days, $P < .05$). Two phlegmons coalesced into abscesses within 1 week of diagnosis. Lactational phlegmon is a complication of mastitis in breastfeeding women that is distinct from abscess and UM. Optimal treatment consists of an extended course of antibiotics and close follow-up to monitor for coalescence into a drainable fluid collection and/or persistence of mass requiring biopsy.

KEYWORDS

breast, breastfeeding, lactation, mastitis, phlegmon

1 | INTRODUCTION

Lactational mastitis results in maternal and infant morbidity and is associated with increased medical costs and early weaning.¹ The World Health Organization recommends breastfeeding for at least 2 years,² and failure to breastfeed is associated with a multitude of health hazards. These include increased risks of pediatric infections, leukemia, and sudden infant death syndrome, as well as increased maternal risks of breast and ovarian cancers and chronic health conditions such as diabetes and hypertension.³

Mastitis results from milk stasis and constitutes a clinical spectrum from engorgement to noninfective mastitis to infective mastitis to abscess.^{4,5} Lactational phlegmon also can develop within this obstructive and inflammatory spectrum. While appendiceal⁶ and diverticular⁷ phlegmons have well-defined management strategies distinct from uncomplicated cases, societal guidelines on mastitis have yet to describe lactational phlegmon.^{4,5} This is not surprising, given the relatively small body of literature on breastfeeding medicine and continued lack of consensus on management of recognized complications such as lactational abscess.⁸ We seek to describe the presentation and treatment of lactational phlegmon, a unique complication of mastitis that may require surgical management.

2 | MATERIALS AND METHODS

We conducted a retrospective analysis of women treated by a single breast surgeon for lactational phlegmon or the related conditions of lactational abscess or uncomplicated mastitis (UM) between July 2016 and October 2018. This surgeon has expertized in breastfeeding medicine and receives referrals from lactation consultants

and other physicians. This study was approved by the Presbyterian Healthcare Services Institutional Review Board.

Demographic variables and treatment details were extracted via chart review. Continuous variables were compared using the Student's *t* test or ANOVA, as appropriate, and categorical variables were compared using Pearson's Chi-square test. Due to low frequencies of several categorical variables limiting the validity of the Chi-Square test, analysis of UM vs complicated mastitis (CM, defined as phlegmon or abscess) also was performed. A *P*-value of .05 was considered statistically significant. Analyses were performed using JMP version 13.0.

3 | RESULTS

Ten women with lactational phlegmon (19.2%), 15 women with lactational abscess (28.8%), and 27 women with UM (51.9%) were eligible for this study.

3.1 | Clinical presentation of lactational phlegmon

Clinical features of lactational phlegmon, lactational abscess, and uncomplicated mastitis are summarized in Table 1. All 52 women had clinical signs of mastitis such as breast tenderness, erythema, warmth, and/or induration, with or without systemic symptoms such as fever. Patients with phlegmon additionally presented with a tender mass in a ductal distribution on physical examination (Figure 1). Phlegmon was differentiated from abscess, which may also present as a mass, by lack of fluctuance and/or lack of discrete fluid collection on ultrasound. Diagnostic ultrasound of phlegmon demonstrated an ill-defined area of heterogeneous and hyperemic parenchyma, with interdigitating fluid (Figure 2).

Clinical features	Lactational phlegmon (N = 10)	Lactational abscess (N = 15)	Uncomplicated mastitis (N = 27)
Classic mastitis symptoms and signs	10 (100%)	15 (100%)	27 (100%)
Palpable mass	10 (100%), 0 (0%) fluctuant	15 (100%), 4 (26.7%) superficial and fluctuant	0 (0%)
Diagnostic ultrasound (US) findings	US obtained in 9 patients (90%) to establish diagnosis, with the following findings: ill-defined fluid collection with soft tissue stranding 1 patient (10%) was unable to complete an US as her infant was emergently admitted to the hospital	US obtained in 11 patients (73.3%) without fluctuant masses with the following findings: discrete fluid collection	US not generally required for diagnosis, but obtained in 10 patients (37.0%) for the following reasons: 7 (25.9%): question of deep, nonpalpable abscess—negative 2 (7.4%): recurrent mastitis in same location—negative for underlying mass/lead-point lesion 1 (3.7%): axillary lymphadenopathy—negative for concerning lymph nodes; benign appearance only

TABLE 1 Clinical features of lactational phlegmon, lactational abscess, and uncomplicated mastitis



FIGURE 1 Clinical appearance of lactational phlegmon. A tender mass was palpable in the medial left breast in the erythematous region

3.2 | Epidemiology of lactational phlegmon

Patients with phlegmon were similar to women with the related conditions of abscess or UM with respect to the following variables: age, race/ethnicity, parity, breastfeeding history, number of weeks postpartum, and use of All-Purpose Nipple Ointment (APNO) (Table 2). Overall, the mean age was 31.6 years and most women were non-Hispanic white (71.2%). Approximately half (55.8%) were primiparous and 30.8% breastfed a previous child. All women with phlegmon were <12 weeks postpartum, while women with UM were up to 1 year postpartum and women with abscess were up to 5 months postpartum, with one outlier at 2.5 years postpartum.

All women with phlegmon reported intense deep breast massage in an attempt to relieve plugged ducts; in contrast, no women with UM or abscess reported intense massage. A higher proportion of patients with phlegmon reported regular use of a nipple shield compared with patients with UM (33.3% vs 11.1%); however, rates of nipple shield use were similar between patients with phlegmon and abscess ($P = .734$). A significantly higher proportion of women



FIGURE 2 Ultrasonographic appearance of the mass palpated in the breast of the patient in Figure 1. Key findings include a heterogeneous, complex fluid collection with soft tissue edema and stranding

with abscess reported regular use of a breast pump (80% vs 30.0% for phlegmon and 29.6% for UM, $P = .004$). One woman with abscess was exclusively pumping, whereas the remainder of women utilizing a breast pump also were breastfeeding.

3.3 | Management of lactational phlegmon

Key management strategies for lactational phlegmon, lactational abscess, and uncomplicated mastitis are summarized in Table 3. All patients were instructed on the importance of frequent, effective milk removal to counteract milk stasis, the inciting event in all forms of mastitis. Patients were cautioned against pumping, as pumping removes milk less effectively than breastfeeding. They also were instructed to discontinue deep massage and nipple shield use. All phlegmon patients were prescribed antibiotics until clinical resolution (range 10-30 days, Table 4). One patient was noncompliant.

Aspiration was attempted in 7/10 phlegmon patients, with return of minimal nonpurulent, serosanguinous fluid. One of these patients underwent two additional attempts at drainage due to persistent mass and cellulitis in the context of antibiotic noncompliance. Two phlegmons coalesced into abscesses within 1 week of the initial consultation and then were treated effectively with a drainage procedure. One deep abscess was drained via image-guided percutaneous catheter insertion by interventional radiology; the drain was removed after 4 days. The other abscess, which developed after the patient underwent multiple therapeutic ultrasounds utilizing a physical therapy ultrasound machine,⁹ was drained via an #11 blade stab incision office procedure.

Among the eight phlegmons that did not coalesce into abscess, time to clinical resolution ranged from 8 days to >3 months. Interval imaging was obtained in four of these patients due to mass persisting >14 days. Two underwent core needle biopsy for suspicious imaging findings, with pathology demonstrating acute and chronic mastitis in both cases.

Overall, patients with phlegmon and abscess were similar with respect to antibiotic duration, number of procedures, number of encounters, and number of diagnostic imaging tests (Table 4). Compared with patients with either phlegmon or abscess, women with UM had significantly shorter antibiotic duration (mean 9.7 vs 14.5 days, $P = .014$), fewer diagnostic imaging tests (mean 0.4 vs 1.1, $P < .0001$), and fewer encounters (mean 2.2 vs 4.3, $P = .0001$).

4 | CONCLUSION

This is the first report to describe lactational phlegmon, a complication of mastitis in breastfeeding women that warrants management distinct from that of UM or abscess. Phlegmon, an inflammatory mass resulting from obstruction with or without infection, is described in the surgical literature as a complication of appendicitis⁶ and diverticulitis.⁷ We demonstrate that a similar phenomenon occurs in the lactating breast in the setting of milk stasis. In addition to signs and symptoms of mastitis, phlegmon manifests as a nonfluctuant

TABLE 2 Epidemiology of lactational phlegmon and related conditions of lactational abscess and uncomplicated mastitis (UM). Distribution of demographic and clinical variables is presented overall and by diagnosis. Due to low frequencies of several categorical variables limiting the validity of the Chi-Square test, analysis of UM vs complicated mastitis (CM, defined as phlegmon or abscess) also was performed

Variable	Total cohort	Complicated mastitis (CM)		Uncomplicated mastitis (UM) N = 27	3-group P-value	UM vs CM P-value	P vs A P-value
		Phlegmon (P) N = 10	Abscess (A) N = 15				
Age							
Mean (SD)	31.6 (5.3)	32.9 (3.7)	32.3 (5.1)	30.7 (5.8)	.437	.203	.721
Median (range)	32 (20-41)	32.5 (27-41)	33 (21-40)	31 (20-41)			
Number of weeks postpartum							
Mean (SD)	12.8 (20.1)	5.7 (3.3)	14.9 (32.4)	14.2 (14.2)	.473	.606	.294
Median (range)	6.5 (1-130)	5 (1-11)	5 (1-130)	9 (2-52)			
Race/Ethnicity							
White/NH	37 (71.2%)	7 (70.0%)	11 (73.3%)	19 (70.4%)	.976*	.897	.856
Other	15 (28.8%)	3 (30.0%)	4 (26.7%)	8 (29.6%)			
Parity							
Primiparous	29 (55.8%)	4 (40.0%)	8 (53.3%)	17 (63.0%)	.447	.278	.513
Multiparous	23 (44.2%)	6 (60.0%)	7 (46.7%)	10 (37.0%)			
Breastfed prior child							
Yes	16 (30.8%)	4 (40.0%)	3 (20.0%)	9 (33.3%)	.021*	.677	.275
No	36 (69.2%)	6 (60.0%)	12 (80.0%)	18 (66.7%)			
Pumping							
Yes	23 (44.2%)	3 (30.0%)	12 (80.0%)	8 (29.6%)	.004	.028	.012
No	29 (55.8%)	7 (70.0%)	3 (20.0%)	19 (70.4%)			
Nipple shield use							
Yes	12 (23.1%)	4 (40.0%)	5 (33.3%)	3 (11.1%)	.096*	.033	.734
No	40 (76.9%)	6 (60.0%)	10 (66.7%)	24 (88.9%)			
APNO use							
Yes	4 (7.7%)	1 (10.0%)	2 (13.3%)	1 (3.7%)	.509*	.262	.802
No	48 (92.3%)	9 (90.0%)	13 (86.7%)	26 (96.3%)			
Deep breast massage	10 (19.2%)	10 (100.0%)	0 (0.0%)	0 (0.0%)	n/a	n/a	n/a

Note: Categorical variables are presented as the number of patients and percentage for each column.

Bold indicates significant p-values (<0.05).

Abbreviations: APNO, All-Purpose Nipple Ointment; NH, Non-Hispanic; SD, Standard Deviation.

*At least 20% of cells have an expected count of <5.

palpable mass in a ductal distribution. Diagnostic ultrasound demonstrating tissue edema and inflammation with a poorly defined heterogeneous fluid collection can differentiate phlegmon from abscess.

More studies are needed to clarify the epidemiology of lactational phlegmon. The prevalence of phlegmon in our cohort (19.2%) is likely elevated due to referral bias to a surgeon; the true incidence may be closer to that of lactational mastitis complicated by abscess (3%-11%).¹⁰ Based on patterns observed in this cohort, intense breast massage, nipple shields, and breast pump use appear to be risk factors for the development of phlegmon. Intense massage likely potentiates edema and microvascular injury in the lactating breast. Nipple shields and breast pumps are often utilized in the setting of ineffective infant suckling and/or nipple trauma, both of which can

predispose a woman to mastitis.⁴ Women who develop mastitis and continue to use a nipple shield may be at higher risk for complications such as phlegmon and abscess because nipple shields may impede milk removal and therefore contribute to persistent milk stasis. Furthermore, breast pump use stimulates milk production while removing milk less effectively than breastfeeding. Our analysis may have failed to identify additional risk factors due to underpowering.

Further studies also are needed to identify risk factors for progression of UM to phlegmon or abscess. Phlegmon may represent an obligate precursor to abscess, or conversion to abscess may occur only in some phlegmons that remain untreated. Conversion to abscess did not occur in the patient in our cohort who was noncompliant with treatment, but did in the patient who underwent multiple therapeutic

TABLE 3 Key management strategies for lactational phlegmon, lactational abscess, and uncomplicated mastitis

Management strategy	Lactational phlegmon (N = 10)	Lactational abscess (N = 15)	Uncomplicated mastitis (N = 27)
Frequent, effective milk removal through direct breastfeeding with minimization of pumping	10 (100%)	15 (100%)	27 (100%)
Antibiotic therapy	9 (90.0%) 1 patient (10%) noncompliant with recommended antibiotics.	15 (100%)	23 (85.2%) Not indicated for 2 patients (7.4%) with resolution of symptoms prior to surgical evaluation, and 2 additional patients (7.4%) with noninfective mastitis
Invasive procedures	9 (90.0%), specifically: 7 (70.0%) aspiration attempted 2 (20.0%) drainage after coalescence into abscess	15 (100%) drainage for source control 5 (33.3%) aspiration 10 (66.7%) catheter drainage	0 patients (0%) with indication
Interval Imaging	Follow-up ultrasound obtained in 4 patients (40.0%) for mass persisting >14 d: 2 (20.0%)—markedly reduced area of abnormality with no discrete mass 2 (20.0%)—smaller but persistent mass	Follow-up ultrasound obtained in 3 patients (20.0%), for the following reasons: 2 (13.3%): persistent edema—negative for undrained collection 1 (6.7%): persistent mass—galactocele diagnosed	0 patients (0%) with indication
Biopsy	2 (20.0%) for suspicious imaging findings—pathology showed acute and chronic mastitis	0 patients (0%) with indication	0 patients (0%) with indication

TABLE 4 Management of lactational phlegmon and related conditions of lactational abscess and uncomplicated mastitis (UM), quantitative comparisons. Data are presented overall and by diagnosis. In keeping with Table 2, analysis of UM vs complicated mastitis (CM, defined as phlegmon or abscess) also was performed

Variable	Total cohort	Complicated mastitis (CM)		Uncomplicated mastitis (UM) N = 27	3-group P-value	UM vs CM P-value	P vs A P-value
		Phlegmon (P) N = 10	Abscess (A) N = 15				
#total encounters							
Mean (SD)	3.2 (2.1)	4.6 (2.5)	4.1 (2.0)	2.2 (1.3)	<.001	.0001	.625
Median (range)	3 (1-10)	4.5 (2-10)	4 (1-7)	2 (1-5)			
#total days antibiotics							
Mean (SD)	12.0 (7.2)	15.0 (9.7)	14.2 (6.2)	9.7 (5.9)	.046	.014	.821
Median (range)	10 (0-30)	10 (0-30)	10 (10-30)	10 (0-30)			
#diagnostic imaging tests							
Mean (SD)	0.7 (0.7)	1.3 (0.7)	1.0 (0.5)	0.4 (0.5)	<.001	<.0001	.255
Median (range)	1 (0-2)	1 (0-2)	1 (0-2)	0 (0-1)			
#procedures							
Mean (SD)	0.6 (0.9)	1.3 (1.2)	1.3 (0.6)	0	N/A	N/A	.935
Median (range)	0 (0-4)	1 (0-4)	1 (1-3)				

Note: Categorical variables are presented as the number of patients and percentage for each column.

Bold indicates significant p-values (<0.05).

Abbreviations: N/A, Not Applicable; SD, Standard Deviation.

ultrasounds,⁹ suggesting that this provocative measure may promote coalescence. The higher rate of pumping reported by women with abscess in our cohort may be explained by the increased risk of ineffective

milk removal through pumping relative to breastfeeding. Effective milk removal is the most essential component of mastitis management, and inadequate treatment is an established risk factor for abscess.^{5,11}

Our study lends several insights into the appropriate treatment of lactational phlegmon. Attempted aspiration does not have an appreciable treatment effect, but an extended antibiotic course may be warranted. In our cohort, patients with phlegmon required a significantly longer duration of antibiotics for complete resolution of infectious signs and symptoms relative to patients with UM. The mean durations of 15 and 10 days, respectively, approach the upper and lower limits of the range recommended in expert consensus guidelines for lactational mastitis.⁴ However, the maximum durations studied in randomized controlled trials¹²⁻¹⁴ included in Cochrane reviews^{8,15} were 6-7 days. Further research therefore is needed to clarify the optimal duration of antibiotic therapy for not only lactational phlegmon, but also UM and mastitis with abscess.

Like phlegmons occurring elsewhere in the body, lactational phlegmons warrant surgical evaluation and regular follow-up until clinical and radiographic resolution. In contrast to UM, phlegmon resolution may take up to 1 month or longer. As phlegmons often are classified as Breast Imaging and Reporting Data System¹⁶ (BI-RADS) 4 lesions on diagnostic ultrasound, repeat imaging within 6 months is recommended to document complete resolution. Earlier interval imaging may be obtained with high clinical suspicion for underlying lesion as lead point for obstruction.

Our study is limited by a relatively small size, which precludes some quantitative analyses and increases the risk of type II error. As patients were treated at a single institution by a single consultant, our findings may not be generalizable to other populations and may reflect biases of the individual surgeon. Finally, as some variable collection was dependent on patient report, there is potential for recall bias.

In summary, lactational phlegmon should be suspected in breastfeeding women with mastitis when a persistent, tender mass in a ductal distribution is detected on clinical breast examination, and confirmed with diagnostic ultrasonography. These women should complete an appropriate antibiotic treatment course; avoid deep massage, nipple shields, and pumping; breastfeed with the affected breast; and follow up until resolution of symptoms both clinically and radiographically. A subset of phlegmons may coalesce into an abscess necessitating drainage and/or require biopsy of a persistent mass. Surgeons are well-poised to make clinical decisions that ensure not only adequate treatment of the afflicted breast but also successful continuation of breastfeeding.

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CONFLICT OF INTEREST

No disclosures.

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