MASTITIS

The major conceptual shift over the last few years is from **“milk stasis → blocked duct → bacterial infection → empty/massage/antibiotics”** toward a **spectrum model of ductal inflammation, stromal oedema, altered milk production and possibly mammary dysbiosis, with bacterial infection occurring only in a subset**. The 2022 Academy of Breastfeeding Medicine (ABM) protocol drove much of this change, although some elements of its mechanistic model remain debated. Importantly, a new 2025 multidisciplinary guideline from the American Society of Breast Surgeons/Society of Breast Imaging/College of American Pathologists reinforces the clinically important distinction between **noninfectious and infectious lactational mastitis**, while modifying the approach to abscess drainage.

Contemporary mastitis spectrum: pathophysiology and management

Stage / entity	Contemporary pathophysiology	Typical clinical picture	Investigations	Management	Antibiotics / intervention
Physiological engorgement *(not technically mastitis)*	Secretory activation + increased blood flow + **interstitial oedema**, usually days 3–5 postpartum. Not infection and not simply “retained milk.”	Bilateral diffuse swelling, firmness/tenderness; areolar oedema; generally no focal cellulitis	Clinical. Imaging unnecessary unless atypical/persistent focal mass	Physiological breastfeeding; avoid unnecessary pumping; hand express **small amounts for comfort/latch**, reverse-pressure softening; cold/ice; NSAID/paracetamol	**No antibiotics.**
Ductal narrowing / “plugging”	Current model: microscopic **ductal inflammation and luminal narrowing**, associated with alveolar distension, oedema/hyperaemia and possibly dysbiosis. A single macroscopic “milk plug” obstructing one duct is probably an oversimplification.	Localised tender induration/fullness ± mild erythema; **no systemic illness**	Clinical	Continue normal/physiological breastfeeding. Cold/ice + NSAID. Correct oversupply and pump/latch issues. **Do not repeatedly pump to empty. Do not aggressively massage/squeeze the lump.**	**No antibiotics. No drainage.**
Inflammatory mastitis	Progression of ductal inflammation → stromal oedema, hyperaemia and inflammatory response. Crucially, **fever, chills and tachycardia can occur without bacterial infection.**	Increasing focal erythema, swelling and pain; fever/chills/myalgia possible	Usually clinical initially. CBC/CRP poorly distinguish inflammation from infection.	Ice/cold, NSAID/paracetamol, rest/fluids; physiological breastfeeding; avoid oversupply/excess pumping and deep massage. Reassess over ~24–48 h.	**Usually no immediate antibiotics** if clearly noninfectious and clinically stable. 2025 consensus: antibiotics if not improving within 24–48 h.
Acute bacterial / infectious mastitis	Inflammation complicated by bacterial infection. Common organisms include **S. aureus**, other staphylococci and streptococci. Infection probably reflects interaction between host, microbiome and local	More convincing **cellulitis**: well-demarcated/progressive erythema and induration ± systemic illness; failure of conservative therapy supports infection	Usually clinical. Milk culture if failure after ~48 h, recurrent disease, MRSA risk, immunocompromised infant/NICU	Continue breastfeeding at physiological frequency + anti-inflammatory measures. Avoid excessive pumping/massage.	**Yes.** Typical first line: flucloxacillin/dicloxacillin 500 mg QID or cephalexin 500 mg QID. ABM suggests 10–14 d; tailor to response/local guidance. MRSA-risk/resistant

Stage / entity	Contemporary pathophysiology	Typical clinical picture	Investigations	Management	Antibiotics / intervention
	inflammation rather than simply bacteria entering through a cracked nipple.		circumstances, or unusual/severe infection		disease → culture-directed therapy.
Phlegmon	Intense inflammation/infection produces an **ill-defined heterogeneous inflammatory mass** rather than a mature cavity. Tissue trauma/deep massage may aggravate oedema and microvascular injury. Can evolve into abscess.	Firm, increasingly mass-like tender area; usually **nonfluctuant**; often follows mastitis	**Breast ultrasound** important: heterogeneous inflammatory tissue without discrete drainable cavity	Antibiotics + anti-inflammatory management; close clinical/US follow-up until resolution because it may coalesce into an abscess	**Yes.** 2025 guideline recommends ≥10 d antibiotics. **Do not drain unless a drainable collection develops.**
Lactational abscess	Localised infected fluid collection following bacterial mastitis/phlegmon. Once pus is encapsulated, **source control becomes central**; antibiotics alone are inadequate.	Persistent/progressive focal induration, erythema, pain; palpable/fluctuant mass may occur. Fever can paradoxically improve once infection becomes walled off	**Ultrasound** defines collection/size/loculations . Send aspirate/drainage for culture	Continue breastfeeding/physiological milk removal unless anatomy makes it impractical. Drain collection + treat surrounding infection.	**Drainage + antibiotics.** Current drainage strategy discussed below.
Infected galactocele	Milk-filled cyst resulting from impaired drainage/ductal narrowing becomes secondarily infected	Cystic mass, often fluctuates with feeding; when infected → pain, erythema ± systemic symptoms	Ultrasound; culture drained material	Drainage + antibiotics; manage underlying oversupply	**Yes + source control.** Repeated aspiration may lead to recurrence/infection; catheter/drain may be preferable.
Subacute mastitis *(controversial entity)*	ABM proposes chronic **mammary dysbiosis with bacterial biofilm** causing ductal narrowing rather than acute invasive infection. Evidence is considerably weaker than for acute bacterial mastitis.	Recurrent deep/needle-like or burning pain, blebs, intermittent induration/congestion; few systemic symptoms	Careful history/exam; milk culture may be nondiagnostic. Exclude nipple trauma, vasospasm, dermatological disease and structural pathology	Individualised management; address pumping/oversupply and other contributors. Selected probiotics have been proposed but evidence remains limited	ABM suggests macrolides may have a role, but explicitly acknowledges need for further evidence. **Avoid reflexive repeated antibiotic courses.**
Recurrent mastitis	Often reflects unresolved predisposing factors: oversupply, recurrent inflammation, pumping mechanics, resistant organism, or possibly dysbiosis rather than repeated de novo infection	Repeated episodes, sometimes same quadrant	**Culture rather than repeated empiric antibiotics.** Repeated same-site disease → imaging to exclude structural lesion, granulomatous mastitis or malignancy	Correct underlying lactation mechanics/oversupply; targeted therapy according to diagnosis	Avoid prophylactic antibiotics; they have not demonstrated benefit and may select resistance.

The key paradigm changes

Older paradigm	Contemporary interpretation	Practical consequence
"Blocked milk duct" containing inspissated milk	More likely **microscopic ductal narrowing caused by inflammation/oedema**, with complex interconnecting ductal anatomy	Stop trying to physically "push the plug out."
Milk stasis is the primary cause	Milk accumulation/alveolar distension may contribute, but simple milk stasis → infection is probably an incomplete model; causation has not been firmly demonstrated	Management targets **inflammation and production-demand mismatch**, not simply emptying the breast.
"Empty the breast completely"	Breast is continuously producing milk and is never literally empty. Repeated emptying/pumping reduces feedback inhibition and can **upregulate production → worsening congestion/inflammation**	Feed according to infant demand/physiological volumes rather than pumping repeatedly to "empty."
Feed/pump the affected breast more frequently	Excess stimulation can perpetuate hyperlactation and oedema	Continue breastfeeding, but **do not deliberately increase removal beyond physiological need**.
Firm/deep massage to unblock duct	Deep massage may cause capillary injury, increased oedema and tissue trauma and has been associated with phlegmon/abscess formation	Avoid aggressive kneading, vibrating massagers and attempts to squeeze out a plug.
Heat opens the ducts	Vasodilatation can theoretically increase oedema; evidence that heat improves outcomes is poor	**Cold/ice + NSAIDs** have become the preferred anti-inflammatory approach; warmth can still be used briefly if subjectively comforting.
Fever = bacterial infection	Systemic inflammatory response can accompany **sterile inflammatory mastitis**	Do not automatically prescribe antibiotics solely because fever is present.
Mastitis = infection	Clinically important distinction between **noninfectious inflammation and infectious mastitis**	Antibiotic stewardship becomes central. This distinction is strongly endorsed by the 2025 multidisciplinary guideline.
Cracked nipple allows bacteria to ascend	Nipple trauma is associated with mastitis, but microbiome studies challenge a simple ascending-infection model	Treat nipple trauma, but avoid framing mastitis simply as poor hygiene/ascending infection. Routine sterilisation is unnecessary.
Stop breastfeeding from infected breast	Milk from bacterial mastitis is generally safe for the infant	**Continue breastfeeding** where feasible.
Abscess = formal surgical I&D	Source control remains mandatory, but minimally invasive/local approaches generally preserve breastfeeding and cosmesis better	Ultrasound-guided/percutaneous drainage or small stab incision + drain increasingly replaces large open I&D.

Antibiotics: where they now fit

The useful clinical dividing line is therefore **inflammation versus infection**, rather than “mild versus severe mastitis.”

Clinical situation	Antibiotics?	Approach
Engorgement	**No**	Anti-inflammatory/supportive
Ductal narrowing	**No**	Anti-inflammatory + physiological milk removal
Early inflammatory mastitis	**Usually no initially**	Observe response over 24–48 h if clinically stable
Persistent inflammatory symptoms >24–48 h	**Consider/start**	Increasing probability of bacterial component; 2025 guideline recommends treatment if failure to improve
Clear cellulitis / bacterial mastitis	**Yes**	Anti-staphylococcal treatment
Phlegmon	**Yes**	≥10 d in 2025 breast-surgery consensus + imaging follow-up
Abscess	**Yes + drainage**	Antibiotics cannot substitute for source control
Infected galactocele	**Yes + drainage**	Culture fluid
Recurrent episodes	**Culture first where feasible**	Avoid serial blind antibiotic courses
Noninfected galactocele	**No**	Drain only if symptomatic/large
Suspected subacute mastitis	**Uncertain / individualised**	Evidence for antibiotic strategy is substantially weaker

For uncomplicated infectious lactational mastitis, the ABM regimen remains **flucloxacillin/dicloxacillin 500 mg QID or cephalexin 500 mg QID for 10–14 days**, with clindamycin or TMP-SMX among second-line choices depending on allergy, MRSA epidemiology and infant factors. TMP-SMX requires particular caution with prematurity, neonatal hyperbilirubinaemia and G6PD deficiency.

Failure to improve after approximately **48 hours** should trigger reconsideration rather than simply escalating empirically: culture milk, assess adherence/organism resistance, and particularly ask whether there is a **phlegmon or abscess requiring ultrasound**.

Abscess: an important 2025 refinement

There has actually been a further evolution beyond the commonly quoted “ultrasound-guided aspiration instead of surgery” message.

ABM 2022 recognised needle aspiration as a common first-line intervention but highlighted the frequent need for repeated aspirations and suggested that **drain placement at the initial procedure may provide more definitive treatment**.

The **2025 multidisciplinary American Society of Breast Surgeons guideline is more prescriptive**:

Abscess characteristics	2025 approach
Fluid collection <3 cm	Aspiration + culture can be attempted
Aspiration successful	Clinical follow-up
First aspiration fails	Small stab incision + gravity drain
Collection >3 cm	Stab incision + gravity drain rather than serial aspiration
Thick/viscous collection	Drain placement generally preferable because lactational abscess contents often aspirate poorly
Heavily loculated/solidified collection	Operative drainage may be required
Patient cannot tolerate office drainage	Drainage in theatre with sedation
Operative incision	**As small as possible and away from nipple–areolar complex**
Packing	**Avoid routine packing**
Drain	Gravity drainage, typically removed after approximately 3–5 days
Breastfeeding	Continue physiological breastfeeding/pumping where feasible

These recommendations represent a subtle but important change: **“avoid surgery” does not mean repeated needle aspiration indefinitely.** The objective is rapid source control using the least traumatic definitive procedure.

Large traditional incisions and repeated packing can produce unnecessary pain, ductal injury, prolonged wound care and cosmetic morbidity. Older WHO guidance already recognised ultrasound-guided aspiration as less painful and mutilating than conventional I&D, but the newer surgical guideline favours a **small stab incision with short-term gravity drainage for many larger/thick lactational collections**.

Where the pathophysiology remains uncertain

This is important because the ABM 2022 protocol is sometimes presented as though the entire spectrum model were established biology. It isn’t.

The strongest contemporary clinical proposition is that **mastitis is fundamentally an inflammatory spectrum and that systemic symptoms do not necessarily equal bacterial infection**. The distinction between infectious and noninfectious disease now has broader multidisciplinary support.

The more specific hypothesis that **mammary dysbiosis → loss of microbial diversity → proliferation of coagulase-negative staphylococci/viridans streptococci → thick intraductal biofilm → luminal narrowing → subacute mastitis** is biologically plausible and supported by microbiome observations, but should still be regarded as an evolving model rather than settled causation. ABM itself acknowledges substantial research gaps.

Indeed, a published critique of Protocol #36 argues that some mechanistic assumptions are presented with greater certainty than the evidence warrants, particularly recommendations involving lymphatic drainage, therapeutic ultrasound, lecithin and aspects of the hyperlactation/dysbiosis model.

Consequently I would distinguish:

Relatively well supported: inflammation ≠ infection; avoid unnecessary antibiotics; avoid traumatic massage; avoid pathological over-pumping; maintain breastfeeding; use ultrasound when a collection is suspected; and obtain source control for abscess.

Promising but incompletely established: microbiome/dysbiosis as a major causal mechanism, biofilm-mediated "subacute mastitis," therapeutic probiotics, lecithin, therapeutic ultrasound and specific lymphatic techniques.

Practical clinical algorithm

Focal breast pain/erythema → history + examination → determine inflammatory versus infectious phenotype. If mild/noninfectious, use cold/NSAID/analgesia, normal breastfeeding and remove causes of oversupply or excessive pumping, with no deep massage. Reassess within 24–48 h. Failure to improve or convincing cellulitis warrants antibiotics; failure after ~48 h of appropriate antibiotics warrants culture and ultrasound. A firm nonfluctuant mass suggests **phlegmon → antibiotics + serial clinical/US assessment**. A discrete collection suggests **abscess → culture + source control**, with aspiration reasonable for small collections but a small stab incision/gravity drain increasingly preferred for >3 cm, failed aspiration or viscous collections. Operative drainage is reserved mainly for complex/solidified disease or inability to tolerate office drainage. Persistent or recurrent same-site disease should prompt imaging and consideration of **galactocele, granulomatous mastitis and malignancy**, rather than another automatic antibiotic course.

For reference, the two documents I would currently put at the top of a clinician's reading list are the ABM Clinical Protocol #36: The Mastitis Spectrum and the 2025 multidisciplinary guideline on infectious and inflammatory breast lesions. The latter is particularly useful because it updates the procedural/surgical side of the pathway.

Duct
Lobule/Alveoli
Inflammation
Bacteria (optional)
Fluid/Pus

The New Model of Mastitis – A Spectrum of Disease

Inflammation comes first. Infection occurs in some cases.
Treat the cause, reduce inflammation, support lactation.

The Mastitis Spectrum

1. Physiological Engorgement
(Not mastitis)

- Days 3–5 postpartum
- Bilateral swelling, fullness, tenderness
- No focal redness
- No systemic symptoms

Management
- Physiological breastfeeding
- Small amounts of hand expression for comfort
- Cold/ice, NSAID, rest
- NO antibiotics

2. Ductal Narrowing
(Formerly "plugged duct")

- Localized tender lump or induration
- Mild or no redness
- No systemic symptoms

Management
- Continue normal breastfeeding
- Cold/ice, NSAID
- Address oversupply/ pumping issues
- DO NOT over-pump or empty
- DO NOT massage deeply

3. Inflammatory Mastitis
(Noninfectious)

- Increasing pain, redness, swelling
- May have fever, chills, body aches
- Can occur WITHOUT bacterial infection

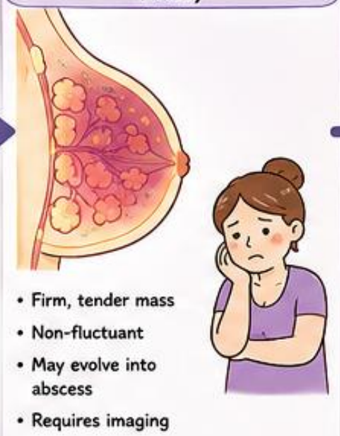
Management
- Cold/ice, NSAID, rest, fluids
- Continue breastfeeding at physiological frequency
- Avoid oversupply and excess pumping
- Reassess in 24–48 h
- Usually NO antibiotics initially

4. Infectious Mastitis
(Bacterial)

- Progressive redness, induration, pain
- Fever, chills, malaise
- Failure to improve after 24–48 h suggests bacterial infection

Management
- Continue breastfeeding
- Anti-inflammatory measures
- START antibiotics (10–14 days; e.g., flucloxacillin or cephalexin)
- Reassess in 48 h
- Consider culture if not improving, recurrent or severe

5. Phlegmon
(Ill-defined inflammatory mass)



- Firm, tender mass
- Non-fluctuant
- May evolve into abscess
- Requires imaging

Management
- Antibiotics (≥10 days)
- Anti-inflammatory care
- Close follow-up
- Ultrasound to monitor
- DO NOT drain unless collection forms

6. Abscess
(Drainable collection)

- Fluctuant, painful mass
- May or may not have fever
- Result of bacterial infection

Management
- Continue breastfeeding
- Ultrasound evaluation
- Drainage + antibiotics
  - <3 cm: aspiration ± culture
  - >3 cm or failed aspiration: small incision + drain
- Culture pus/aspirate

Key Paradigm Shifts (Old Model → New Model)

Blocked Duct with Milk Plug	Empty the Breast Completely	Frequent Pumping of Affected Breast	Deep Massage & Heat	Mastitis = Infection (Always)	Stop Breastfeeding Affected Side
					
→ Microscopic ductal inflammation & narrowing	→ Physiological milk removal, not over-emptying	→ Avoid excess stimulation that worsens inflammation	→ Avoid deep massage use cold/ice + anti-inflammatories	→ Inflammation ≠ infection Antibiotics only when indicated	→ Continue breastfeeding where feasible

Foundational Principles

- Inflammation is central. Infection happens in some cases, not all.
- Support lactation with physiological breastfeeding.
- Reduce inflammation: cold/ice, rest, NSAIDs.
- Reassess. Use ultrasound when mass, no improvement, or concern for abscess.
- Treat the cause. Address oversupply, pumping technique, nipple trauma, and other contributors.

When to Seek Help

- Fever >38.5°C (101.3°F)
- Redness getting worse
- Severe pain
- No improvement in 24–48 hours
- Lump persists

The Goal: Relieve inflammation, treat infection when present, and protect breastfeeding.