Mastitis

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Mastitis, which is septic inflammation of the mammary gland, can be acute and fulminant or chronic and low grade. Single or multiple mammary glands may be affected. Coliforms, Staphylococcus spp, and Streptococcus spp are the most commonly isolated causative organisms in both bitches and queens. The source of bacteria is usually cutaneous, sometimes exogenous, and less often hematogenous. Mild mammary discomfort and heat, galactostasis, cutaneous inflammation, and the presence of an intra-mammary mass are the earliest signs.

DIAGNOSTIC CRITERIA

Historical Information
Gender Predisposition
- Mastitis is primarily a disease of lactating females.
- Males with gynecomastia can develop mastitis.
- Females experiencing pseudocyesis can also develop mastitis.

Age Predisposition
- None.

Breed Predisposition
- None.

Owner Observations
- Diminished willingness to nurse neonates.
- Gradual or acute onset of hyporexia or anorexia.
- Ventral discomfort with palpation.
- Lethargy.
- In advanced cases, the owner may detect a firm, erythemic, painful mammary gland.

Other Historical Considerations/Predispositions
- Having small litters and abundant lactation predisposes patients to galactostasis.
- Galactostasis predisposes bitches and queens to mastitis.
- Bitches and queens experiencing mastitis are predisposed to developing the condition in future lactations.
- Excessive unhygienic manipulation of the mammary glands predisposes dams to mastitis.

Physical Examination Findings
- Mammary gland discomfort.
- Focal heat, erythema, and firmness of the affected gland(s).
- Fever.
- Discolored (yellow, brown, or red) milk with increased viscosity.
- Advanced cases can present with clinical signs of systemic inflammatory response syndrome (SIRS) or sepsis. These signs include tachycardia, tachypnea, hypotension, injected mucous membranes, and prolonged capillary refill time. Currently accepted diagnostic criteria for SIRS include tachycardia (bradycardia in cats), tachypnea, leukocytosis or leukopenia, and pyrexia or hypothermia. Sepsis is diagnosed when there is evidence of SIRS in the presence of documented infection.

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• Dams with concurrent metritis may have an abnormal vaginal discharge.

**Laboratory Findings**
- Inflammatory leukogram: Left-shifted neutrophilic leukocytosis that can have degenerative changes.
- Monocytosis if chronicity exists.
- Mild normochromic, normocytic, nonregenerative anemia compatible with recent pregnancy (dilutional).
- Hypoalbuminemia (negative acute-phase protein response).
- Hyperglobulinemia.

Laboratory findings can be normal in acute cases presented early in the course of the disease.

If mastitis has progressed to SIRS or sepsis, hypoglycemia, hypoalbuminemia, leukopenia, and coagulopathies may occur.

**Other Diagnostic Findings**
- Milk cytology can be helpful (it can show an increase in leukocytes or phagocytosis of bacteria) in some cases but is not specific for mastitis.
- Milk culture (aerobic and anaerobic) is indicated; a midstream sample should be acquired.
- Ultrasonography of the affected gland can help identify abscessation.
- Ultrasonography of the postpartum uterus is indicated because of the potential for metritis as a concurrent disorder.

**Summary of Diagnostic Criteria**
- Deterioration of dam’s attitude, appetite, and maternal behavior.
- Physical changes of the mammary glands (e.g., heat, pain, erythema, firmness) seen on careful physical examination. Gentle aseptic expression of milk should be done for visual examination and culture.

**Diagnostic Differentials**
- **Galactostasis** (milk impaction without bacterial contamination): Galactostasis is relieved by evacuation of the affected gland, which is best accomplished by encouraging nursing; gentle, aseptic manual expression is acceptable. Imperforate or inverted teats should be ruled out. Nervous dams may not position themselves in the brood box to enable nursing from all glands. Clients should be instructed to examine the mammary glands at least once a day to ensure that adequate nursing is occurring and to reposition dams or neonates as necessary.

- **Other causes of postpartum fever:** Metritis, eclampsia. Metritis is best diagnosed with abdominal ultrasonography and cytology and culture of vaginal discharge. Eclampsia is diagnosed via measurement of serum ionized calcium evaluation.

**Initial Treatment**
- Broad-spectrum bactericidal antibiotics should be initiated while the practitioner is awaiting culture and sensitivity results. $\$
- Intravenous delivery of antibiotics is indicated if the dam is significantly ill or presents with clinical signs of SIRS or sepsis. $$
- If the dam is eating and relatively stable, oral administration of antibiotics can be attempted. If nursing is continued, the antibiotic chosen should not be problematic for the neonates (i.e., it should not require extensive metabolism to avoid overdosage or possess directly toxic side effects). $\$
  — First-generation cephalosporins: 20–30 mg/kg cephalexin PO or IV q8h for ≥14 days.
  — Potentiated penicillins: Amoxicillin–clavulanic acid (dose based on the amoxicillin fraction): 12–13.75 mg/kg PO for ≥14 days or 50 mg/kg of ticarcillin with 1.7 mg/kg of clavulanic acid IV. $$
- Hospitalization with supportive care as indicated by the dam’s condition (IV fluids, antibiotics, physical therapy). $$$

**Alternative/Optional Treatments/Therapy**
- Gentle manual evacuation of the affected gland.
- Ultrasound-guided sterile aspiration of purulent fluid from the organized abscessation within the gland.
- Ultrasound-guided establishment of drainage when an organized abscess occurs can help prevent spontaneous necrosis of the gland with rupture and can hasten recovery.
- Surgical debridement of a necrotic gland should be delayed until the dam’s condition has stabilized and the infection has organized. Premature surgical inter-

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**ON THE NEWS FRONT**

Coexistence of metritis and mastitis suggests that the two conditions may be interrelated and that bacteremia may be present.

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Patient Monitoring
- Resolution of clinical signs (fever, pain, mammary gland heat, erythema, and firmness).
- Improvement in attitude, appetite, and maternal behavior.
- Normalization of body temperature and hemogram.

Home Management
- The dam should be monitored if she remains with the nurslings because she may be in pain.
- Nurslings should be monitored for adequate milk consumption by evaluating their daily body weight (gain should be approximately 10% per day).
- Nurslings should get milk supplementation or be weaned as indicated.
- Warm compresses should be applied to the affected gland q6–8h.
- Antibiotics and analgesics should be given as prescribed for the full course.
- Appropriate hygiene should be instituted if a draining abscess is present.
- Trauma to the affected gland from nursling claws and whelping or queening box edges should be prevented.

Milestones/Recovery Time Frames
- Improvement in the clinical signs should occur within 24 hours of instituting appropriate therapy.
- If severe cellulitis is present, abscessation may occur followed by necrosis of the gland, which can impact future function and prolong resolution. In this scenario, full recovery may take several weeks.
- Close monitoring of the remaining glands is indicated because they may become mastitic as well.
- Close monitoring is indicated at the next lactation.

Supportive Treatment
- Analgesia should be provided. Oral or parenteral narcotics with a conservative dosage are the best choice. Sedation of neonates can still result but is usually acceptable and is reversible if it becomes excessive.
- Physical therapy should be done, primarily gentle expression of the affected gland(s). Warm hydrotherapy is helpful before milk evacuation.
- If at all possible, nursing should be allowed to continue to prevent galactostasis in other glands. (Nursing neonates tend not to suckle from the affected gland, making concerns about the ingestion of infected milk minimal.)
- If weaning is indicated because of a very ill dam or because the offspring are older than 6 weeks of age, antiprolactin therapy (cabergoline 5.0 µg/kg PO divided q12h for 3–5 days) can hasten regression of lactation. Nausea or diarrhea can occur.
- Probiotic supplements should be considered if diarrhea occurs with antibiotic therapy.

Treatment Contraindications
- Any drug administered to a nursing dam will be ingested by the nurslings as well. Drugs can be concentrated in milk, resulting in increased doses to the nurslings (Table 1). Nephrotoxic and hepatotoxic drugs should be avoided.
  - Nonsteroidal antiinflammatory drugs should be avoided in nursing dams because of neonates’ immature renal and hepatic metabolism.
  - Aminoglycosides.
  - Sulfonamides.
  - Chloramphenicol.
- Nurslings will also be exposed to any topical antimicrobials or debride-ment.

TABLE 1
Drugs That are Safe in Pregnant and Nursing Animals

<table>
<thead>
<tr>
<th>Drug Type</th>
<th>Safe Drugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antibiotics</td>
<td>Ampicillin, amoxicillin, carbenicillin, cephalosporins, clindamycin, cloxacillin, dicloxacillin, hetacillin, lincomycin, neomycin, oxacillin, penicillin G, ticarcillin</td>
</tr>
<tr>
<td>Antimycotics</td>
<td>Miconazole (for topical use only)</td>
</tr>
<tr>
<td>Antiparasitics</td>
<td>Diethylcarbamazine, fenbendazole, mebendazole, ivermectin, piperazine, praziquantel, bunamidine, pyrantel, thenium</td>
</tr>
<tr>
<td>Anticancer drugs</td>
<td>None</td>
</tr>
<tr>
<td>Anticonvulsants</td>
<td>None</td>
</tr>
<tr>
<td>Anesthetics</td>
<td>Lidocaine, naloxone</td>
</tr>
<tr>
<td>Cardiovascular drug</td>
<td>Digitalis</td>
</tr>
<tr>
<td>Endocrine drugs</td>
<td>None</td>
</tr>
<tr>
<td>Gastrointestinal drugs</td>
<td>Antacids, sucralfate</td>
</tr>
<tr>
<td>Muscle relaxants</td>
<td>None</td>
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</tbody>
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Prognosis

**Favorable Criteria**
- Early recognition and intervention.
- Lack of abscessation.
- No progression to SIRS or sepsis.

**Unfavorable Criteria**
- Resistant organism.
- Abscessation or necrosis of the gland.
- SIRS or sepsis.
- Concurrent metritis (suggests bacteremia).
- Multiple gland involvement.
- Recurring condition in subsequent lactations.

Recommended Reading


