

Neonatal Mastitis: Controversies in Management

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ABSTRACT

Objective: To document the range of presentations, extent of investigations, and treatment choices of 'physicians treating' neonates with mastitis seen over a 9-year period at a tertiary care pediatric hospital. **Materials and Methods:** An email survey was sent to Emergency Department (ED) staff and fellows asking them how they would treat a well-looking neonate with localized mastitis. Secondly, a retrospective chart review of neonates presenting to the ED with a diagnosis of neonatal mastitis or breast engorgement from July 2000 to December 2009 was conducted to assess how such patients were actually treated. **Results:** 46/107 surveys were returned, with a wide discrepancy in how clinicians would treat neonatal mastitis: 4.3% would perform a full sepsis work up, including lumbar puncture, followed by IV antibiotics and hospital admission; 28% chose discharge on oral antibiotics; and 28% suggested admission only if blood work was abnormal. From the chart review, 33 neonates were diagnosed with possible neonatal mastitis over a 9-year period: 12 met the inclusion criteria. Of these, 8 (66%) were admitted and treated with intravenous antibiotics, 2 (16.6%) were treated with oral antibiotics, and 2 (16.6%) did not receive antibiotics. None of the 12 patients had lumbar puncture performed. **Conclusion:** There is significant disagreement among clinicians regarding the best way to treat the well-looking neonate with localized mastitis. Most elect to perform blood tests and start treatment with IV antibiotics with good *Staphylococcus aureus* coverage, followed by oral antibiotics if cultures are negative.

Key words:

Neonatal breast cellulitis, neonatal breast skin infection, neonatal mastitis

INTRODUCTION

Mastitis (infection of breast tissue) typically occurs in infants after 2 months of age and in lactating women. During the first 2 weeks of life, it occurs with equal frequency in males and females; thereafter, it is more common in girls, with a female:male ratio of approximately 2:1.^[1] This is thought to be related to the longer duration of physiologic breast hypertrophy in female infants.^[1] The majority of cases of neonatal mastitis are caused by *Staphylococcus aureus*;^[1-4] less common causes include gram-negative enteric organisms (e.g. *Escherichia coli*, *Salmonella*), anaerobes, and Group B *Streptococcus*.^[1-4] Clinically, infants usually present with unilateral swelling, erythema, warmth, tenderness, and induration of the breast, occasionally with purulent discharge from the nipple, and/or fluctuation suggesting breast abscess. Mastitis in infancy is usually a local infection, and systemic symptoms such as fever, vomiting, lethargy, and irritability are uncommon.

The evaluation of the neonate with mastitis includes a careful history and physical examination, with particular attention being paid to the presence of fever and other systemic symptoms. Investigations may include a full sepsis work up, culture of discharge, and ultrasound of the breast; however, there is little evidence guiding the extent of investigations indicated for the neonate without systemic symptoms and signs. Likewise there is no evidence from controlled

trials regarding the need to treat with antibiotics, choice of antibiotics, and route or duration of treatment. Much of the literature recommends treatment with parenteral antibiotics with good coverage for *S. aureus*.^[1,4]

In this study, we review all neonates with mastitis seen over a 9-year period at a tertiary care pediatric hospital, and document the range of presentations, extent of investigations, and treatment choices.

MATERIALS AND METHODS

The study was conducted at the Hospital for Sick Children, Toronto, Canada. Initially, a survey was sent to

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the 107 pediatric emergency staff whose seniority allows them to discharge patients independently, asking how they would approach a 2-week-old afebrile baby, without any signs of toxicity, who has clear signs of unilateral mastitis as shown in an accompanying color photo. They were asked to select one of five management choices with varying investigation, treatment, and disposition options [Figure 1].

For the second, main part of the study, ethical approval was obtained from the Research Ethics Board of the hospital and a retrospective chart review was conducted of all neonates seen at the hospital with neonatal mastitis (ICD diagnosis code 771.5) or breast engorgement (ICD diagnosis code 778.7) between July 2000 and December 2009. Patients were included if they presented with swelling, erythema, warmth, tenderness, and induration of the breast, and a final diagnosis of mastitis or breast abscess. Neonates with findings suggestive of systemic toxicity and those who were already inpatients when they developed the condition were excluded. The following details were extracted from patients' charts: age, gender, presenting symptoms and their duration, physical examination, presence of breast abscess (clinically or by breast ultrasound), disposition (admission, discharge or transfer to another facility), investigations (blood count, blood culture, urinalysis and culture, lumbar puncture, culture of breast discharge, ultrasound), treatment details including antibiotic choice, route, duration and need for surgical intervention, and complications during or after treatment.

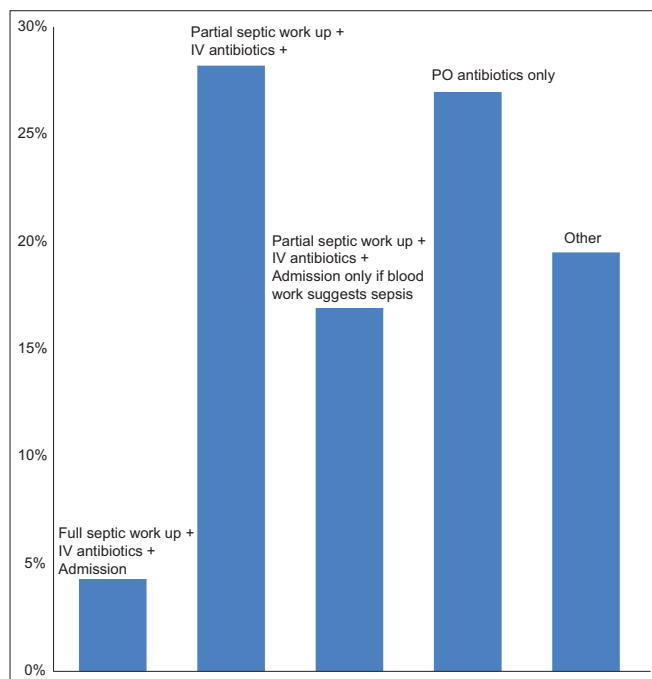


Figure 1: Proportion of clinicians selecting different clinical approaches to the infant with mastitis

RESULTS

Survey

Forty-six of 107 physicians (42.9%) responded to the survey—their choice of treatment, investigations, and disposition is shown in Figure 1.

Chart review

Thirty-three neonates were seen at the hospital over the 9-year period with a diagnosis of neonatal mastitis or breast engorgement. Nineteen were excluded from this review for the following reasons: 17 were found to have breast engorgement only and no symptoms or signs of mastitis, one had a breast cyst, and one developed the condition while admitted to the neonatal intensive care unit. This left 12 neonates meeting the inclusion criteria; their demographic characteristics, presentation, investigation, treatment, and disposition are shown in Table 1.

There were 10 female and 2 male infants with a mean age of 17.9 days. Mean duration of symptoms before presentation to the emergency department was 2.6 days and breast abscess was detected by physical exam in 6/12 (50%) of patients. Six of the 12 patients (50%) had purulent discharge from the breast, either directly from the nipple or from the adjacent skin; of these, three had an abscess and two were noted to have pustular lesions on the breast.

Complete blood count (CBC) with differential was performed in 9/12 (75%) of patients; in 4 (44.4%), the white blood count (WBC) was high (14,400–24,000 cells/mm³) with a raised neutrophil and band count; in 1 (11.1%), the WBC count was normal with a high band count; and in the remaining 5 (55.5%), the WBC count was normal. Platelets were >250,000/mm³ in 6 of 9 (66.6%) patients who had a CBC done. Blood culture was performed in 6/12 (50%) of neonates: 5 (85.7%) were negative and 1 was positive for *Staph. aureus*.

This neonate had been on oral cloxacillin, with no improvement, for 2 days prior to being seen. His parents thought he felt warm, but no fever was ever documented at home or in hospital and a repeat blood culture, after starting intravenous cloxacillin, was negative. All six patients who had breast discharge or drainage had cultures positive for *S. aureus* susceptible to cloxacillin and cefazolin. Urine analysis was performed and was negative in 2 (16.6%) patients; one of these patients had a culture performed which was negative. Erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) were not ordered for any neonate, nor did any patient undergo a lumbar puncture.

Ultrasound of the breast was performed in 2/6 infants who were suspected of having breast abscess by physical

Table 1: Clinical details of neonates with mastitis

Patient	Age (days)	Gender	Duration of symptoms (days)	Breast abscess suspected clinically	Purulent breast discharge	U/S	WBC ($\times 10^9/L$)	Plate lets ($\times 10^9/L$)	Neutro phils ($\times 10^9/L$)	Bands ($\times 10^9/L$)	Blood culture	Culture of breast disch arge	Disposition	ER revisit	Surgical inter vention
1	19	F	1	N	N	N/D	21	471	9.4	2.7	N/D	N/D	Admission	N	N
2	23	M	1	Y	Y	N/D	23	548	12.4	0.23	N/D	N/D	Admission	N	N
3	13	F	2	N	N	N/D	18	721	9.5	N/A	Neg	N/D	Discharge	N	N
4	16	M	5	Y	Y	N/D	22.2	645	8.4	0.22	<i>S. aureus</i>	<i>S. aureus</i>	Admission	N	N
5	5	F	N/A	N	N	N/D	N/A	N/A	N/A	N/A	N/D	N/D	Discharge	Y	N
6	29	F	2	Y	N	N/D	N/A	N/A	N/A	N/A	N/D	<i>S. aureus</i>	Discharge	N	Y
7	17	F	7	Y	Y	N/D	24	395	12.9	0.24	N/D	<i>S. aureus</i>	Admission	N	Y
8	21	F	1	N	Y	N/D	18.4	538	8.25	N/A	Neg	<i>S. aureus</i>	Admission	N	N
9	14	F	1	Y	Y	Yes-no abscess	17.3	225	10.8	N/A	Neg	<i>S. aureus</i>	Admission	N	N
10	23	F	2	Y	Y	Yes-no abscess	15.5	374	4.9	N/A	Neg	<i>S. aureus</i>	Admission	N	N
11	18	F	6	N	N	N/D	14.4	663	4.9	10.4	Neg	N/D	Admission	N	N
12	17	F	1	N	N	N/D	N/A	N/A	N/A	N/A	N/D	N/D	Discharge	N	N

Y=Yes, N: No, N/A=Not available, N/D=Not done

examination; neither had ultrasonographic evidence of abscess formation. Four neonates were diagnosed with breast abscess without ultrasound and two underwent incision and drainage in the emergency department. One of these patients was discharged on oral cloxacillin for 7 days and the other was admitted for intravenous cloxacillin.

Ten of 12 (83.3%) infants were started on antibiotics: 8 (80%) intravenously and 2 orally. All of those started on intravenous antibiotics subsequently received a course of oral antibiotics. Choice of intravenous antibiotic is shown in Table 2. The two patients started on oral antibiotic were treated with oral cloxacillin for 7 days; one returned after 48 h as parents were concerned that the breast was still inflamed and the baby's condition was not improving. Although there were still no systemic signs, a partial sepsis work up was performed (without lumbar puncture), and the baby was started on intravenous cloxacillin and tobramycin and transferred to a community hospital. The test results were negative.

Mean duration of intravenous antibiotic therapy was 2.5 days and of oral antibiotics was 7 days, whether or not the baby had previously received intravenous antibiotics. Of the eight patients admitted for intravenous antibiotics, four were transferred to a community hospital. Of the four patients discharged home from the emergency department, two were treated with oral antibiotics and two were not.

DISCUSSION

Based on the physician reply to the survey, there was significant variation in physicians' theoretical approach to a non-toxic neonate with localized mastitis. However,

Table 2: Initial choice of intravenous antibiotic

Antibiotic	Number of patients (%)
Cloxacillin alone	3 (37.5)
Cloxacillin + cefotaxime	1 (12.5)
Cloxacillin + tobramycin	1 (12.5)
Cefazolin	3 (37.5)

when actually treating a patient, physicians treated 80% of patients with 1-3 days of intravenous antibiotics with good staphylococcal coverage, followed by oral antibiotics for 7-10 days. The remaining 20% of patients were successfully treated with oral antibiotics. Although the literature does not support this approach unequivocally, at least one major pediatric emergency textbook recommends intravenous antibiotics until the results of the cultures become available, with incision and drainage if indicated.^[5]

In our study, blood cultures were performed in 50% of patients and 5/6 were negative. Walsh *et al.*^[1] studied 41 hospitalized neonates and infants less than 2 months of age diagnosed as having mastitis with signs of breast inflammation. Nineteen blood cultures and nine cerebrospinal fluid (CSF) cultures were done; none was positive, suggesting that blood culture and lumbar puncture are not required unless there is a clinical indication. Thirty-two out of 36 patients in their study grew *S. aureus*; other organisms cultured were *Staphylococcus epidermidis*, alpha-hemolytic *Streptococcus*, *Peptostreptococcus*, and Group B *Streptococcus*. The authors recommended starting therapy with parenteral beta-lactamase-resistant penicillin and adding an aminoglycoside if the patient appears septic, and that if the Gram stain of pus indicates pure *staphylococci*, a single anti-staphylococcal drug would suffice. In a study

by Faden *et al.*,^[2] there were 14 infants with and without systemic signs and symptoms out of a total of 22 patients with mastitis. All had CSF and blood cultures performed, all of which were negative, and all were treated with IV followed by oral antibiotics.

Stricker^[3] studied 18 infants aged 12-45 days with mastitis, including patients with systemic manifestations; 12 developed breast abscess including 5 who had been pretreated with oral antibiotics. Blood culture was performed in only two patients and was negative in both cases. The authors suggested treatment with parenteral antibiotics because of a relatively high rate of abscess formation associated with failure of oral antimicrobial treatment. However, further information on treatment is lacking in this study.

In our study, none of the patients, even those with a raised white blood cell count, underwent a lumbar puncture, and although a complete blood count was performed in 75%, it did not appear to consistently influence physicians' plans since two patients were treated with oral antibiotics without doing a CBC and all other patients received parenteral antibiotics regardless of the CBC result.

As suggested by our study, the utility of obtaining Gram stain and culture of purulent breast discharge is also questionable since most cases of neonatal mastitis are caused by *S. aureus*.^[3] However, the results of culture can be useful subsequently if the patient's condition fails to improve or worsens.

Breast ultrasound may confirm an abscess, but this does not necessarily mandate surgical intervention unless there is fluctuation.^[1,5] In our study, only 2 (16.6%) infants, who were suspected of having breast abscess by physical examination, underwent ultrasound which did not confirm an abscess. Likewise, of a further four patients in whom abscesses were suspected clinically, two underwent drainage without ultrasound and the remaining two did not undergo incision and drainage.

It is important to distinguish mastitis from physiologic breast hypertrophy, a condition which resolves spontaneously. In physiologic hypertrophy, the breast bud is neither red nor tender, and nipple discharge, if present, is milky rather than purulent.

Our study is limited by the relatively low number of responses to our questionnaire and the low number of patients available for the chart review. Furthermore, the sensitivity pattern of the *S. aureus* strains from our institution may be very different from those elsewhere, limiting the generalizability of our results. A prospective trial comparing different approaches to the management of neonatal mastitis with no systemic manifestations is a difficult proposition due to the rarity of this condition.

We have shown that although clinicians say they are unclear about how to approach this condition, they do tend to follow recommendations quoted in at least one major pediatric emergency textbook.^[5] Based on our review of the available literature, non-toxic infants with mastitis need to undergo only limited investigations, and oral antibiotic treatment can be considered, especially if good follow-up can be ensured.

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