Molluscum BOTE Sign: A Predictor of Imminent Resolution

abstract
Molluscum contagiosum is a common self-limited viral skin infection. The course of the infection often includes tender, crusted, erythematous lesions that prompt suspicion for bacterial infection. However, these signs of inflammation represent a host response that often precedes resolution of the viral disease, rather than bacterial superinfection, and do not require additional antibacterial treatment. We present a case report and retrospective review of 7 additional cases to characterize the clinical presentation of inflamed molluscum, assess the utilization of medical resources, and consider the psychosocial burden associated with mistaken diagnoses of bacterial infection. We propose the acronym “BOTE”* sign (for beginning of the end) to help underscore the significance of inflammation as an expected variant in the evolution of molluscum immunity. *We included the acronym BOTE in our title to introduce this term as the focus of our article.

PEDIATRICS Volume 131, Number 5, May 2013
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Molluscum contagiosum is a common skin infection caused by the molluscipox virus that classically manifests as multiple, regionally clustered, 1- to 3-mm pearly dome-shaped papules with central umbilication. The lesions are spread by skin-to-skin contact and autoinoculation. Although molluscum contagiosum is most often seen in children and immunocompromised patients, otherwise healthy adults who have not been exposed in childhood can acquire the infection with sexual contact. Each individual’s immune response influences the number and size of the lesions, associated itching, and duration of the infection. The incubation period has been estimated at 2 to 8 weeks, and a single lesion can persist for several weeks to months. The infection usually persists for 6 to 12 months but can last for up to 3 to 5 years. Because the infection does not recur after the lesions have resolved and is rare in healthy elderly adults, immunity is believed to last for a lifetime.

Individual lesions may be pruritic. Occasionally, the surrounding skin will become erythematous and scaly, a condition often referred to as “molluscum eczema.” Individual lesions can also develop redness, swelling, crusting, and even drainage. Caregivers often seek medical attention for suspected concerns that are beyond the risk of this benign, self-limited skin infection. Common concerns include the appearance of the lesions, possible negative social impact on their child, and bacterial superinfection. Although a single case report documented culture and secondary Gram-positive bacterial infection in an immunocompetent patient, presenting as toxic shock syndrome, 1 emergency department (ED) visits and even hospitalizations for otherwise healthy children are not uncommon, resulting in unnecessary antibiotic treatment of pediatric patients without significant pain, fever, constitutional symptoms, or leukocytosis. Pain, fever, and bacterial culture positivity do not prove bacterial infection, but predominant itch in an afebrile child with a negative skin culture supports a nonbacterial cause of inflammation. We illustrate this concept with a case report and a retrospective analysis of 7 additional cases of children who all presented with inflamed molluscum that prompted superfluous evaluation and treatment of suspected bacterial infection. This series further characterizes the clinical presentation of molluscum, assesses the use of medical resources, and considers the psychosocial burden associated with inaccurate diagnoses of bacterial infection.

**CASE REPORT**

A 16-year-old African American male adolescent was directly admitted from the ED of our tertiary children’s hospital for presumed cellulitis refractory to outpatient management. He presented to the ED with a 6-month history of multiple, gradually enlarging violaceous papules on the left side of his upper back that became painful with drainage in the previous 2 weeks. He denied fever or contact with anyone who had similar lesions.

Eight days before the ED visit, his primary care physician reportedly prescribed a 5-day course of sulfamethoxazole/trimethoprim after receiving a positive bacterial culture from a skin swab specimen. Worsening erythema and pain prompted the primary care physician to recommend evaluation at a local hospital ED where the patient received a parenteral dose of an antibiotic. The next day, the patient was discharged with instructions to return to the ED if fever or pain persisted. The patient was admitted by the ED of our tertiary children’s hospital on hospital day 1. On physical examination, the majority of the lesions were localized to the upper left back. A few crossed the midline (see Fig 1).

White blood cell count was $5.2 \times 10^3$/mL. Nonselective bacterial culture was positive only for coagulase negative *Staphylococcus* species, likely normal skin flora. Skin biopsy confirmed a diagnosis of molluscum contagiosum. The patient was discharged on hospital day 1 with ibuprofen as needed for discomfort.

**CASE SERIES**

**Methods**

Eight patients with clinically diagnosed molluscum contagiosum seen at Cardinal Glennon Children’s Hospital in 2011–2012 were included in the cohort. These patients were identified by a pathogen-negative bacterial swab culture obtained from an inflamed or draining skin surface.

**FIGURE 1**

Dermatology consultation recognized numerous discrete pearly pink umbilicated papules coalesced into ~20 nodules $>1$ cm in size with a surrounding violaceous hue. A few of the nodules were mildly tender. Some had punctate superficial black eschars.
molluscum. We retrospectively reviewed each patient’s medical record for the number of visits to primary care, dermatology clinic, ED, or hospital admission; the patient’s age and gender; the onset and duration of molluscum infection; the onset of associated signs of inflammation; the visual description of inflammation and available clinical images; previous treatments; and level of caregiver concern. Caregivers were prospectively contacted for information about level of concern and timing of molluscum resolution.

**Results**

The patients’ ages ranged from 4 to 16 years. There were 3 boys and 5 girls. At the time of presentation, molluscum lesions were reported to have been present for 2 months to 2 years (mean 8.6 months). There were at least 22 outpatient visits (ED, primary care, dermatology) among the 8 patients, including 6 ED visits. Three patients underwent incision and drainage. Seven patients were treated for suspected bacterial superinfection with oral antibiotics including cephalexin, cefadroxil, trimethoprim/sulfamethoxazole, or clindamycin. Two patients were previously treated with mupirocin. One patient was treated with nystatin cream. Seven of 8 patients had coexisting centrally umbilicated lesions. Two patients had <10 lesions, and 6 had between 20 and 30 lesions. The records of 4 patients indicated purulent drainage. All 8 patients reported at least 1 of the inflammatory lesions as tender (see Fig 2). All 8 patients had culture results that stated “mixed skin flora,” “no growth,” or “coagulase-negative Staphylococcus species.” Follow-up phone contact verified clinical resolution of all lesions, representing a mean 9.6-month total duration of infection (range: 2 months–2 years). The mean duration from onset of inflammation to disease resolution was 3.6 months (range: 3 weeks–5 months). See Table 1.

The level of parental concern about potential bacterial infection was not specifically documented in any of the encounter notes, although the inflammatory reactions were the primary reason for their dermatology office visit. At the time of follow-up phone contact, all the caregivers reported a sense of relief when given the diagnosis of molluscum as opposed to bacterial infection.

**Discussion**

The mechanism through which molluscum lesions become inflamed and subsequently resolve is not well understood. A recent study correlated a cutaneous perilesional plasmacytoid dendritic cell infiltrate with molluscum resolution.2 Although commonly suspected and often empirically treated, bacterial superinfection does not appear to play a role, as supported by pathogen-negative bacterial swab cultures in each of the patients in this study. There are financial, medical, and emotional costs of incorrectly diagnosing a bacterial superinfection. These include the costs of bacterial swab culture and empirical topical and systemic antibiotics. At our institution, the charge for each culture is $132, a new patient dermatology office visit is $180, and an ED visit is $697, with additional charge for incision and drainage. The side effects of antibiotics and risks of overuse are well known. Caregiver emotional distress after diagnosis of bacterial superinfection must also be considered. One study of the public perception of methicillin-resistant *Staphylococcus aureus* suggests that up to 7% of patients believe such an infection is untreatable.3 Recognizing the inflammatory phase of molluscum infection will avoid contributing to the problems of rising health care costs and the emergence of antibiotic resistant bacteria. Although tender, crusted, erythematous lesions prompt suspicion for bacterial infection, inflamed molluscum rarely requires antibiotic treatment. Molluscum is a self-limited viral infection, and an inflammatory phenomenon often precedes disease resolution.4 This phenomenon is well recognized by pediatric dermatologists, but to the best of our knowledge, it has not been christened. We propose the acronym “BOTE” sign (for “beginning of the end”) to help underscore the significance of
the inflamed lesion as an expected variation in the evolution of immune response to the virus rather than bacterial superinfection.

In summary, our review of 8 immunocompetent children with inflamed molluscum illustrates the superfluous nature of bacterial swab cultures from inflamed lesions. Rather than provoking concern, the BOTE sign should be viewed as a predictor of impending resolution.

REFERENCES


<table>
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<tr>
<th>Case</th>
<th>Age (y)</th>
<th>Duration of Molluscum Infection (mo)</th>
<th>Onset of Inflammation to Resolution (wk)</th>
<th>No. of Lesions (inflamed/total)</th>
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TMP/SMX, trimethoprim/sulfamethoxazole.
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Pediatrics; originally published online April 1, 2013;
DOI: 10.1542/peds.2012-2933

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