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Diagnostic and therapeutic hindrance of severe non- bullous impetigo contagiosa in a rural Nepalese child: A case report

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Abstract

Impetigo is a common, contagious superficial bacterial skin infection predominantly affecting children aged two to five years. Severe presentations are rare but can be diagnostically and therapeutically challenging, particularly in rural, resource-limited settings. We report a 7-year-old girl from rural Nepal with severe non-bullous impetigo contagiosa unresponsive to initial therapy with topical mupirocin and oral cephalexin. Due to the absence of culture and sensitivity facilities and the high regional prevalence of methicillin-resistant Staphylococcus aureus (MRSA), empirical oral doxycycline was initiated. Marked improvement occurred within 48 hours, with complete resolution by day 7. This case underscores the importance of flexible, evidence-based empirical therapy for suspected MRSA in pediatric patients when diagnostic resources are unavailable, and highlights the short-term safety and efficacy of doxycycline in children.

Key words: Impetigo Contagiosa, MRSA, Rural health, Doxycycline, Antibiotic resistance, Pediatric dermatology.

Introduction

Impetigo is one of the common superficial skin infections. It affects mainly children and its occurrence decreases with increase in age. Impetigo has influenced more than 140 million people worldwide. *Staphylococcus aureus* and *Streptococcus* pyogenes are the common contributory organisms. It exhibits as non-bullous (70%, caused by both pathogens) and bullous (30%, caused by S. aureus) lesions.[1] The known risk factors for impetigo are poor hygiene, high humidity, skin barrier disruption (e.g., scabies, dermatitis, insect bites), maceration, comorbidities, and drug-related rashes or itching.[2] The 20th century advancement in antibiotics is a cornerstone achievement in medicine but the recent developments of resistance to antibiotics in hospitals, communities and the environment has been concerning. Overuse of antibiotics has supported the microorganisms to develop the resistance and horizontal gene transfer in clinical uses.[3] The clinical use of methicillin has found the rise of methicillin-resistant S. *aureus* (MRSA). The new MRSA clones are powerful in infecting and extending in the community to individuals lacking the usual risk factors.[4] The resource limitation plays a significant impact in diagnosis and treatment; as it delays the treatment, especially when resistant organisms like MRSA are involved. Here, we aim to present and discuss a case of 7-year-old child with severe non-bullous impetigo contagiosa and the challenges faced in treatment in rural health care setting. We have presented the case report in accordance with 2023 SCARE Guidelines.[5]

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Case Report

A 7-year-old female child from an underserved, low-income family from rural part of Nepal was brought to the emergency department of primary health care center by her parents at around 6 pm in the evening. According to her father, she was in the usual state of sound health until 5 days back, when she developed pus filled lesions, acute on onset, around nose and mouth, 7-8 in number, each 2-3 mm in diameter, were painless, and ruptured within 24 hours to form erosive, erythematous lesions. The erosive lesions subsequently became painful, increased to 10-12 in number, each 5-8 mm in diameter. Over the next 2-3 days, they progressed to involve the entire perioral and perinasal area. This was followed by the formation of crusts, light brown in color and thick in consistency which restricted mouth opening which affected eating and drinking. There was no history of any associated fever, history of trauma or insect bites, recent medication use, or similar symptoms in household contacts.

On examination, the patient appeared conscious, thin built, and ill looking with reduced interaction. Her vitals demonstrated mild tachypnea (RR: 28bpm) and tachycardia (HR:120 bpm) and rest were normal. All other parameters under systemic examination of respiratory, cardiovascular, neurological, gastrointestinal systems were unremarkable.

Local examination demonstrated diffuse, tender erythematous papules, pustules, and erosions with thick adherent honey- colored crusts covering the perinasal and perioral regions. There was painful restricted mouth opening. No mucosal lesions and lymphadenopathy were noted. (Figure 1)

Figure 1: First day at presentation: Extensive crusted and ulcerated lesions with purulent discharge involving the perioral and perinasal regions

A clinical diagnosis of severe non-bullous impetigo contagiosa was made, and the patient was admitted to the inpatient department. Initial treatment included local wound dressing with topical mupirocin every 8 hours and oral cephalexin (50 mg/kg/day in four divided doses; 250 mg PO QID). Supportive means such as hygiene maintenance, nutritious diet, and adequate hydration was administered. After five days of therapy with no clinical improvement and given the high regional prevalence of MRSA, coupled with lack of culture/sensitivity facility at our health center, methicillin-resistant Staphylococcus aureus (MRSA) was suspected. Gram staining was not performed due to lack of laboratory facilities at the primary health care centre. Although Gram staining could have provided preliminary microbiological guidance, the diagnosis and management were based on clinical findings and regional epidemiological patterns.

Treatment was switched to oral doxycycline (4 mg/kg/day in two divided doses; 40 mg PO BID). The patient showed marked clinical improvement within 48 hours of initiating doxycycline. (Figure 2) A full 7-day course was completed, resulting in complete resolution of all symptoms. After completion of her treatment, she was discharged. She was symptom free with complete resolution and without any complications on 10th day follow up. (Figure 3)

Figure 2: Third day of Doxycycline Therapy

Figure 3: After complete course of Doxycycline therapy

Discussion

This case unveils the hardships we face diagnosing and treating impetigo in rural areas with limited resources, where wound cultures aren't easily available. We must rely on clinical judgment. When impetigo is severe and doesn't improve with standard treatment, we need to suspect MRSA, especially in regions where it's common.

Impetigo is a superficial bacterial infection of the skin characterized by honey-colored crusting that primarily affects children, especially between the ages of 2 and 5.6 Our 7-year-old patient, though outside the typical age range, showed classic features—highlighting that this condition can occur beyond the usual age group. The word impetigo is the generic Latin word for 'skin eruption.[7]

Impetigo is generally classified into two types: primary impetigo, which results from direct bacterial invasion of healthy skin, and secondary impetigo, which occurs at sites of pre-existing skin damage such as eczema, insect bites, or trauma.8 In our case, there was no history of prior eczema or trauma, suggesting a diagnosis of primary impetigo. There are several clinical forms and about 70% are non-bullous impetigo, the most prevalent cases. Nonetheless, bullous impetigo, brought about mainly by toxin-producing strains of Staphylococcus aureus, is infrequent.9 Our patient displayed typical features of non-bullous impetigo, with small pustules that quickly ruptured to form golden-yellow crusts, characteristic of this form of the disease.[8] Anatomically, the face is the most commonly affected area in cases of non-bullous impetigo, particularly around the nose and mouth.[8] This anatomical predisposition is due to factors such as frequent touching, nasal colonization by S. aureus, and minor trauma in these areas. In our patient, the lesions were also found around the mouth and nose, mirroring the common distribution seen in the medical literature. The clinical progression of non-bullous impetigo typically begins with vesiculopustular lesions that rupture within 24 to 48 hours to form erosions and thick golden-yellow crusts. In this case, the lesions appeared as 2–3 mm pustules that ruptured within 24 hours, leading to erythematous erosions and crusts, following the classic disease pattern.

The diagnosis of impetigo is nearly always clinical and skin swabs cannot differentiate between bacterial infection and colonization.[10,11] In patients in whom first-line therapy fails as in our case, diagnostic tools like culture of the pus or bullous fluid, not the intact skin, may be helpful for pathogen identification and antimicrobial susceptibilities.[12] In our rural environment, diagnostic facilities were unavailable, and we were impelled to count on clinical features for diagnosis, representing a shortcoming in our case.

Impetigo is treated with topical antibiotics such as mupirocin, and systemic antibiotics as dicloxacillin, cephalexin, clindamycin, and amoxicillin/clavulanic acid.13 In 2012, 68 randomized controlled trials containing 26 on oral and 24 on topical treatments were assessed in an updated Cochrane review on impetigo management. There was no clear evidence as to which intervention is most effective. Clinicians sometimes may choose both topical and systemic therapy for generalized or more severe infections. The ideal treatment should be effective, inexpensive, have limited adverse effects, and should not promote bacterial resistance.[13,14] Our patient was initially treated with topical mupirocin (three times daily) and oral cephalexin but did not show improvement even after 5 days. Given that Staphylococcus aureus is the most common causative organism in non-bullous impetigo, a lack of response to first-line therapy should raise concern for MRSA infection.[8,15] A study from China examining 984 isolates from pediatric impetigo patients found that approximately 1% were infected with community-associated MRSA (CA-MRSA.)16 Based on this, we decided to escalate treatment, particularly as regions with a high MRSA prevalence may warrant empirical therapy using trimethoprim/sulfamethoxazole, clindamycin, or doxycycline targeting MRSA.[14] In our case, the patient was switched to oral doxycycline 40 mg twice daily for 7 days, which led to complete resolution of the skin lesions without any post-inflammatory sequelae. In our case, the use of oral doxycycline as empirical therapy proved to be both safe and effective, even in a pediatric patient.

Non-bullous impetigo presents as mild condition mostly. The occasional complications include septic arthritis, scarlet fever, sepsis, and staphylococcal

scalded skin syndrome.8The patient did not experience any complications. Early interference and antibiotic therapy are required to ward off these complications. Good personal hygiene and avoiding other children during the active outbreak are the effective in preventing transmission. Hands, linens, clothes, and affected areas should be washed after coming into contact with infected fluids.

Conclusion

In resource constrained areas, there can be high prevalance of MRSA. Unavailability of laboratory facilities can cause diagnostic delays. In such case, doxycycline can be considered a safe and effective empirical treatment for pediatric impetigo unresponsive to first-line agents. This case reinforces the importance of clinical judgment and adaptable treatment strategies in rural healthcare.

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