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A Rare Case Report: Facial cellulitis secondary to Methicillin Resistant Staphylococcus Aureus Infection in an 8-month-old infant with Dengue Fever.

Dr. Shruti Shanmughan
V.S Dental College and Hospital

Dr. Amitha H.A. Author
V.S Dental College and Hospital

Dr. Santosh A. Nandimath
V.S DENTAL COLLEGE AND HOSPITAL

Dr. Chandan G.D. Author
V.S Dental College and Hospital

Dr. Sandhya Prabha M Author
V.S Dental College and Hospital

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Abstract

Background: Dengue Fever (DF), a mosquito-borne illness caused by the Dengue virus (DenV), is known for its systemic and haemorrhagic manifestations. Secondary bacterial infections, though rare in paediatric patients, can complicate the clinical course, especially in severe forms like Dengue Haemorrhagic Fever (DHF). Methicillin-resistant *Staphylococcus aureus* (MRSA) septicaemia is a life-threatening condition, seldom reported in association with DF, and facial cellulitis as a consequence has not been previously documented in children.

Case Presentation: We report a unique case of an 8-month-old female who presented with persistent fever, facial swelling, and oral lesions following recent hospitalization for dengue fever complicated by bronchopneumonia. Clinical examination revealed facial cellulitis with periorbital oedema and intraoral lesions. Blood and pus cultures confirmed MRSA and *Pseudomonas aeruginosa*, indicative of MRSA septicaemia secondary to facial cellulitis. The patient was managed with intravenous vancomycin, clindamycin, and piperacillin-tazobactam based on culture sensitivity, along with supportive care and correction of nutritional deficiencies. Clinical improvement was noted by day 9, with complete recovery following surgical drainage and a 21-day treatment course.

Conclusion: To our knowledge, this is the first documented case of MRSA septicemia presenting as facial cellulitis in an infant with dengue fever. Early recognition, appropriate cultures, and timely initiation of MRSA-targeted antibiotics are critical in managing such rare but potentially life-threatening complications. This case also emphasizes the need for heightened infection control and vigilance for secondary infections in pediatric dengue care.

Keywords: Dengue, Dengue Hemorrhagic Fever, Methicillin resistant staphylococcus aureus infection, Facial Cellulitis, Periorbital Edema, Septicemia.

Introduction

Dengue fever (DF), is a sudden onset, flu-like illness whose causative factor is the *Dengue virus* (DenV) and is primarily transmitted through the bite of *Aedes aegypti* mosquitoes[1]. DenV has four serotypes,

contributing to its widespread distribution and increasing global disease burden. Although oral lesions are rare in dengue, their presence can mimic bleeding disorders, complicating diagnosis[2].

Methicillin resistance in *S. aureus* is defined by an oxacillin minimum inhibitory concentration of ≥ 4 µg/mL. MRSA is categorized into hospital-associated (HA-MRSA) and community-associated (CA-MRSA) infections, which differ in clinical presentation, molecular biology, antibiotic susceptibility, and treatment[3]. Resistance to beta-lactam antibiotics in MRSA is primarily due to the *mecA* gene, which produces PB2a, a transpeptidase with reduced binding affinity for beta- lactam antibiotics.

Though *Staphylococcus aureus* co-infections with dengue are documented in adults, but are rare in children. Factors like vascular leakage, mucocutaneous barrier disruption, and immune changes are thought to facilitate bacterial co-infections. The dengue virus's non-structural protein (NS1) disrupts cell signalling, causing excessive inflammation, endothelial dysfunction, and vascular leakage[4]. Additionally, dengue-induced immunosuppression during viremia phase and *S. aureus* virulence factors can lead to septic syndrome. Gut microbiota translocation may also result in Gram-negative bacteremia, allowing skin colonizers like *S. aureus* to invade the bloodstream and body cavities, causing secondary infections[4].

Cellulitis is a diffuse inflammation of soft tissues, which is not confined to one area, and in contrary to abscess, tends to spread through tissue spaces and along fascial planes. This response is predominantly triggered by microorganisms that secrete substantial quantities of streptokinase, fibrinolysins and hyaluronidase[5]. These enzymes facilitate the degradation of hyaluronic acid—the fundamental intercellular binding component—as well as fibrin, thereby promoting tissue breakdown and spread of infection[5]. One of the main concerns with facial cellulitis is the potential for complications, particularly when it is associated with odontogenic or orbital infections, which may require surgical intervention.

Here we report a case of dengue fever patient complicated with MRSA septicemia resulting in facial cellulitis. To the best of our knowledge this is the first report of such a case.

Case Presentation

An 8-month-old female child reported to the Department of Paediatric Dentistry of with fever, facial puffiness and lesions on the right side of the face and vomiting. Her past medical history revealed hospital admission for dengue fever 12 days back as the child developed bronchopneumonia. The child was receiving oxygen for 3 days via facial mask after which the child was discharged. A week after the discharge the child was again taken to the hospital for facial swelling, eyelid edema and persistent fever spikes from where the patient was referred to our hospital.

On the day of admission, the general examination revealed a febrile temperature of 102.8-degree F, a heart rate of 154 beats per minute, blood pressure of 98/62 mmHg, a respiratory rate of 46 breaths per minute, and an oxygen saturation of 98% on room air.

On extraoral examination facial asymmetry was noted due to diffuse swelling of the right side of face extending superior-inferiorly from infraorbital margin to the lower border of the mandible and antero-posteriorly from ala of nose to the tragus, which was tender on palpation with a local rise of temperature [Fig 1]

Figure 1: Periorbital oedema, facial swelling and Facial asymmetry noted on the day of admission

Erythema was present all over the right side of the face. Periorbital edema was noted with compromised eye opening. Right cervical lymph nodes were palpable with tenderness on palpation. Nasal discharge was noted.

Intraoral examination revealed gingival bleeding and a tear on the labial mucosa including the labial frenum in the maxillary primary central incisor region.

The child was put on oxygen by nasal prongs and immediately shifted to PICU wherein after the ENT consultation, CBCT head and neck, CBC test, Pus and Blood culture and sensitivity tests were done.

CBCT Head and Neck revealed sinusitis with no airway compromise. CBC test showed severe leukocytosis i.e. 28900 cells/cmm and decreased haemoglobin levels at 9gm/ dl.

Intravenous administration of Inj. Xone 330 mg BD, Inj. Ampiclox 330 mg QID, Inj. Metrogyl 66mg TID and Inj. Vancomycin 132mg TID was started as the initial course of treatment.

On day 5, Pus culture and sensitivity test from the lesion confirmed the presence of Pseudomonas aeruginosa and MRSA while the blood culture and sensitivity test confirmed the growth of MRSA [Fig 2].

Figure 2: Day 5, slight improvement in the periorbital swelling**.**

Laboratory findings also showed a significant increase in the TLC, CRP at 55.45, and Procalcitonin levels at 19.44. Intravenous Vancomycin 135 mg TID, Inj. Clindamycin and Inj.Piptaz 660mg TID was started considering the antibiotic sensitivity and continued for 14 days. Along with this Inj. PCT 6.6ml QID was given for analgesia, Inj. Pantop 7mg OD to prevent acidity and Inj. Emeset 0.7mg TID to manage nausea and vomiting. USG of neck revealed diffuse subcutaneous plane thickening on the right side of the face and neck with edematous changes in the deeper plane and no obvious collection.

On day 9, the sepsis was clinically improving [Fig 3].

Figure 3: Day 9 Significant improvement in the facial swelling

The foci of infection in the maxillary incisor region showed good healing [Fig 4].

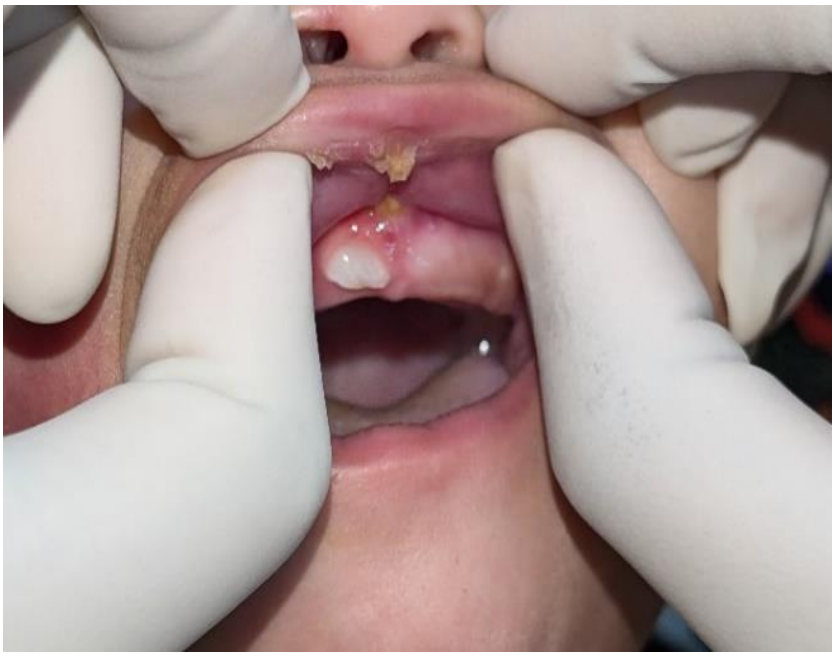

Figure 4: Day 9 maxillary incisor region lesion shows good healing

Vital signs were stable and biochemistry reports showed a decrease in the CRP levels from 55.45 to 45.73 and Procalcitonin levels from 19.44 to 9.39. Eye opening improved and there was minimal nasal discharge.

After 14 days of the newer treatment regimen, facial cellulitis and the periorbital edema significantly improved but did not subside completely. [Fig 5]

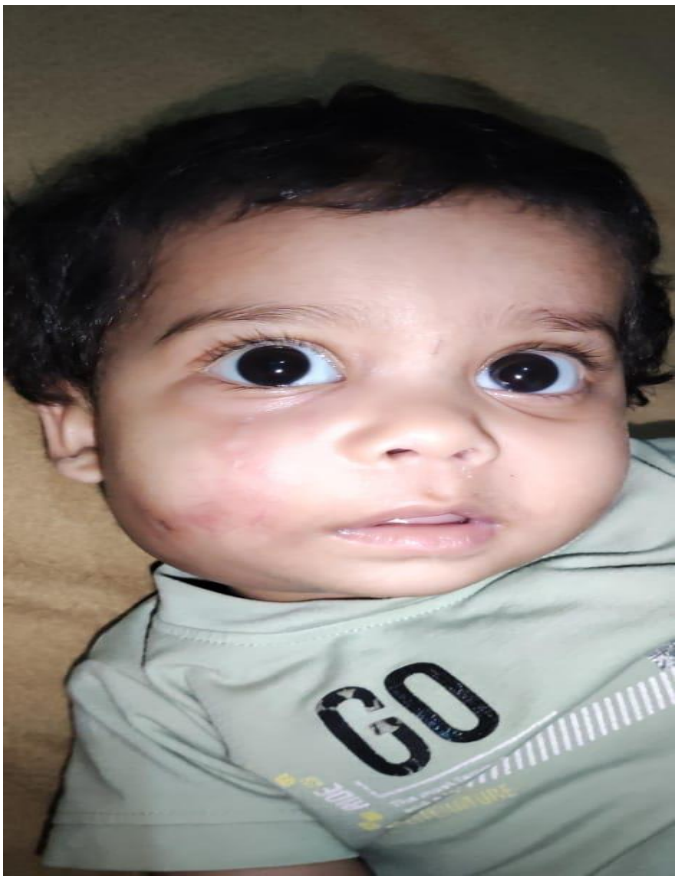

Figure 5: Day 14, of the newer treatment regimen, facial cellulitis and the periorbital edema significantly improved

Therefore, drainage of the lesion and histopathological investigation was advised. Drainage was done by placing a small incision in the affected area and the aspirated pus was sent for histopathological investigation. Histopathological investigation showed no significant findings. After a 7-day follow-up the patient had recovered completely.

Discussion

Oral mucosal involvement is observed in around 30% of patients having Dengue fever, with a higher prevalence reported among those with Dengue Hemorrhagic Fever (DHF). Common oral manifestations include crusting of the lips and tongue, erythema and vesicular lesions on the soft palate[6]. Previous studies, such as by Amitbyatnal et al., have described hemorrhagic bullae on the sublingual mucosa, lateral tongue, and floor of the mouth, as well as rough, brown plaques on the buccal mucosa that bled upon contact[6]. Additional reported symptoms include petechiae, ecchymoses, gingival bleeding, and epistaxis.

The isolation of Methicillin-resistant *Staphylococcus aureus* (MRSA) and *Pseudomonas aeruginosa* from the blood culture, along with the identification of MRSA with an identical antibiotic susceptibility profile in the pus culture from the facial abscess, suggests that the patient developed MRSA septicemia secondary to facial cellulitis[7]. The cellulitis likely led to the formation of an abscess and associated periorbital edema. While the contribution of *Dengue virus* to the development of facial cellulitis remains uncertain, the overall clinical picture strongly supports a diagnosis of MRSA-induced facial cellulitis in the context of Dengue Haemorrhagic Fever (DHF).

The positive blood culture allowed for the prompt initiation of appropriate antibiotic therapy. MRSA septicaemia is known for its higher risk of mortality, even with optimal treatment, highlighting the importance of early diagnosis and intervention for a favourable outcome. If the blood culture had returned negative, considering the patient's clinical presentation—characterized by elevated leukocyte count, procalcitonin and CRP levels—broad-spectrum antibiotics such as ceftriaxone or meropenem would still have been administered[7]. However, these agents would not have provided adequate coverage for MRSA, potentially resulting in a poorer outcome.

The development of a tear in the labial mucosa suggests it as a potential site of MRSA entry. The patient had two previous hospital admissions within the past month, raising the possibility of hospital-acquired MRSA transmission.

Based on our experience and previous reports, secondary bacterial infections in dengue patients, particularly in severe cases, are common[8]. Dengue patients are particularly vulnerable to such infections due to leukopenia (especially neutropenia), impaired function of antigen-presenting cells, reduced phagocytic and migratory capacity of macrophages, defects in the interferon signalling pathway, and compromised skin barrier integrity[9]. It is reasonable to assume that these factors contributed to the MRSA infection in this patient.

These findings underscore the importance of strict infection control measures to prevent healthcare-associated infections (HAIs) in the management of dengue patients[10]. Additionally, the presence of pre-existing bacterial infections may predispose patients to subsequent dengue infections. In this case, the MRSA was isolated from both blood and pus cultures, even after prolonged antibiotic treatment. It is plausible that the dengue infection impaired the patient's skin barrier, thereby facilitating the development of MRSA bacteremia, which subsequently led to facial cellulitis.

Conclusions

The diagnosis and management of facial cellulitis in dengue patients can be particularly challenging, especially in settings with limited resources. It is crucial to consider the possibility of secondary bacterial infections in dengue patients, particularly when fever persists, the patient’s condition worsens, and neutrophil counts fail to decrease during the course of the illness[10]. The availability of procalcitonin testing in hospitals could aid in identifying bacterial co-infections in those with viral fevers such as dengue. When a dengue patient presents with signs and symptoms of facial cellulitis, prompt diagnostic evaluation and appropriate treatment are vital to preventing complications and ensuring a better clinical outcome.

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