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Case Report

Orbital cellulitis secondary to primary varicella zoster infection in a child: a rare but serious complication

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ABSTRACT

Varicella zoster virus (VZV) infection is generally a self-limiting childhood illness; however, secondary bacterial complications may result in significant morbidity. Orbital cellulitis is a rare but vision-threatening complication of varicella, usually arising from bacterial superinfection following disruption of the cutaneous barrier. We report the case of a 7-year-old child who developed unilateral orbital cellulitis three days after the onset of primary varicella infection. Prompt recognition and aggressive combined antiviral and broad-spectrum intravenous antibiotic therapy resulted in complete clinical recovery. This case highlights the importance of early identification of red-flag symptoms in varicella and underscores the need for vigilant monitoring for invasive bacterial complications.

Keywords: Varicella, Orbital cellulitis, Secondary bacterial infection, Pediatric infection, Varicella zoster virus, Acyclovir

INTRODUCTION

Varicella (chickenpox) is a highly contagious exanthematous illness caused by the Varicella zoster virus (VZV), a neurotropic, double-stranded DNA virus of the *Herpesviridae* family.[1,2] Although typically benign in immunocompetent children, varicella may be complicated by secondary bacterial infections, particularly involving the skin and soft tissues.[3,4] Orbital cellulitis represents a rare but potentially life-threatening complication, carrying risks of visual impairment, orbital abscess formation, and cavernous sinus thrombosis.[5,6] Reports of orbital cellulitis following primary varicella infection remain scarce in the literature. We describe a pediatric case illustrating this uncommon but severe complication and review its pathophysiology, management, and clinical implications.

CASE REPORT

A 7-year-old previously healthy child presented with a 3-day history of fever and generalized papulovesicular rash. The rash demonstrated a classic centripetal distribution, involving the scalp, face, and trunk, with lesions in various stages of evolution, including macules, papules, and vesicles. Vesicular lesions were also noted on the oral mucosa. There was no prior history of varicella vaccination. Three days after the onset of the rash, the child developed acute swelling, redness, and pain around the left eye, associated with persistent fever. There was no history of trauma, sinusitis, or prior ocular infection.

Physical examination

On admission, the child was febrile with a temperature of 39.2°C, heart rate 118 beats/min, respiratory rate 22 breaths/min, and blood pressure 102/64 mmHg. The child appeared ill but alert and oriented.

Dermatologic examination revealed multiple vesicular lesions with erythematous bases in various stages of evolution over the face, scalp, trunk, and upper extremities, with several lesions showing crusting. Some lesions over the left periorbital region appeared the excoriated.

Ophthalmologic examination of the left eye revealed marked periorbital edema and erythema, with local warmth and tenderness. Mild proptosis was noted, and extraocular movements were painful and restricted, particularly on upward and lateral gaze. Conjunctival chemosis was present, while visual acuity was preserved at 6/6 equivalent for age. Pupils were equal and reactive to light, with no relative afferent pupillary defect. Fundoscopic examination showed no papilledema or optic disc edema. The right eye was normal. There were no meningeal signs, focal neurological deficits, or indications of cavernous sinus involvement.

Table 1: Laboratory evaluation revealed evidence of systemic inflammation.

Parameters	Results	Reference range	Interpretation
White blood cell count	17,200 cells/mm³	4,500-11,000	Elevated
Neutrophils	80%	40-70%	Neutrophilia
Lymphocytes	14%	20-45%	Relative lymphopenia
Hemoglobin	11.6 g/dl	11.5-15.5	Within normal limits
Platelet count	428,000/mm³	150,000-400,000	Mild thrombocytosis
C-reactive protein (CRP)	94 mg/l	<5 mg/l	Markedly elevated
Erythrocyte sedimentation rate (ESR)	52 mm/h	<20 mm/h	Elevated
Procalcitonin	2.1 ng/ml	<0.5 ng/ml	Suggestive of bacterial infection
Renal function tests	Within normal limits	—	Normal
Liver function tests	Within normal limits	—	Normal
Blood cultures	No growth (5 days)	—	Negative

The diagnosis of primary varicella infection was made clinically based on the characteristic rash morphology and temporal evolution.

Contrast-enhanced computed tomography (CT) of the orbit and paranasal sinuses demonstrated diffuse left-sided periorbital soft tissue swelling with post-septal inflammatory changes involving the intraconal fat. There was mild anterior displacement of the left globe consistent with proptosis and thickening of the medial rectus muscle. Mild mucosal thickening of the ipsilateral ethmoid sinus was noted.

There was no evidence of subperiosteal abscess, orbital abscess collection, or bony erosion. CT imaging of the brain showed no intracranial extension, cavernous sinus thrombosis, or intracranial abscess. These radiologic findings were consistent with left-sided orbital cellulitis without abscess formation. Radiologic findings were consistent with left-sided orbital cellulitis without abscess formation. Based on the clinical features, elevated inflammatory markers, and imaging findings, a diagnosis of primary varicella infection complicated by orbital cellulitis was established.

Management

The patient was admitted for inpatient care and initiated on intravenous acyclovir to suppress viral replication. Given the high risk of invasive bacterial infection, broad-spectrum intravenous antibiotics were started, including ceftriaxone, metronidazole, and vancomycin, to cover gram-positive organisms (including MRSA), gram-negative bacteria, and anaerobes. Treatment continued for a total of 14 days.

Marked clinical improvement was observed within 48 hours, with resolution of fever and gradual reduction in orbital swelling. Varicella lesions progressed to the crusting stage without further complications. At completion of therapy, ocular motility was fully restored, and no visual sequelae were noted. The patient was discharged in stable condition with scheduled ophthalmology follow-up.

DISCUSSION

VZV infection continues to contribute significantly to pediatric morbidity worldwide, particularly in unvaccinated populations, despite the widespread implementation of universal varicella vaccination programs.[1,2] Although primary varicella is usually a self-limiting illness in immunocompetent children, secondary complications remain clinically relevant and are the leading cause of hospitalization and mortality associated with the disease.[3,4]

Secondary bacterial infections complicate approximately 5-10% of hospitalized pediatric varicella cases and represent the most common severe sequelae.[3,4] The characteristic pruritic vesiculopustular rash of varicella disrupts the epidermal barrier, predisposing to bacterial colonization and invasion, particularly by *S. aureus* and *S. pyogenes*.[4,5] Repetitive scratching, coupled with transient virus-induced immune dysregulation, further increases susceptibility to invasive bacterial disease.[6]

Orbital cellulitis is an exceptionally rare complication of primary varicella infection, with only isolated cases reported in the literature.[6,7] It may occur via contiguous spread from infected facial or periocular varicella lesions, extension from adjacent sinusitis, or hematogenous dissemination.[5,8]

In the present case, the temporal association between cutaneous varicella lesions involving the face and the subsequent development of unilateral periorbital inflammation strongly suggests direct contiguous spread.

A secondary spike in fever following initial defervescence of varicella, along with localized pain, erythema, and swelling, is a well-recognized clinical red flag indicating secondary bacterial superinfection.[9] Failure to recognize these signs promptly may lead to delayed treatment and serious complications. Distinguishing preseptal cellulitis from orbital cellulitis is critical, as the latter is associated with higher morbidity, including optic nerve compression, visual loss, subperiosteal abscess, intracranial extension, meningitis, and cavernous sinus thrombosis.[5,10]

Management of orbital cellulitis in the context of varicella requires aggressive inpatient therapy. Empirical broad-spectrum intravenous antibiotics are recommended to cover gram-positive cocci (including MRSA), gram-negative organisms, and anaerobes until microbiological data are available.[10,11] The antibiotic regimen used in this case ceftriaxone, vancomycin, and metronidazole provided comprehensive empiric coverage consistent with current evidence-based recommendations for the management of severe pediatric orbital infections.[12]

Antiviral therapy with acyclovir plays a critical adjunctive role in hospitalized children with complicated varicella. Early initiation has been shown to reduce viral replication, shorten disease duration, and decrease the risk of visceral dissemination and secondary complications.[13] Combined antiviral and antibiotic therapy are therefore considered the optimal approach for varicella complicated by deep soft-tissue or invasive bacterial infections.[14]

Prevention remains paramount. Two-dose varicella vaccination programs have demonstrated 98-100% effectiveness in preventing severe disease and significantly reducing hospitalizations and complications.[15,17] However, breakthrough varicella cases, though generally milder, can still develop serious complications, emphasizing the need for continued clinical vigilance even in vaccinated populations.[16,18]

This case reinforces the importance of recognizing varicella as a potential precursor to severe bacterial infections and highlights orbital cellulitis as a rare but vision-threatening complication. Prompt diagnosis, early initiation of combined antiviral and antimicrobial therapy, and close monitoring are essential to ensure favorable outcomes.

CONCLUSION

This case highlights orbital cellulitis as a rare but serious complication of primary varicella infection in an otherwise healthy child. Although varicella is commonly regarded as a benign, self-limiting illness of childhood, this report underscores its potential to precipitate invasive bacterial infections with sight-threatening and life-threatening consequences. The temporal association between the cutaneous eruption and the onset of unilateral periorbital inflammation emphasizes the importance of maintaining a high index of suspicion for secondary bacterial superinfection when new focal symptoms or a secondary febrile spike occurs during varicella.

Early clinical recognition and prompt differentiation between preseptal and orbital cellulitis are critical, as delayed diagnosis may result in irreversible visual impairment, intracranial extension, or systemic sepsis. This case demonstrates that aggressive inpatient management with combined intravenous broad-spectrum antibiotics and antiviral therapy can lead to rapid clinical improvement and complete recovery when initiated in a timely manner. The favorable outcome observed reinforces the effectiveness of early, multidisciplinary intervention in preventing long-term morbidity.

From a preventive standpoint, this case further underscores the importance of universal varicella vaccination. Despite the overall reduction in disease burden following widespread immunization, unvaccinated children remain at risk for severe complications, and clinicians must remain vigilant even in the post-vaccine era. Continued education of caregivers regarding warning signs of secondary infection, along with adherence to vaccination schedules, is essential to reduce preventable morbidity.

In conclusion, varicella should not be underestimated in pediatric practice. Awareness of rare complications such as orbital cellulitis, early recognition of clinical red flags, and timely initiation of combined antiviral and antibacterial therapy are paramount in ensuring optimal outcomes and minimizing the risk of permanent sequelae.

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