

Case Report

Retrograde Cavernous Sinus Thrombosis and Orbital Cellulitis Secondary to Meningitis in Immunocompetence Child[†]

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A case of cavernous sinus thrombosis is usually a complication of severe orbital cellulitis and meningitis. The authors reported a retrograde cavernous sinus thrombosis and orbital cellulitis in an immunocompetence child, due to meningitis.

Keywords: Orbital cellulitis, Cavernous sinus thrombosis, Meningitis

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Orbital cellulitis is an infrequent disease but this is a serious complication from sinusitis especially in young children. In 60 to 80% orbital cellulitis is related to sinusitis⁽¹⁾. Two thirds of patients had fever on or after presentation and 73% had proptosis and ophthalmoplegia. Ethmoidal sinusitis was present in 98%, maxillary sinusitis in 71%, frontal sinusitis in 32% sphenoid sinusitis in 22% and subperiosteal or other orbital abscess was presented in 83% in pediatric populations⁽²⁾. Orbital cellulitis can occur after trauma, surgery, and as complication of preseptal cellulitis and acute dacryocystitis⁽³⁾.

The pathogen most often involved in orbital cellulitis in children is *H. influenzae*, whereas *Staphylococcus* and *Streptococcus* are more frequent in adults⁽⁴⁾.

When orbital cellulitis spreads posteriorly to the cavernous sinus, signs of meningeal irritation (nausea, vomiting, and generalized sepsis) will appear⁽⁵⁾. Mortality of septic cavernous thrombosis has decreased from 80% to 100% in the preantibiotic era to 20% to 30% since 1940. However, the threat of temporary complications and long-term sequelae remains⁽⁶⁾.

The authors reported a rare case of retrograde cavernous sinus thrombosis and orbital cellulitis secondary to meningitis.

Case Report

A 3-year-old Thai girl presented with fever and severe headache for five days and developed bilateral axial proptosis three days later without preceding symptoms of sinusitis, periorbital skin infection or dental caries. Two days later, she developed alteration of consciousness, generalized convulsion, and opisthotonus. She was diagnosed meningitis and treated with intravenous antibiotic. She was referred to PSU and hemoculture was *Streptococcal* spp.

She had bilateral axial proptosis with total ophthalmoplegia without any sign of sinusitis, periorbital skin infection, dental caries, or any other source of infection except meningitis.

The CBC revealed leukocytosis. Lumbar puncture was done and CSF profile showed bacterial meningitis. MRI brain demonstrated cavernous sinus thrombosis with leptomeninges enhancement and hydrocephalus without subperiosteal abscess and no evidence of sinusitis.

She was treated with intravenous antibiotics. Unfortunately, her clinical condition deteriorated. She developed worse alteration of consciousness with hydrocephalus, central diabetic insipidous, and multiple brain infarctions that involved the bilateral

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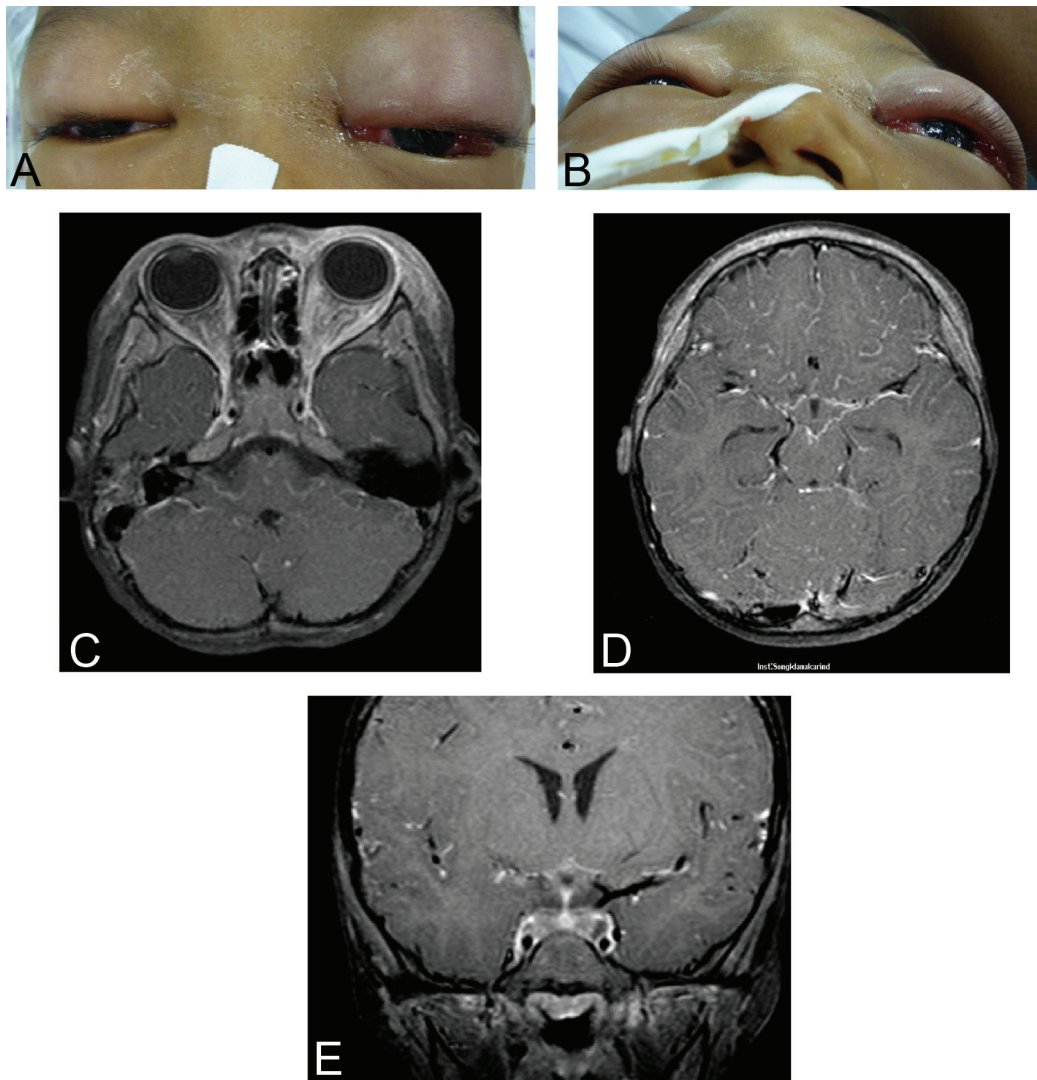


Fig. 1 (A & B) A photograph of 3 year old girl demonstrated bilateral axial proptosis with conjunctival injection and chemosis. (C) Post-Gd-DTPA fat suppressed axial spin-echo T1-weighted images revealed bilateral proptosis due to orbital cellulitis seen as ill defined enhancement of the retrobulbar fat, more severe at the left side. (D) Diffuse prominent leptomeningeal enhancement involving bilateral cerebral hemispheres and brain stem due to meningitis was demonstrated (B). Mild dilated temporal horns of lateral ventricle were suggestive evidence of associated mild hydrocephalus. (E) Contiguous 3-mm post-Gd-DTPA fat suppressed coronal spin-echo T1-weighted images revealed small filling defects within left cavernous sinus due to cavernous sinus thrombosis. Right cavernous sinus was unremarkable

cerebellar hemisphere except the part of inferior cerebellum that was supplied by the anterior inferior cerebellar artery. After prognosis had been advised, her parents decided to take her home.

Discussion

It has been known that orbital cellulitis was frequently caused by sinusitis, trauma, surgery,

preseptal cellulitis, and dental extraction. Orbital cellulitis can cause the rare complication as cavernous sinus thrombosis when the infection spreads posteriorly to the cavernous sinus.

Cavernous sinus thrombosis may produce intracranial complications when the infection extended to adjacent tissues as meningitis, subdural empyema, and pituitary necrosis⁽⁷⁾. Orbital infection is rarely

complicated by cavernous sinus thrombosis, although the ophthalmic veins drain directly into orbits⁽⁸⁾.

The presented patient had unusual clinical courses. Her symptoms and signs suggested that she had preceded meningitis and septicemia before the onset of cavernous sinus thrombosis and orbital cellulitis. This atypical presentation may be explained by the spreading of infection directly to the orbit from the superior ophthalmic vein.

The dural sinuses, cerebral veins, and emissary veins have no valves, which allow blood flow in either direction according to pressure gradients in the vascular system⁽⁹⁻¹¹⁾. Consequently, bidirectional spread of infection and thrombi can occur throughout this network. This fact and the extensive direct and indirect vascular connections of the centrally located cavernous sinuses make them vulnerable to septic thrombosis resulting from infection at multiple sites.

Furthermore, the increasing intracranial pressure in meningitis condition in the presented patient may promote retrograde spreading of infection to the cavernous sinus and orbit.

Bacteria are potent stimulators of thrombosis by mechanisms that include release of coagulative substances or toxins causing tissue damage, and the thrombus itself is an excellent growth medium for bacteria⁽¹²⁾.

Adequate antibiotics have had the greatest impact on the prognosis of septic cavernous sinus thrombosis as shown in the decreasing mortality and morbidity^(13,14). However, bacteria within the deeper layers of the thrombus are shielded from antibiotics penetration by outer layers of thrombus that they can subsequently infect⁽¹⁵⁾.

The high dose parenteral antibiotics should be given based on the pathogens implicated at primary source of infection. Anticoagulation and steroid therapy as an adjuvant in the treatment of cavernous sinus thrombosis remains controversial⁽¹⁶⁾.

The early detection may provide early investigation and early treatment to reduce morbidity and mortality.

Conclusion

Cavernous sinus thrombosis is a serious complication of orbital cellulitis that had high morbidity and mortality. It is unusual that orbital cellulitis occurs in sequelae of cavernous sinus thrombosis and meningitis. This retrograde spread infection can occur in the immunocompetence patient in atypical presentation and prognosis is guarded. Early recognition

may provide early investigation and early treatment for better prognosis.

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Potential conflicts of interest

None.

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***Retrograde cavernous sinus thrombosis และการอักเสบของเบ้าตาภายหลังภาวะเยื่อหุ้มสมองอักเสบ
ในผู้ป่วยเด็กที่มีภูมิคุ้มกันปกติ***

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Cavernous sinus thrombosis เป็นภาวะแทรกซ้อนที่มักเกิดภายหลังจากการอักเสบของเบ้าตา และภาวะเยื่อหุ้มสมองอักเสบที่รุนแรง การศึกษานี้เป็นรายงาน *retrograde cavernous sinus thrombosis* และการอักเสบของเบ้าตาในผู้ป่วยเด็กที่มีภูมิคุ้มกันปกติ ซึ่งเกิดขึ้นภายหลังภาวะเยื่อหุ้มสมองอักเสบ