

Concomitant Bilateral Orbital and Brain Abscesses-Unusual Complications of Pediatric Rhinosinusitis

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Rhinosinusitis is a common medical problem. Complications involving the orbits or brain are not frequently met. Concomitant involvement of both orbits and the brain is very rare. We here describe a 6-year-old girl who suffered from acute rhinosinusitis and initially, subperiosteal abscesses in both orbits. Bilateral functional endoscopic sinus surgery and drainage of the subperiosteal abscesses through the upper eyelids were done. Pus cultures showed methicillin-resistant *Staphylococcus aureus*. The brain abscesses were found under magnetic resonance imaging (MRI) and were treated conservatively with vancomycin and rifampin for 7 weeks. The patient was free of ocular and neurologic sequelae at the 1-year follow up. Retrograde thrombophlebitis instead of anatomic dehiscence was the most likely route for the spread of infection. Multidisciplinary approaches are necessary in managing ophthalmologic and intracranial complications of sinusitis. (*Chang Gung Med J* 2005;28:51-5)

Key words: subperiosteal abscess, brain abscess, pediatric rhinosinusitis.

Inflammation of the paranasal sinuses is a common medical problem. Complications of rhinosinusitis remain a major cause of orbital inflammation and visual impairment in children.⁽¹⁾ Clary *et al.* reported only 19 children with orbital complications over a 10-year period.⁽²⁾ Most of the reported orbital complications were unilateral. Bilateral orbital complications of sinusitis have been reported but are quite rare.⁽³⁾

Clayman *et al.* reported a 3.7% (24 of 649) prevalence of intracranial complications among all patients hospitalized for sinusitis in a 13-year combined institutional review. They found brain abscess to be the most common intracranial complication of sinusitis.⁽⁴⁾ The frontal lobes are the most common sites of brain abscess.⁽⁵⁾ Despite early and aggressive therapy, the mortality rates from intracranial abscess are between 10% and 20%.⁽⁶⁻⁷⁾

Here, we describe a previously healthy child who presented with subperiosteal abscesses in both

orbits and brain abscesses as severe complications of rhinosinusitis. They were successfully treated without sequelae. The possible mechanisms and treatment strategies of these lesions are also discussed.

CASE REPORT

A 6-year-old girl had symptoms of purulent rhinorrhea and fever for 4 days and sought help at another hospital. Under the impression of acute rhinosinusitis, she was treated with aqueous penicillin G initially. Because the fever persisted, the antibiotics were shifted to cefuroxime. Nasal swab cultures showed methicillin-resistant *S. aureus* (MRSA). Vancomycin was used according to antibiotics sensitivity tests and the fever gradually subsided. Two days later, her fever increased again accompanied by bilateral orbital swelling. Computed tomographic (CT) scan of the sinuses and orbits showed bilateral subperiosteal abscesses and pre-

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septal cellulites (Fig 1A, 1B). She was transferred to our hospital for further management.

On admission, she was unable to open her eyes (Fig 2A). Ocular movement was limited when looking upward but her visual acuity was not impaired. She was communicative and answered questions appropriately. The white blood cell count was 16600/ μ L and erythrocyte sedimentation rate was 7.94 mm/h.

Vancomycin (45 mg/kg/day) and amikacin (14 mg/kg/day) were administered over the ensuing 24 hours, but the purulent rhinorrhea and periorbital swelling did not improve. Because the rhinosinusitis with orbital complications was not responsive to medications, functional endoscopic sinus surgery was done the next day and the pus in the bilateral

maxillary and ethmoid sinuses was drained endoscopically. The subperiosteal abscesses were drained through the upper eyelids because they were located superiorly to the orbits and could not be reached intranasally. Re-aspiration of the left subperiosteal abscess was done due to accumulation of pus the day after surgery (Fig 2B). Cultures from the swabs of both ethmoid sinuses and from the subperiosteal abscesses yielded *S. aureus* which was susceptible to sulfamethoxazole-trimethoprim, teicoplanin and vancomycin. Vancomycin (45 mg/kg/day) was administered.

On the 4th post-operative day, fever (up to 39.4°C) appeared again and brain magnetic resonance imaging (MRI) was done to search for other infectious foci. Two large abscesses (4 cm and 3.5

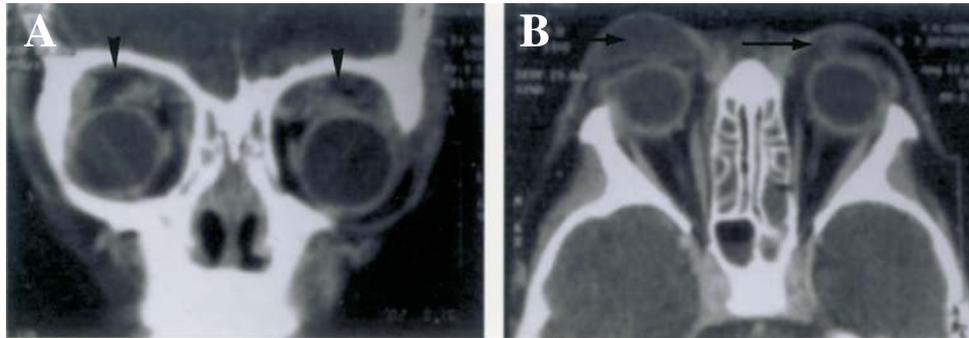


Fig. 1 (A) Coronal CT demonstrates bilateral subperiosteal abscesses (arrowheads). (B) Axial CT shows bilateral preseptal cellulites (arrows).

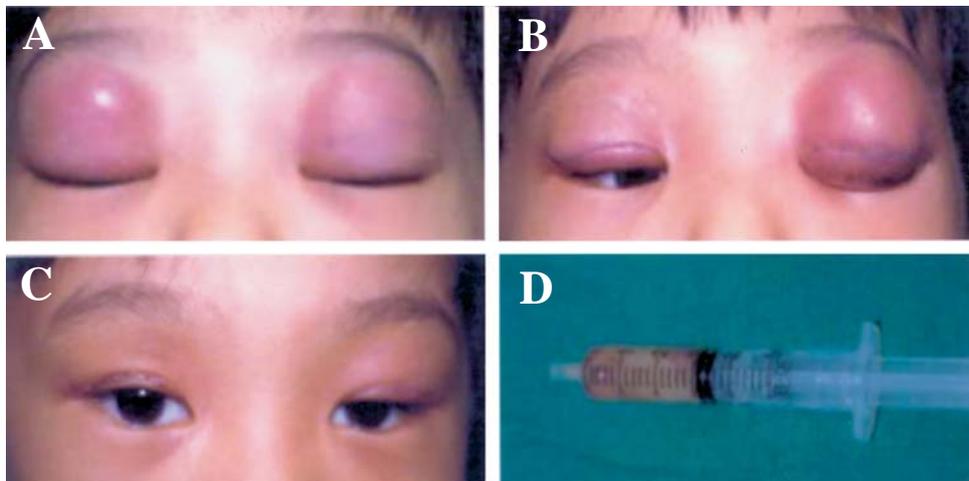


Fig. 2 (A) Bilateral periorbital swelling and erythema when patient looks upward (before surgery). (B) Left periorbital swelling persists (2nd post-operative day). (C) Complete resolution of periorbital swelling 1 month after surgery. (D) Pus aspirated during surgery.

cm in diameter) were found in both frontal lobes with marked perifocal edema (Fig. 3A). The bilateral subperiosteal abscesses and rhinosinusitis were resolving. The patient did not have Kernig's sign, Brudzinski's sign or other focal neurological signs at that time. The vancomycin dosage was increased (60 mg/kg/day) and rifampin (200 mg daily) was added instead of surgical drainage to avoid possible sequelae. Two days later, the fever subsided. The periorbital swelling and purulent rhinorrhea gradually improved. In a follow-up MRI 1-month post-operatively, the frontal lobe abscesses (Fig. 3B), subperiosteal abscesses in the orbits and rhinosinusitis were all resolving. Vancomycin and rifampin were used for 4 more weeks. Brain MRI done 3 months post-operatively showed scarring in the left frontal lobe without abscesses (Fig. 3C). Brain MRI done at the 1-year follow-up showed complete resolution of the abscesses (Fig. 3D). The patient was free of ocular and neurological sequelae.

DISCUSSION

Complications of rhinosinusitis occur frequently

in the orbit. These complications include the following in order of increasing severity: orbital cellulitis, subperiosteal orbital abscess, intraorbital abscess, and cavernous sinus thrombosis.^(8,9) Ocular complications are easier to detect because ocular swelling or movement impairment appears early in all 4 types of complications. In contrast, intracranial complications may be asymptomatic until late in their course—especially when “silent” areas of the central nervous system are involved, such as the frontal lobe.⁽¹⁰⁾ Fever may be the only sign of intracranial complications of paranasal sinusitis,⁽⁴⁾ as in our patient. To detect intracranial complications early, a high index of suspicion is warranted.

The pathophysiology of suppurative intracranial complications of sinusitis has been well described.⁽¹¹⁾ There are 2 paths of infectious spread from the paranasal sinuses to the intracranial cavity: 1. retrograde thrombophlebitis through the diploic veins of the skull and ethmoid bone or communicating veins; and 2. direct extension of disease through anatomic pathways, such as congenital or traumatic dehiscence, sinus wall erosion, and existing foramina (i.e., olfactory nerves). Ocular complications from rhi-

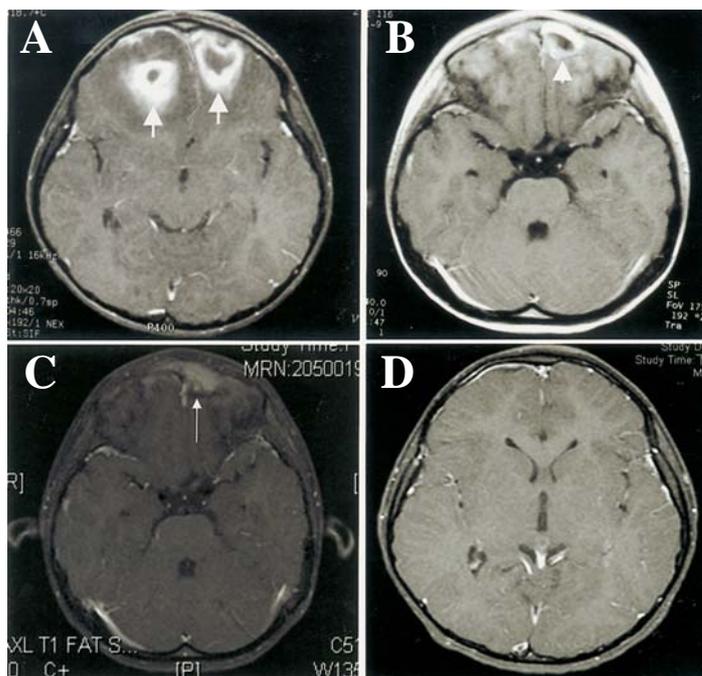


Fig. 3 (A) Axial brain MRI (T1 weighted) demonstrates bilateral frontal abscesses after surgery (arrows). (B) Axial brain MRI (T1 weighted) 1 month post-operatively shows that the abscesses are resolving (arrowhead). (C) Axial brain MRI (T1 weighted) 3 months post-operatively shows scarring in the left frontal lobe (long arrow). (D) Axial brain MRI (T1 weighted) at the 1 year follow-up shows complete resolution of the abscesses.

nosinusitis can also arise from these 2 pathways.⁽¹⁾ The reason why orbital involvement is usually unilateral is probably related to asymmetry in the dehiscence of the lamina papyracea, the so-called Zuckerkandl dehiscence.⁽¹²⁾ In bilateral orbital complications, trauma could provide multiple pathways for the spread of infection.⁽³⁾ In patients who have involvement of both orbits and frontal lobes without a history of trauma, retrograde thrombophlebitis through valveless channels instead of congenital dehiscence is the most likely route.

For orbital abscesses refractory to antibiotics treatment, surgical decompression is the preferred therapy. Decompression can be achieved by an open procedure, such as external ethmoidectomy, or by functional endoscopic sinus surgery (FESS). FESS provides a shorter hospital stay and faster resolution of orbital edema than external approaches.⁽¹³⁾ For endoscopic drainage of orbital abscesses, Mann et al.⁽¹⁴⁾ found 23% (6/26) of children required revision procedures. The most common reason was either inadequate removal of the lamina papyracea or an abscess that was positioned superiorly or laterally in the orbit which was difficult to drain endoscopically. For subperiosteal abscesses which lie superiorly in the orbits and can not be reached intranasally, combined FESS and drainage through the eyelids externally is the procedure of choice. Post-operatively, a Penrose drain is strongly recommended to prevent accumulation of pus in the orbits of those who receive external drainage procedures.

Most intracranial abscesses require drainage.⁽¹⁵⁾ Some investigators report successful treatment of intracranial abscesses with medical therapy alone.⁽¹⁶⁾ In intracranial complications of sinusitis, sinus cultures have been shown to correlate well with intracranial pathogens.⁽¹⁷⁾ They could be helpful in refining the choice of antibiotics. Eliminating the primary focus of infection and obtaining cultures early are thus important in these patients. In patients without increased intracranial pressure or other neurologic signs, conservative treatment of the intracranial abscess could be attempted initially. Close observation of the clinical condition and serial image studies (CT scan or MRI) are required during the treatment course. Six to 8 weeks of intravenous antibiotics therapy is recommended.

Concomitant intracranial and orbital complications of pediatric rhinosinusitis are best managed

with a multidisciplinary approach guided by a team consisting of an otolaryngologist, ophthalmologist, neurosurgeon and neurologist.

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小兒急性鼻竇炎併發兩側性眼窩及顱內額葉膿瘍——罕見之表現

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鼻竇炎在我們處理的疾病中是相當常見的問題，但因鼻竇炎併發眼睛或腦部的感染並不常見，而同時侵犯眼睛與腦部的情況更是罕見。我們在此提出一名6歲女性病患因急性鼻竇炎的感染，後續併發兩側眼睛骨膜下膿瘍與雙側額葉的腦部膿瘍。對於鼻竇炎及兩側眼睛骨膜下膿瘍，病患接受雙側功能內視鏡手術與眼睛外切開引流手術，手術所得檢體細菌培養結果為對methicillin有抗藥性的金黃色葡萄球菌。顱內膿瘍則以vancomycin及rifampin藥物治療7週。患者追蹤1年後，並無眼睛或神經學之後遺症，對於對稱性併發症感染散佈之途徑，最可能為逆行性血栓靜脈炎所引起而非解剖構造之裂隙。而處理因鼻竇炎引起之眼睛與顱內併發症，則須由多專科合作一起來處理。(長庚醫誌 2005;28:51-5)

關鍵字：骨膜下膿瘍，腦膿瘍，小兒鼻竇炎。

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