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Complications of Bacterial Rhinosinusitis in Children and their Management

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Rhinosinusitis can lead to local and systemic complications. Most local complications are anatomically linked to the paranasal sinuses and other structures of the head, neck, and chest. The exact rates of these complications are not known, but they occur in about 5% of patients hospitalized for rhinosinusitis [1].

Sinus infection can spread through anastomosing veins or by direct extension to close by structures. Orbital complications of rhinosinusitis were categorized by Chandler et al. [2] into five stages according to their severity. Contiguous spread to the oribital area can cause periorbital cellulitis, subperiosteal abscess, orbital cellulitis, and abscess. Orbital cellulitis can complicate acute ethmoiditis if thrombophlebitis of the anterior and posterior ethmoidal veins spreads to the lateral or orbital side of the ethmoid labyrinth. Sinusitis can also spread intracranially, where it can cause cavernous sinus thrombosis, retrograde meningitis, and epidural, subdural, and brain abscesses [2-5]. Orbital symptoms often precede intracranial extension of the infection [5]. Other complications include sinobronchitis, maxillary osteomyelitis, and frontal bone osteomyelitis [6-10]. Frontal bone osteomyelitis often originates from an extending thrombophlebitis. Frontal sinus periostitis can cause outer membrane osteitis and periostitis, which produces a tender, puffy swelling of the forehead.

The most common pathogens causing these complications are those seen in acute and chronic rhinosinusitis, depending on the length and etiology of the primary rhinosinusitis. These include *Streptococcus pneumoniae, Haemophilus influenzae, Staphylococcos aureus (*including methicillin resistant), anaerobic bacteria (*Prevotella, Porphyromonas, Fusobacterium* and *Peptostreptococcus* spp.) and Microaerophilic streptococci [5]. Anaerobic bacteria are mostly found in chronic rhinosinusitis and those associated with dental etiology [11].

Early diagnosis of a complication is of prime importance. Diagnosis is assisted by computed tomography (CT) and nuclear isotope scanning. Prevention of these complications is of great importance. This can be accomplished by administering appropriate empiric antimicrobial therapy, obtaining sinus cultures from those who fail to respond to treatment after 2-4 days and those with severe symptoms who do not respond within 48 hours, and the immunocompromised. These cultures can guide the choice of appropriate definite antimicrobial choice.

Medical treatment should be vigorous for the early stages of periorbital cellulitis. If this is not done, the infection can progress to orbital cellulitis and abscess. The outcome of medical management depends to a large extent on the duration and stage of the orbital involvement. If orbital cellulitis or abscess is suspected, an ophthalmologist should be consulted. If rapidly advancing infection is suspected, time is crucial and imaging studies and therapeutic measures should be instituted without delay.

Patients with mild inflammation or edema of the eyelid or preseptal cellulites can be treated with oral antibiotics and decongestants, especially if they have not been previously treated with antimicrobial agents. However, close supervision and follow-up is mandatory, and the initiation of parenteral antimicrobial therapy in the hospital should be undertaken if postseptal involvement is suspected or has emerged.

In the early stages of cerebritis (before abscess encapsulation) antimicrobials can prevent the development of an abscess [12]. However, once a brain abscess has formed, surgical excision or drainage combined with a long course of antibiotics (4-8 weeks) is the treatment of choice. Increased intracranial pressure may necessitate the administration of mannitol, hyperventilation, or dexamethasone prior to surgery.

Establishing a microbiological diagnosis is important in planning the appropriate antimicrobial therapy. CT guided needle aspiration can provide this important information and enable adjustment of empirical antimicrobial therapy when needed. Frequent scans are essential in monitoring the response to treatment. Although surgical intervention remains an essential treatment, selected patients may respond to high-dose antibiotics alone that which are given for an extended period of time [12,13].

The use of corticosteroid is controversial. They can retard the encapsulation process, increase necrosis, reduce antibiotic penetration into the abscess, and alter CT scans. Steroid administration can also produce a rebound effect when discontinued. When used to reduce cerebral edema, treatment should be of short duration. The appropriate dosage, the proper timing, and any effect of steroid therapy on the course of the disease are unknown.

Initial empirical antimicrobial treatment is based on the expected microbiological agents according to the likely primary source of the infection. Although appropriate selection of antimicrobial therapy is of critical importance in the management of intracranial infections, surgical drainage may be also needed. Delay in surgical drainage and decompression can be associated with high morbidity and mortality [13]. Surgical drainage may be needed in many patients to ensure adequate and complete resolution of the infection. Surgical drainage of the concomitant sinus infection and any orbital collection of pus should also be performed at that time. Periodontal abscess or any other dental lesion should also be drained and/or corrected.

Early recognition and proper treatment of complications of sinusitis in children can reduce morbidly prevent and prevent mortality.

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