

두개안면부 수술 후 발생한 다약제내성 폐렴구균 패혈증 및 뇌막염: 증례 보고

김형석 · 임소영 · 변재경 · 문구현 · 방사익 · 오갑성

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Multidrug-Resistant *Streptococcus pneumoniae* Sepsis and Meningitis after Craniofacial Surgery: Case Report

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Purpose: The prevalence of antibiotic-resistant *Streptococcus pneumoniae* meningitis has increased worldwide. There are some reports about postoperative antibiotic-resistant *Streptococcus pneumoniae* infection after craniofacial surgery, but, there is no report in Korea. We present a report on the treatment of postoperative multidrug-resistant *Streptococcus pneumoniae* (MRSP) meningitis and sepsis after craniofacial surgery based on our experience.

Methods: The patient was a 7-year-old boy with Crouzon's disease who was treated by fronto-orbital bar advancement. Intraoperatively, frontal sinus opening was seen during osteotomy which was covered with forehead galeopericranial flap. MRSP meningitis was diagnosed after the surgery, he was treated with intravenous vancomycin, meropenem, and levofloxacin.

Results: The patient was treated successfully after 3 weeks of intravenous antibiotics treatment. During the 8 month follow-up period, there was no neurologic sequelae.

Conclusion: Postoperative infection after craniofacial surgery is an important phenomenon that needs immediate recognition. Prevention, early diagnosis, and treatment immediate after onset are important as countermeasures against postoperative drug-resistant bacterial infection. To prevent adverse outcome and reoperation, proper antibiotics treatment should be performed.

Key Words: Multidrug-resistant *Streptococcus pneumoniae*, Cranio-

facial surgery, Complications

I. INTRODUCTION

The prevalence of antibiotic-resistant *Streptococcus pneumoniae* meningitis has increased worldwide, particularly in South Korea.¹ Craniofacial surgery for correction of craniofacial malformations such as Crouzon's disease may carry great risk, and postoperative infection is a life-threatening complication. There are some reports about postoperative antibiotic-resistant *Streptococcus pneumoniae* infection after intracraniofacial surgery,^{2,3} but, there is no report in Korea. We present a report on the treatment of postoperative multidrug-resistant (≥ 3 drugs) *Streptococcus pneumoniae* (MRSP) meningitis and sepsis after craniofacial surgery based on our experience.

II. CASE

The patient was a 7-year-old boy with Crouzon's disease. Obliteration of coronal, sagittal, lambdoid suture, exophthalmos with shallow orbit, mild midface hypoplasia, sinusitis involving right maxillary and ethmoid sinus were noted. There was no neurological deficit. Patient and his parents wanted to correct exorbitism in a single stage, fronto-orbital bar advancement was planned.

Frontal bone was osteotomized and detached from the dura, supraorbital bone unit was also osteotomized. Frontal sinus opening was seen during osteotomy, which was covered properly with forehead galeopericranial flap for prevention of meningitis intraoperatively. A 1.5 cm of advancement was achieved and this position was then secured by fixing absorbable plates and screws. An inlay bone graft was added to the advancement gap. Administration of a parenteral ceftizoxime (third-generation cephalosporin) was initiated during surgery. He also received metronidazole (nitroimidazole antibiotic) and gentamicin (aminoglycoside antibiotic) after surgery.

Early postoperative course was smooth and no leakage of cerebrospinal fluid was seen. He only complained of

Received April 3, 2011
Revised May 18, 2011
Accepted May 23, 2011

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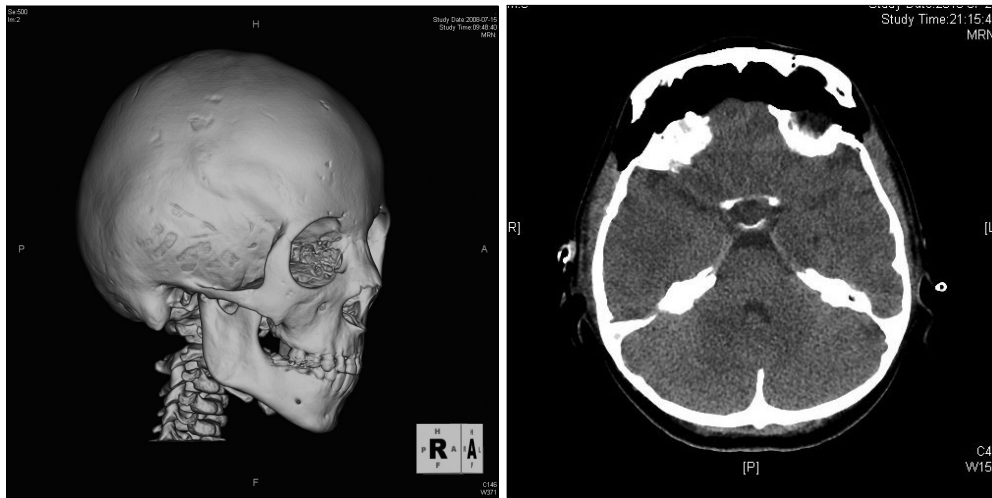


Fig. 1. Computed tomography images of the patient. (Left) Preoperative 3-dimensional image. (Right) Image of postoperative day 1.



Fig. 2. (Left) Preoperative finding. (Right) Postoperative finding in 4 weeks after the operation.

a mild headache and dizziness. Discharge from the intensive care unit was possible on postoperative day 2, but fever between 37 and 38°C continued. On postoperative day 4, fever reached 39.4°C, and transient altered mentality occurred. He was disorientated and confused. He had mild nuchal rigidity but no focal neurologic deficits. Blood cultures were obtained, and the patient was treated with intravenous vancomycin (glycopeptides antibiotic), meropenem (carbapenem), and levofloxacin (fluoroquinolone). Emergency brain non-contrast computed tomography showed no finding suggesting abscess formation. In a blood test, the white

blood cell count was 21,000/ μ L, and C-reactive protein was 18.73 mg/dL. Lumbar puncture yielded cerebrospinal fluid with a glucose level of 22 mg/dL and a protein level 68 mg/dL. There were 130/ μ L red blood cells and 2300/ μ L white blood cells (75% of polymorphonuclear neutrophils). A gram stain of blood revealed gram-positive cocci in pair, admission blood cultures grew *Streptococcus pneumoniae*; the organisms were susceptible only to levofloxacin, clindamycin, and vancomycin. Antibiotic sensitivity tests showed that the penicillin G, cefepime and ceftriaxone minimum inhibitory concentrations (MIC) were both 2 μ g/mL, and that of ampicillin,

cefactor and tetracycline were 4 µg/mL. His mental status improved, and blood cultures were sterile within 24 hours after administration of vancomycin (glycopeptides antibiotic), meropenem (carbapenem), and levofloxacin (fluoroquinolone). Blood chemistry findings returned almost normal on postoperative day 18. During the 8 month follow-up period, there was no neurologic sequelae.

III. DISCUSSION

Streptococcus pneumoniae (pneumococcus) is the most common cause of community-acquired pneumonia, meningitis, and bacteremia in children and adults and the most common cause of acute otitis media in children. The nasopharynx is the major ecological niche of *S. pneumoniae*; spread from nasopharynx to the lower respiratory tract or other sites may cause invasive pneumococcal disease. Case fatality rates for pneumococcal meningitis range from 16 to 37% in adults. Mortality rates are much higher in the elderly and in patients with comorbidities.⁴

Acquisition of antibiotic resistance due to *Streptococcus pneumoniae* is a serious problem. Following the initial detection of penicillin non-susceptible *S. pneumoniae* in a few geographic regions (e.g. South Africa, Australia, Spain) in the 1970s, resistance to penicillin and other antibiotic classes spread rapidly worldwide.⁵ Rates of multidrug-resistant were higher in Asia (26.8%), with exceptionally high frequencies in Korea (45.2%).¹

Postoperative infection after craniofacial surgery is an important phenomenon that needs immediate recognition. Meningitis can occur after any kind of craniofacial surgery, it is often associated cerebrospinal fluid leakage and nasocranial communication. Use of a galeo-pericranial flap with bone graft, gelatin sponge and fibrin glue can be a good option for prevention of meningitis intraoperatively.⁶ Preoperatively, the most effective preventive method may be a pneumococcal vaccine.⁷ Administration of a protein-bound vaccine is recommended.

Postoperative meningitis can often be treated with a course of intravenous antibiotics, but early diagnosis and proper treatment immediate after onset are important as countermeasures against postoperative drug-resistant bacterial infection. Prophylactic antibiotics can decrease postoperative morbidity and shorten hospitalization, but

it should be administered properly. In our case, initial prophylactic administration of gentamicin (aminoglycoside antibiotic) was not proper agent of choice in the aspect of antimicrobial spectrum and toxicity. Once a bacterial pathogen is isolated and *in vitro* susceptibility testing is performed, antimicrobial treatment should be modified for optimal treatment. The duration of antimicrobial therapy for *Streptococcus pneumoniae* meningitis is 10 to 14 days. However, the duration of therapy may need to be individualized on the basis of the patient's clinical response.⁸ To prevent adverse outcome and reoperation, proper antibiotics treatment should be performed.

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