Skull Base Osteomyelitis Presenting as Villaret's Syndrome

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Abstract- This report documents a 47-year-old male who developed acute deficits of the IX, X, XI, XII cranial nerves and Horner's symptoms, consistent with Villaret's syndrome. Neuroimaging studies demonstrated an osteolytic lesion in the skull base involving the clivus and jugular foramen. The patient recovered after the antibiotic treatment for proteus mirabilis infection. We suggest that Villaret's syndrome can be a rare presentation of skull base osteomyelitis.

Key Words: Skull base osteomyelitis, Villaret's syndrome, Proteus mirabilis

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INTRODUCTION

Skull base osteomyelitis is a life-threatening infection involving the external auditory canal and skull base[(1)]. It typically occurs in elderly diabetic or immunocompromised patients. The most common pathogen is pseudomonas aeruginosa; other pathogens are rarely reported[(2)]. This report documents a case of a middle-aged man with proteus mirabilis infection of the skull base, presenting with Villaret's syndrome: paralysis of multiple lower cranial nerves and the sympathetic chain. To our best knowledge, proteus mirabilis infection of the skull base with Villaret's syndrome has not been reported in adults.

CASE REPORT

The patient was a 47-year-old non-diabetic male diagnosed of nasopharyngeal carcinoma (NPC) 20 years ago. He had received a complete course of cobalt radiotherapy. Through these years, no recurrence was noted. About 6 months prior to admission, he experienced a persistent deep-seated headache over the right frontotemporal and maxillary regions, subsequently developing progressive dysarthria and dysphagia. A series of examinations by otolaryngeal physicians identified a thickened posterior pharyngeal wall. Biopsy revealed only chronic inflammation. No culture was obtained at that time.

One week prior to admission, the patient developed a sudden onset of left hemiparesis. Magnetic resonance imaging (MRI) scan demonstrated a recent infarction in the territory of the right middle cerebral artery (MCA). He was then referred to Chang Gung Memorial Hospital (CGMH) for further evaluation.

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On examination, he was alert and reported having a distressing headache. Blood pressure and body temperature were normal. Multiple cranial nerve lesions were identified. There were ptosis and miosis in the right eye. His speech was dysarthric with a nasal tone. He had severe dysphagia and required a naso-gastric tube for feeding. An obvious bulging posterior pharyngeal wall was noted. The right side gag reflexes were impaired and the right posterior tongue taste sensation was lost. The patient's tongue deviated to the right when extended. No granulation tissue was observed in the external auditory canals. No cerebrospinal fluid (CSF) leakage was identified. Therefore, Villaret's syndrome with sympathetic dysfunction was prominent.

Basic biochemical analyses and blood cell counts were within normal limits, except for an elevated erythrocyte sedimentation rate (ESR) and c-reactive protein (CRP). Two occasions of blood cultures revealed proteus mirabilis during hospitalization. Computed tomography (CT) of the brain disclosed an extensive osteolytic lesion throughout the central skull base (Fig. 1A). Infratentorial MRI showed osteomyelitis in the clivus and abscess formation just medial to the right sigmoid sinus (Fig. 1B). Supratentorial MRI demonstrated border-zone infarcts in the right hemisphere. Magnetic resonance angiography (MRA) revealed total occlusion of the right internal

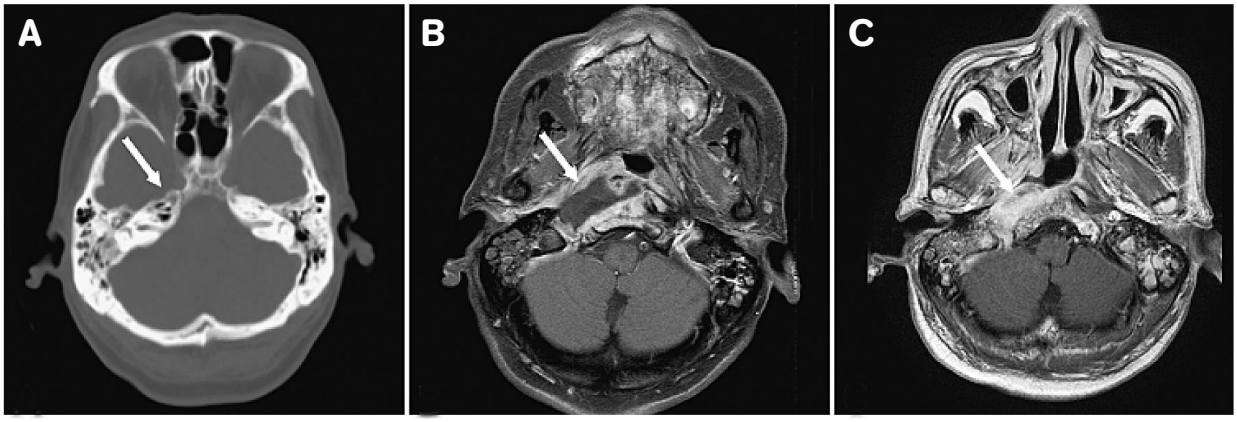

Figure 1. The CT scan with bone window shows an extensive osteolytic lesion in the skull base (A). The MRI shows an abscess adjacent to the clivus and right jugular foramen (B), which resolved 2 months after treatment (C).

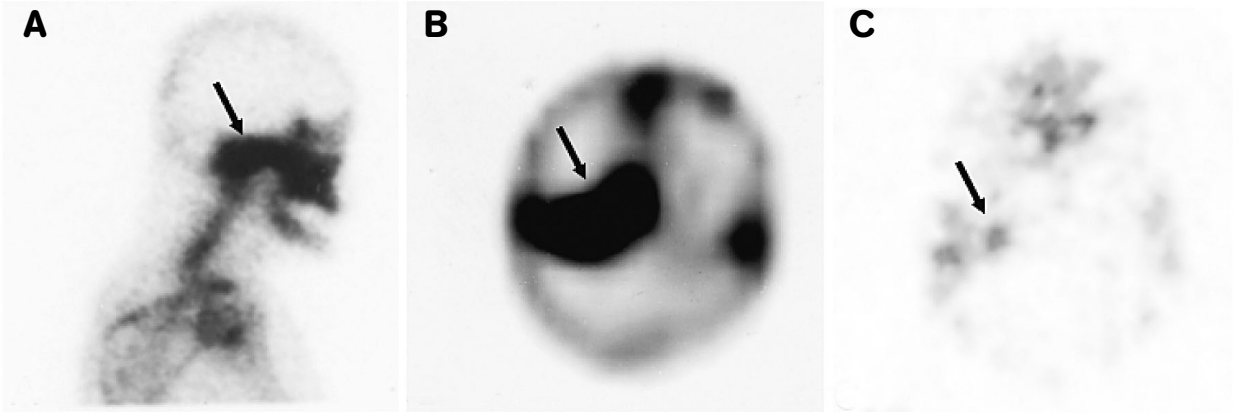

Figure 2. Technetium bone scan shows an increased uptake in the central skull base (A), which was further verified by the gallium scan in the axial view, especially in the right side (B). The uptake was significantly reduced and improved 2 months after treatment (C).

carotid artery (ICA) after the bifurcation and there were collateral blood supplies of right MCA and ACA through the Willis's circle. Radionuclide studies of technetium bone scan and gallium scan showed increased uptake in the central skull base (Figs. 2A-B).

The patient was given intravenous ceftriaxone (4 g/day) for 4 weeks. The patient's headache improved significantly 3 days after initiation of ceftriaxone therapy, and it completely resolved at the end of the treatment course. The multiple cranial nerve lesions also improved substantially at discharge. At 2-month follow-up, brain MRI results did not show lesions of osteomyelitis in the central skull base (Fig. 1C) and a gallium scan demonstrated great resolution in inflammation (Fig. 2C).

DISCUSSION

This patient developed skull base osteomyelitis presenting with multiple lower cranial lesions of the sympathetic and IX, X, XI, XII nerves, consistent with Villaret's syndrome. Skull base osteomyelitis is a life-threatening condition similar to notorious infectious diseases such as malignant otitis externa, and necrotizing otitis externa[1-3].

As for the causative organism, pseudomonas aeruginosa is the most common pathogen in skull base osteomyelitis rather than staphylococcus aureus, staphylococcus epidermidis, and salmonella[4-6]. The likely causative organism, proteus mirabilis in this patient, has been once reported in a 6-month-old infant who did not develop neurological deficits from the beginning and during the treatment course[7]. This is the first reported skull base osteomyelitis by proteus mirabilis infection in adult, presenting with Villaret's syndrome.

Osteoradionecrosis secondary to radiation therapy is a source of confusion with osteomyelitis[8]. However, clinical symptoms and signs, imaging findings and response to antibiotics differentiated these conditions.

Another aspect is the risk factor for skull base osteomyelitis. Osteomyelitis commonly occurs in elderly diabetic or immunocompromised patients[9,10], and causes progressive, unrelenting otalgia unresponsive to local treatment[2,3]. This patient had no risk factors, except for previous nasopharyngeal carcinoma post radiation therapy. The most principal indicator of malignant otitis externa on examination is granulation tissue in the floor of the external auditory canal near the bony-cartilaginous junction[2]. That was not observed in this patient. There was no sign of paranasal infection, either. The presumed infection source may be hematogenous[11].

Involvement of multiple lower cranial nerves in skull base osteomyelitis has been reported[1,5,7,10-16]. Differing from limited cranial nerve lesions, such as prominent facial nerve paralysis and jugular foramen syndrome, extensive involvement (Villaret's syndrome) was observed in this patient[17]. Common etiologies of Villaret's syndrome are parotid gland tumor, increased pressure by an enlarged lymph gland, nasopharyngeal tumors, pharyngeal abscesses, and aneurysms of internal carotid artery. Villaret's syndrome resulting from skull base osteomyelitis has not been reported, particularly together with the sympathetic chain involvement as in this patient.

Radionuclide (functional) imaging scans are useful for initial diagnosis and staging of skull base osteomyelitis. Both technetium (bone) and gallium scans should be performed. When only the gallium scan is positive, the lesion is limited to soft tissue, likely indicating a necrotizing otitis externa. When both bone and gallium scans are positive, the lesion is extensive and likely indicates skull base osteomyelitis. However, both radionuclide studies are not specific for skull base osteomyelitis[3,18]. The results of gallium scan correlate well with infection regression, whereas those of bone scan can be positive for 9 months after complete treatment. In this patient, the gallium scan was used to monitor disease progression, and the uptake of radionuclide had decreased significantly at 2 months after intravenous antibiotics treatment.

The patient had a concomitant cerebral infarction in the symptomatic phase of skull base osteomyelitis. MRI/MRA scan showed acute infarction in the right central semiovale and total occlusion of the right ICA, which might be the effect of previous NPC irradiation. The incidence of significant carotid stenosis following head and neck irradiation ranges from 30% to 50%.

Patients with carotid stenosis are at increased risk for stroke[19]. To determine the causal-effect relationship between the osteomyelitis and cerebral infarction in the patient is difficult, although infection is deemed as a precipitating factor of cerebral infarction. However, the mechanisms are complex and multifactorial and probably differ from infection to infection and from patient to patient[20].

CONCLUSION

This report described a rare case of skull base osteomyelitis manifesting Villaret's syndrome likely caused by proteus mirabilis infection. After successful treatment with adequate antibiotics, skull base osteomyelitis resolved except for mild sequelae. We propose that Villaret's syndrome should be considered a presenting syndrome in skull base osteomyelitis.

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