

# 2세 여아에서 진단된 바이러스 감염과 연관성이 의심된 단독 설하신경 마비

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## Viral Infection-related Isolated Hypoglossal Nerve Palsy in a 2 Year-old Girl

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Isolated hypoglossal nerve palsy (HNP) is rare in children. Predominantly malignant tumors are the most common cause of HNP, with trauma coming second. A 2-year-old girl with acute onset dysarthria was referred to the pediatric neurology clinic. She also had fever and left-sided tongue deviation upon protrusion. She had no abnormal sign on physical, neurological, and otorhinolaryngological examination other than left hypoglossal nerve palsy. She had no tongue fasciculation. Her brain magnetic resonance imaging and magnetic resonance angiography were normal. In a polymerase chain reaction test, enterovirus was positive in the stool and adenovirus was positive in nasopharyngeal aspirate. We diagnosed viral infection-related isolated HNP and prescribed prednisolone and acyclovir. Within a month, the tongue deviation and dysarthria gradually improved. The first step for the evaluation of isolated HNP should be investigation of the underlying malignancy. However, serologic tests for viral infection are also needed.

**Key Words:** Hypoglossal nerve disease, Child, Enterovirus, Human adenovirus

## Introduction

The hypoglossal nerve, or twelfth cranial nerve, innervates the muscles of the tongue. Isolated hypoglossal nerve palsy (HNP) is a rare neurological disorder, and usually presents with atrophy of the ipsilateral tongue musculature. Many cases are related to cancer (49%), trauma (12%), stroke (6%), multiple sclerosis (6%), and surgical complication (5%), while only a few cases (4%) are associated with infection<sup>1)</sup>. Apart from a case of an 11-year-old Korean boy with idiopathic isolated HNP<sup>2)</sup>, to our knowledge, there are no reports of idiopathic HNP with an identified infectious cause in Korean children. Herein, we report a case of viral infection-related isolated HNP in a 2-year-old girl.

## Case report

A 2 year-old girl, presenting with dysarthria four days prior, was referred to

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the pediatric neurology clinic. Her birth history was unremarkable. She had normal developmental milestones and her family history was non-specific. She had no recent vaccination history. She had no trauma and surgery history other than ventilation tube insertion for otitis media with effusion 8 months prior. She didn't have recent upper respiratory tract infection history. She complain neither respiratory nor gastrointestinal symptoms. Her body temperature was 37.6°C, heart rate 102 beats/min, and blood pressure 90/60 mmHg. The neurological examination revealed left-sided deviation of the tongue upon protrusion (Fig. 1). Other cranial nerve function and neurological examinations showed no pathological signs. She had no tongue fasciculation. She also showed no abnormal finding following a physical and otorhinolaryngological examination. She didn't show conjunctival, pharyngeal, and ear drum injection, and cervical lymph node enlargement.

Laboratory tests revealed a hemoglobin level of 12.5 g/dL, hematocrit 36.1%, white blood cell count 18,540/mm<sup>3</sup>, platelets 346,000/mm<sup>3</sup>, sodium 138 mEq/L, potassium 4.1 mEq/L, aspartate aminotransferase/alanine transaminase (AST/ALT) 28/10 IU/L, blood urea nitrogen/creatinine 5.9/0.3 mg/L, C-reactive protein 13.3 mg/L, and antistreptolysin O (ASO) titer 11,05 IU/mL. Blood culture and cerebrospinal fluid (CSF) microscopic examination and culture were non-specific. In a polymerase chain reaction (PCR) test, enterovirus in the stool and adenovirus in the nasopharyngeal aspirate were positive. Epstein-Barr virus, tuberculosis, varicella-zoster virus, herpes simplex virus type 6, and enterovirus on CSF PCR testing were negative. Human metapneumovirus, coronavirus, parainfluenza virus, influenza A/B virus, respiratory syncytial virus, rhinovirus, and enterovirus on the nasopharyngeal aspirate PCR were negative. Serum herpes simplex virus immunoglobulin (Ig) M and G showed negative results. Anti-nuclear antibody, anti-double-stranded DNA antibody, Ig profile, and complements were non-specific. Brain magnetic re-

sonance imaging (MRI) and magnetic resonance angiography (MRA) showed no pathological finding.

We diagnosed viral infection related HNP and prescribed oral acyclovir (800 mg/day for 10 days) and prednisolone (1 mg/kg/day for 10 days followed by 0.5 mg/kg/day for 7 days). Within a month, the tongue deviation and dysarthria gradually improved.

## Discussion

Isolated HNP is mainly related to tumor and trauma, and only rarely associated with vascular disorders, postoperative complications, multiple sclerosis, and infection<sup>1,3</sup>. In other case series, idiopathic isolated HNP accounted for up to 50% of cases, and showed a better prognosis than cases with an identified structural lesion<sup>4</sup>. Some cases without structural lesion related to Guillain-Barre syndrome, Epstein-Barr virus (EBV) infection, or streptococcal infection<sup>1,5</sup>. HNP cases related to endotracheal intubation for general anesthesia are rare, and most cases do not persist long after extubation<sup>6</sup>. In our case, there was an interval of 8 months between the symptom onset and the surgery. Therefore, the relationship between isolated HNP and endotracheal intubation was hardly suspected in this patient.

The 2-year-old girl presented with isolated left HNP and fever. Adenovirus and enterovirus were detected via PCR. We postulated that isolated HNP in this girl was associated with a viral infection. However, we could not search previous reports of isolated HNP related to an enterovirus or adenovirus infection. Bell's palsy and isolated HNP were suspected to have a similar pathology<sup>5</sup>. Viruses most often identified in association with facial nerve palsies include herpes simplex, varicella zoster, Epstein-Barr, enterovirus-71, coxsackie A and B, and adenovirus<sup>7,8</sup>. Certain enteroviruses (poliovirus, enterovirus 71) have characteristic tropism for motor nerve cells such as cranial nerve motor nuclei in the brainstem<sup>9</sup>. In our case, enterovirus was not detected in the conventional reverse transcriptase PCR (RT-PCR) for VP1 region on stool, CSF, and nasopharyngeal aspirate. But result was positive in the real time PCR for 5'NCR region of enterovirus on stool. We postulated that viral load was low or the serotype of enterovirus was undetectable in the conventional RT-PCR. The serotypes undetectable in the conventional RT-PCR but reported in the central nervous system (CNS) infection are coxsackievirus B6, A7, echovirus 31, and enterovirus D68. CNS infection such as meningoencephalitis is a rare manifestation of adenoviral infections and most commonly associated with pulmonary or disseminated disease<sup>10</sup>. In our case, she had no signs and symptoms of respiratory tract infection other than fever. On the other hand,

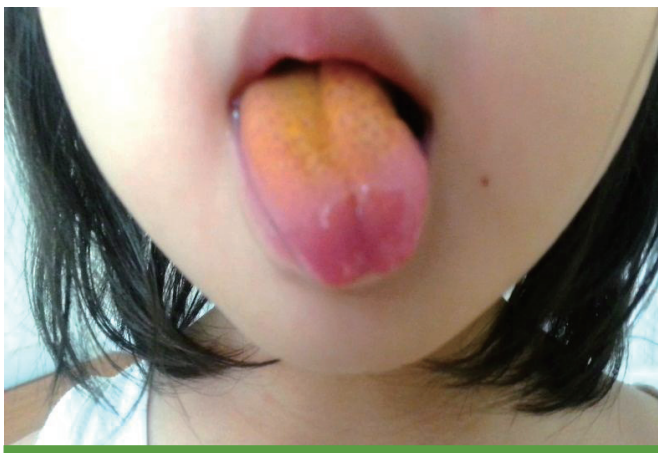


Fig. 1. A 2 year-old girl with left-sided tongue deviation on protrusion.

neurological diseases often arise as complications of mild enteroviral infections including non-specific febrile illness<sup>11</sup>. So we assumed that enterovirus was suitable for the cause, though we could not rule out adenovirus fully.

The cranial nerve palsies may be caused by direct infection of the nerve or via the immune process<sup>5</sup>. In addition, other authors have reported that nerve compression by reactive deep lymph nodes can constitute the etiology of viral cranial neuropathies<sup>12</sup>. In our case, there was neither superficial nor deep cervical lymphadenopathy.

There is no guideline for the treatment of viral infection-related isolated hypoglossal nerve palsy. Initially we didn't know the results of varicella-zoster virus PCR, so we prescribed oral prednisolone and acyclovir in the light of the treatment of facial or lower cranial nerve palsy<sup>13-15</sup>.

Our case demonstrates that isolated HNP can occur in relation to enterovirus or adenovirus infection. The first step for the evaluation of isolated HNP should be an investigation of the underlying malignancy. However, serologic tests for viral infection (particularly enterovirus, adenovirus, and Epstein-Barr virus) are also needed.

## 요약

단독 설하신경 마비는 소아에서는 매우 드문 질환이다. 해외에서는 악성종양이 가장 많은 원인을 차지하고 있으며 외상에 의한 경우가 두 번째로 많다고 보고되어 있다. 국내에서는 11세 남아의 특발성 단독 설하신경 마비 보고가 1례 있었지만, 소아에서 감염원이 밝혀진 단독 설하신경 마비의 보고는 없었다. 저자들은 2세 여아에서 나타난 바이러스 감염과 연관성이 의심되는 단독 설하신경 마비 1례를 경험하여 보고하는 바이다. 환아는 4일전부터 시작된 구음장애로 소아신경 외래에 의뢰되었으며, 내원 당시 열이 있었고 혀를 내밀 때 왼쪽으로 치우치는 소견을 보였다. 다른 신경학적 검사 및 이비인후과적 검사에서는 이상 소견을 보이지 않았다. 뇌자기공명영상 검사 및 자기공명혈관조영술에서도 이상 소견을 보이지 않았다. 중합연쇄반응검사에서는 대변 검체에서 장바이러스(enterovirus)와 코인두 흡인 검체에서 아데노바이러스(adenovirus)가 양성으로 나왔다. 저자들은 환아를 바이러스 감염과 연관된 단독 설하신경 마비로 진단하였으며, 경구 프레드니솔론 및 acyclovir 를 처방하였다. 환아는 한달 후 외래 진찰에서 구음장애 및 혀 마비 증상의 점진적인 호전을 보였다.

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