Lesch-Nyhan syndrome (LNS) is an X-linked recessive disorder with no racial differences. It occurs in approximately 1 in 100,000 male births, but there are few reports of its occurrence in girls. This is attributed to a single congenital deficiency of the hypoxanthine-guanine phosphoribosyltransferase (HPRT). Most patients die by the age of 40 years due to renal failure or respiratory complications. The main symptoms are hyperuricemia, involuntary movements, psychomotor retardation, and self-injurious behavior (SIB). It is often difficult to control SIB, which is a characteristic symptom of this disease. Although patients appear to develop normally for some time after birth, psychomotor retardation may occur as early as several months after birth, and SIB may appear at around one year of age and may persist into adolescence. Bites on the tongue, lips, and fingers are often a problem, and sometimes tissue loss, insufficiency, or complete amputation may occur. Generally, medicine or orthosis is created to control it. However, when ineffective, surgical treatment is required. We encountered a case in which the tongue and lip ulceration were caused by SIB, which became a gateway to invasion and infective endocarditis (IE). IE is a fatal condition, and considering the possibility of recurrence, total tooth extraction and tongue reduction were performed. There have been no reports of cases of IE developing from SIB in the past. We report the case including a review of the literature.

Case Report

Infectious Endocarditis Derived from a Tongue Ulcer Caused by Self-injurious Behavior in Lesch-Nyhan Syndrome Which Required Total Teeth Extraction and Glossectomy: A Case Report

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ABSTRACT

Introduction: Self-injurious behavior is one of the characteristic symptoms of Lesch-Nyhan syndrome. In severe cases, the patient’s lips or tongue are often injured, but there are no reports of cases leading to infective endocarditis via bacteremia. There are non-invasive treatments for self-injurious behavior, but surgery is occasionally needed. Herein, we report a case of Lesch-Nyhan syndrome that required surgery to control self-injurious behavior.

Case presentation: A 21-year-old boy with Lesch-Nyhan syndrome exhibited uncontrollable self-injurious behavior. He visited our hospital with a high fever. Physical examination revealed ulcerations on both his lips and tongue, and there was also a defect on his tongue. All blood cultures that were taken were positive. Vegetations were found on the heart valves through echocardiography, revealing that he has infective endocarditis. To prevent recurrence of ulceration, we performed total tooth extraction and glossectomy. After four months, there is no recurrence of ulcerations or infective endocarditis.

Discussion: Although total tooth extraction is irreversible, invasive, and has a significant impact on the patient’s appearance, it is a definite way not only to prevent ulcerations caused by self-injurious behavior but also to protect his life.

Key words: Lesch-Nyhan syndrome, self-injurious behavior, infectious endocarditis, total teeth extraction, glossectomy
Case presentation

A 21-year-old boy with LNS regularly visited our outpatient department since childhood. SIB started in the patient since the age of 4, and subsequent scrutiny led to the diagnosis of LNS. His family history was unremarkable. He had many past medical histories, including Tetralogy of Fallot, situs inversus, paroxysmal supraventricular tachycardia epilepsy, and a history of hospitalization due to aspiration pneumonia. He had also undergone some surgical operations, including patch closure of the ventricular septal defect, construction of the right ventricular outflow tract using a pig pericardial 1-valve patch, and gastrostomy. At the end of 2020, he had a fever of > 40° and visited our emergency department. Blood culture was taken and all five samples became positive the day after. The patient was admitted to the hospital for intravenous antibiotics. In a series of inspections, vegetations were found on both the pulmonary valve and tricuspid valve by transesophageal echocardiography, and he was diagnosed with IE and treatment was initiated. Physical examination revealed ulcerations at the tip of the right side of his tongue and lower lip, with tissue defects affecting about a quarter of the tongue (Fig 1,2). It was thought to be caused by SIB as the primary symptom of LNS. His oral hygiene was poor, and there were many decayed teeth in his oral cavity. The attending physician considered that the ulceration caused by SIB and poor hygiene resulted in IE; therefore, our department was consulted for surgical treatment. Total tooth extraction and tongue reduction were performed (Fig 3).

Although he was still trying to bite his lips or tongue, this behavior was not frequent anymore. Approximately six months have passed without recurrence of ulcer or other complications (Fig 4,5,6).

Discussion

SIB correspondence

Countermeasures to SIB include medical approaches and orthosis creation.

Drug therapies include 5-hydroxytryptophan, a serotonin precursor; fluphenazine, a D1 receptor antagonist; diazepam; baclofen; and clonazepam to suppress muscle tone and stabilize the mind, but the effects are not consistent. Although the mechanism is unknown, botulinum toxin and gabapentin are also effective. Physical protection of the body is also important to supplement drug treatment. Sharp objects are avoided from the surroundings, and upper limb extension orthosis is used to avoid biting their fingers. In addition, it is not uncommon for patients to feel at ease by creating lip guards and masks to protect the oral cavity, and SIB gradually disappears. If the SIB does not improve after the aforementioned methods, tooth extraction may be considered as the last resort. Tooth extraction sacrifices occlusion, mastication, swallowing, dysarthria, and esthetic aspects, but eliminates bites on the tongue, lips, and fingers. It also helps maintain oral hygiene and reduce infection rates. However, many patients who choose surgery have had difficulty overcoming SIB for a long period of time, and there is a strong desire to stop SIB at the expense of some of these functions. There have been many reports on tooth extraction for SIB treatment. It seems that it is good that the oral cavity, lips, and fingers are not injured after the operation and the person's mental stability can be maintained. In this case, we performed surgery for the following reasons: he already relies on gastrostomy nutrition due to difficulty in oral intake, he rarely spoke, and it was inevitable to prevent recurrence of IE after intracardiac repair. However, if the SIB is mild or the ulcer is localized, it is not necessary to perform full tooth extraction.
In our case, although the lip defects and tongue ulcers were localized to the right side, the operation was performed to prevent the occurrence of ulcers on the center or left side. There was also a dentist in our group, and we considered all the treatment plans appropriately. Even after tooth extraction, patients often self-extract their foot nails or hit them against the wall. However, it is possible to protect it with gloves or socks; therefore, we should not hesitate to extract the patient’s teeth.

In addition, glossectomy is considered if the tongue is severely damaged, thus, we also performed glossectomy. After excising a part of the tongue that had already become ulcerated, tongue reduction was performed to reduce the median tissue so that the gingiva would not cause another ulcer even with a toothless jaw.

**Infection from SIB**

In this case, Group G Streptococcus, which are indigenous bacteria in the oral cavity, became positive in all five blood cultures. Since vegetation was found in the pulmonary valve and tricuspid valve by echocardiography, and no trauma that could be a route of entry was found in other parts of the body, the bacteria seemed to enter from ulcers of the tongue and lips. This resulted in IE from bacteremia.

There was a tendency for improvement with antibacterial treatment, but if SIB does not improve, IE might progress from the recurrence of ulcers. Although treatment and prevention methods have been developed and the mortality rate is declining, the rate is still 8.8%, which is not low. The guideline also clearly states the elimination of the cause, and the recurrence was fatal because it was after intracardiac repair. Therefore, after thorough discussions with parents about the advantages and disadvantages of total tooth extraction, we decided to perform total tooth extraction and tongue plication including the ulcerated part. The antibacterial drug was
initially planned to be administered for six weeks according to the guidelines, but the postoperative wound healing was rather slow, and it was administered for a total of 8 weeks\(^{16}\). It is not uncommon for tooth extraction to lead to bloodstream and IE\(^{17}\). However, there have been no reports of oral ulcers caused by SIB which eventually led to IE, which is considered to be the first in Japan.

**Limitation**

This is the only case of LNS that developed IE, which was treated with tooth extraction; therefore, it is necessary to follow-up for the long-term course, which is less than half a year after the operation.

**Conclusion**

In LNS, ulcers due to SIB often develop into a fatal condition, as in our case. Tooth extraction (especially in all teeth) is irreversible, invasive, and has a significant impact on the patient’s appearance, but it is the definite way to prevent SIB ulcers. Especially in IE patients, it is important not to delay the timing of treatment decisions.

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**Conflicts of interest**

None.

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