Suspected Local Anesthetic Allergy of a Child: A Case Report

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Abstract
In dental practice, a certain number of patients complain of various symptoms after injection of local anesthetics. However, especially in children who cannot express their symptoms properly, a correct diagnosis of local anesthetic allergy is difficult. Here is a case of a boy with suspected local anesthetic allergy. We looked for an alternative local anesthetic on the basis of the medical history and the results of allergy tests.

Keywords: Local anesthetics; Allergy; Allergy tests

Introduction
Local anesthetics (LAs) are essential in dental practice. Although hypersensitivity reactions are especially rare and account for less than 1% of all adverse reactions, exposure to allergens can cause a life-threatening allergic reaction known as anaphylactic shock [1-4]. We sometimes encounter patients who believe that they have LA allergy on the basis of their experiences of developing various symptoms after injection of LAs. However, we often find it difficult to detect and to diagnose LA allergy partly owing to the low reliability of the allergy tests [5]. Here, we examined the use of LAs in a child with suspected LA allergy.

Case Report
An 8-year-old boy was planned for pulpectomy of the second deciduous molar in the lower jaw. He was referred to our hospital by his pediatric dentist because he was suspected of having LA allergy. He was medicated for asthma using inhaled steroids and was diagnosed as having allergies to mites, rice and ragweed. In his previous dental treatments, he did not show any allergic reactions to lidocaine. One year before the first visit to our department, his cavity was filled with local anesthetics administered under general anesthesia; however, the drugs used in general anesthesia are considered to be a beneficial in when planning dental surgeries both physically and mentally. Therefore, searching for safe alternative LAs is considered to be a beneficial in when planning dental surgeries for children with suspected LA allergy.

Prior to his next dental appointment, we planned his treatment on the basis of the literature [1-8] (Figure 1). In our searching for the cause of his skin rashes, we suspected him as having LA allergy not asthma, because he presented with typical symptoms of allergy such as rashes that are different from those in asthma. Moreover, type IV allergy, not type I allergy, was suspected owing to the time of onset. We performed drug lymphocyte stimulation tests (DLSTs) of five LAs; 2% Lidocaine with 1/80,000 Adrenaline, 3% Prilocaine-Felypressin (0.054 U), 3% Mepivacaine, 0.5% Ropivacaine and 1% Procaine. The results of his DLSTs in Table 1 show that he had positive reactions to Lidocaine and Mepivacaine, which suggest that he had type IV allergy to these LAs.

After the DLSTs, a challenge test was undertaken. For a drug challenge test, we chose Prilocaine-felypressin among the dental anesthetics to which the patient showed negative reactions in the DLSTs. During and after injecting 0.9 mL of prilocaine-felypressin, his vital signs were monitored and rescue medication was prepared in case of severe hypersensitive reactions. After 15 minutes of close observation without immediate responses, pulpectomy was performed, which required about an hour. We continued monitoring for further one hour after the dental treatment and no symptoms of hypersensitivity reactions were observed. We asked his mother to check his condition carefully at home, but no abnormalities were reported 1 month later.

One month after the previous treatment, we planned the next dental treatment. Considering his possible sensitization to prilocaine-felypressin in the previous treatment, we performed DLST again. With negative results in this test, we decided to use prilocaine-felypressin in the following treatments. In our hospital, he underwent dental treatment three times in total. Each time, we monitored his vital signs and checked his general condition, and no adverse reactions were observed. Finally, he was sent back to his primary care dentist and there has been no report of adverse events from the dentist so far.

Discussion
For our patient, we planned the treatment with priority in finding alternative LAs. Under general anesthesia, dental treatments can be performed without LAs; however, the drugs used in general anesthesia may also induce adverse reactions. Moreover, since dental treatments will continue throughout the lifetime of the patients, multiple treatments under general anesthesia would be a big burden for them both physically and mentally. Therefore, searching for safe alternative LAs is considered to be a beneficial in when planning dental surgeries for children with suspected LA allergy.

In clinical practice, two types of allergic reaction to LAs are recognized: IgE-mediated type I (immediate-type) allergy and T-cell mediated type IV (delayed-type) allergy [9]. In type I allergy, a rapid increase in vascular permeability as well as contraction of smooth
cases were difficult to differentiate clinically [11]. Moreover, allergic pathomechanisms of type I and type IV allergy are independent, a few which means that cross sensitivity is possible. Although the underlying group of amide-type anesthetics inducing mepivacaine and lidocaine, in general dental clinics. Prilocaine-felypressin also belongs to the same group of amide-type anesthetics inducing mepivacaine and lidocaine, which means that cross sensitivity is possible. Although the underlying pathomechanisms of type I and type IV allergy are independent, a few cases were difficult to differentiate clinically [11]. Moreover, allergic reactions may vary from mild contact dermatitis to anaphylactic shock [9]. According to the medical history and the results of DLST of our patient, we suspected that he had type IV allergy, but the results did not confirm that he did not have type I allergy. Therefore, we performed the challenge test prepared for any emergency and continued monitoring after treatment.

If memory T cells have been sensitized at the first use of an alternative LA, hypersensitivity would be possible upon re-exposure. Performing DLST after the first use of an alternative LA is important for detecting sensitization. Moreover, careful observation of the patient’s condition is necessary even after subsequent dental treatments.

Conclusion
For children suspected of having LA allergy, it is worth trying to find alternative LAs. However, it is difficult to find the safest LAs, because of the risk of sensitization to alternative LAs and the low reliability of the allergy tests. Paying attention to the patient’s general condition is necessary even after subsequent dental treatments.

Table 1: Results of DLST. An S.I. of more than 180 indicates a positive result.

<table>
<thead>
<tr>
<th>Local anesthetics</th>
<th>Test prior to first treatment</th>
<th>Value</th>
<th>SI (%)</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aminoalkalymides</td>
<td>Test prior to first treatment</td>
<td>Lidocaine product (2% lidocaine added 1/80000 adrenaline)</td>
<td>899</td>
<td>204</td>
</tr>
<tr>
<td></td>
<td>Test prior to first treatment</td>
<td>Mepivacaine</td>
<td>914</td>
<td>208</td>
</tr>
<tr>
<td></td>
<td>Test prior to first treatment</td>
<td>Prilocaine-felypressin product</td>
<td>1622</td>
<td>114</td>
</tr>
<tr>
<td></td>
<td>Test prior to first treatment</td>
<td>Repivacaine</td>
<td>1778</td>
<td>126</td>
</tr>
<tr>
<td>Amino alkalymides</td>
<td>Test after treatment</td>
<td>Prilocaine-felypressin</td>
<td>291</td>
<td>87</td>
</tr>
<tr>
<td>Procaine</td>
<td>Prior to first treatment</td>
<td>Value</td>
<td>SI (%)</td>
<td>Result</td>
</tr>
<tr>
<td>1934</td>
<td>137</td>
<td>Negative</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Strategy for a child with suspected LA allergy.


