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# Local Anesthesia Concerns for Pediatric Dentists During COVID-19

## Introduction

The COVID-19 pandemic is a major public-health concern that affects dental practices and hospitals globally (1). Specifically, to pediatric dentistry, COVID-19 impacts family dynamics, income, dietary patterns, and parental behaviour to seek dental care for children (2). The World Health Organization recommends the use of masks over the nose and mouth in children over the age of five in the community setting if there are no contraindications, such as developmental, cognitive, or respiratory impairments (3). As local anesthesia is the most commonly used medication in dental treatment in children and adults, and since post-injection complications including soft-tissue injury to the lower lip is well recognized (4-6), masks can present a unique challenge. Most adult patients do not experience these injuries; they occur more frequently in pediatric patients and patients with special needs, with the prevalence reported to be around 13 per cent across patients ranging from two to 18 years old (7). The choice of local anesthetic administered by infiltration versus nerve block techniques should be considered from patient to patient in order to minimize these injuries (4-6,8). While dental practitioners appropriately provide post-injection instructions to caregivers following the use of local anesthesia, masks can impair visual examination by dentists and caregivers of damaging behaviours and resulting injuries to soft tissues.

## Case report

A six-year-old female patient presented with no significant contributory medical history to the Paediatric Department at the Schulich School of Medicine & Dentistry in London, Ont. The patient arrived with her

caregiver for restorative dentistry. COVID-19 screening was negative. Her lower left primary first molar was restored under local anesthesia administered as 1 carpule (1.8 cc) of 2 per cent lidocaine with 1:100,000 epinephrine as a buccal infiltration. Standardized post-injection instructions were given to the patient's caregiver: "They should not bite, suck, or rub the lips, cheek or tongue while they are still anesthetized. Anesthesia can last for up to two hours following the procedure." The caregiver understood and the patient was dismissed in good health.

One week later, the patient presented with the chief complaint of a large blister on the lower left lip and mild swelling of the lip that went unnoticed due to the regular use of a mask (Figure 1). The patient's caregiver noted that the lesion was worse two days prior. Thorough history revealed that the patient was given food immediately after the dental appointment despite post-injection instructions. Extraoral examination identified mild swelling of the lower left lip. Intraoral examination identified self-induced soft-tissue injury on the lower left lip. There were no signs of secondary infection (no fever, no malaise). The patient was asked to return for a followup visit, even though such injuries are often self-limiting.

The patient's family was contacted by phone the following week to followup on the soft-tissue injury. The caregiver responded that the "blister is now gone" and denies any pain or fever present in the patient. At the followup visit another two weeks later, the patient presented in good health. Intraoral examination determined that the lesion had resolved. No swelling or infection was present (Figure 2).



**Figure 1.** Self-induced soft-tissue injury to lower left lip with mild extraoral swelling of the left lip.



**Figure 2.** Resolution of self-induced soft-tissue injury to the lower left lip.

## Discussion

The most common medications that are utilized to control pain during dental treatment are local anesthetics. These medications are used to inhibit sensation to the dentition by transiently blocking sodium channels to prevent action potentials from occurring, and thereby achieving profound pulpal anesthesia on the teeth being treated (4-6). Particularly in pediatric dentistry, where it is relatively easier to overdose, choice of appropriate local anesthetic and injection technique is necessary to both achieve adequate analgesia and minimize the prolonged effects of the anesthetic beyond the treatment (5,8). It is well documented that self-induced soft-tissue injuries to the lower lip, tongue, and buccal mucosa are post-injection complications after use of dental local anesthetics as a result of the prolonged anesthetic effects on soft tissue, which last considerably longer than pulpal anesthesia (4-6). Amongst the most commonly used techniques are infiltrations and blocks. Given these reasons, in children, 2 per cent lidocaine with 1:100,000 epinephrine is often the local anesthetic of choice, while 0.5 per cent bupivacaine with 1:200,000 epinephrine should be avoided (8).

The first study to demonstrate the prevalence of soft-tissue injury after receiving an inferior alveolar nerve block in the pediatric population was done by College et al. in 2000 (7). A total of 13 per cent of all patients experienced these injuries. As patients got older, they experienced less self-induced injuries post-anesthesia, with the greatest occurrence in patients under four years old, at 18 per cent, and the least in patients older than 12 years old, at seven per cent (7). While this study explored the prevalence of injury related to inferior alveolar nerve blocks, it should be noted that there is no advantage to utilizing mandibular infiltration versus blocks to decrease the duration of soft-tissue anesthesia, as it is not significantly reduced (4). It is well understood that mandibular infiltrations are as effective as mandibular nerve blocks in pediatric patients due to the decreased density of the mandible, and can be used in almost all situations except for pulp-tomies on the primary second molar and extractions (9). As research exploring the relationship between frequency of self-induced soft-tissue injury and shorter acting local anesthetic is limited to case reports, future research is necessary (5). Therefore, between these injection techniques, the choice is based on clinical judgment, patient factors, and operator preference. In this case report, anesthesia was achieved with mandibular infiltration at the primary first molar likely adjacent to the site of the mental foramen, which is typically located between the primary mandibular molars (5). As mandibular

infiltration into the mucobuccal fold is capable of achieving a mental nerve block (10), this patient experienced profound soft-tissue anesthesia of the lower left lip increasing her risk of injury. Dentists should be aware of the potential for a mental nerve block when providing mandibular infiltration in children and accordingly provide appropriate post-injection instructions.

The American Academy of Pediatric Dentistry (AAPD) recommends that dental practitioners provide realistic timeframes on anesthetic dissipation to caregivers and to utilize visual examples of self-induced soft-tissue injuries to emphasize the risks involved (4). The AAPD also makes the following recommendations to reduce and prevent local anesthetic complications:

1. Practitioners who utilize any type of local anesthetic in a pediatric dental patient should have appropriate training and skills and have available the proper facilities, personnel, and equipment to manage any reasonably foreseeable emergency.
2. Care should be taken to ensure proper needle placement during the intraoral administration of local anesthetics. Practitioners should aspirate before every injection and inject slowly.
3. Following an injection, the doctor, hygienist, or assistant should remain with the patient while the anesthetic begins to take effect.
4. Residual soft-tissue anesthesia should be minimized in pediatric and special health-care needs patients to decrease risk of self-inflicted postoperative injuries.
5. Practitioners should advise patients and their caregivers regarding behavioural precautions (e.g. do not bite or suck on lip/cheek, do not ingest hot substances) and the possibility of soft-tissue trauma while anesthesia persists. Placing a cotton roll in the mucobuccal fold may help prevent injury, and lubricating the lips with petroleum jelly helps prevent drying. Practitioners who use phentolamine mesylate injections to reduce the duration of local anesthesia should still follow these recommendations.

The following is our proposed additional post-injection recommendation for pediatric and special-needs patients after all treatment during COVID-19 requiring local anesthetic:

After providing information on evidence-based timeframes following dental treatment for resolution of local anesthetic, practitioners should advise patients and families to return home or elsewhere where the patient can safely avoid wearing their mask in order to improve visualization of damaging behaviours to prevent or minimize injury.

In this particular case, although post-injection instructions were given to the patient and not followed, the patient's self-induced soft-tissue injury went unnoticed by the caregivers due to the use of face masks in light of the COVID-19 pandemic. This presents a unique challenge that dental practitioners and caregivers must face after dismissing pediatric patients from their offices following the use of dental local anesthetic. By advising patients and caregivers to return to an environment where masks are not necessary, visualization and other preventative strategies against self-induced soft-tissue injuries can be utilized, in addition to the continued promotion of physical distancing during the COVID-19 pandemic. 

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