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(CASE REPORT)

The Role of Malocclusion in the Development of Oral Mucocele in Children: A Case Report Using Electrocautery Approach

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Abstract

Background: An oral mucocele represents a commonly encountered, benign cystic lesion of the minor salivary glands, manifesting clinically as a distinct, fluid-filled, fluctuant swelling within the oral mucosa. Oral mucoceles show a pronounced predilection for younger populations. The fundamental etiology of the mucocele involves trauma or obstruction affecting the salivary ducts.

Purpose: The purpose of writing this article is to describe of choice of treatment using electrocautery for oral mucocele that indicated caused by malocclusion.

Case: A 9-year-old female patient came to the Pediatric Dentist Specialist Polyclinic at RSU Haji Surabaya with complaints of swelling on her lower lip. This was the first time this bump appeared, which was there for approximately a month.

Case Management: After analyzing the etiology and patient cooperation we proceed to use electrocautery for surgical excision. Conclusion: Procedures surgical excision using electrocauter for pediatric patients is one of the choices that could apply.

Keywords: Mucocele; Malocclusion; Pediatric; Electrocauter

1. Introduction

An oral mucocele represents a commonly encountered, benign cystic lesion of the minor salivary glands, manifesting clinically as a distinct, fluid-filled, fluctuant swelling within the oral mucosa[1] It is significant in the field of pediatric pathology, as it ranks among the most frequent biopsied oral lesions in children[2]. Pathologically, the condition involves the accumulation of saliva that fails to drain properly due to duct damage or obstruction, leading to the formation of a cyst-like structure[3].

Mucocele lesions are categorized histologically into two main types: the Extravasation Mucocele (EM) and the less frequent Retention Mucocele (RM).[1] The Extravasation Mucocele, which dominates pediatric cases, results from a rupture or damage to the salivary gland duct, often due to trauma, causing mucus to spill into the surrounding connective tissue.[1] The Retention Mucocele, conversely, is caused by the obstruction of the salivary gland duct—potentially by structures or sialoliths—leading to the internal buildup of mucus within the ductal lining. This retention type is statistically less common, typically affecting older individuals[2].

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Oral mucoceles show a pronounced predilection for younger populations, with data indicating that 70% of reported cases occur between 3 and 20 years of age. Although the peak incidence often falls within the second decade (10–20 years), a 7-year-old child is squarely positioned within the demographic considered at high risk for developing this condition. Furthermore, retrospective clinical studies confirm that children across the school-age spectrum (1 to 17 years) exhibit a high incidence[2]

The clinical presentation in this age group is overwhelmingly dominated by the traumatic extravasation type. Evidence from large cohort studies shows that the EM type accounts for up to 84.48% of cases reviewed, and one study noted 101 out of 102 salivary mucoceles in children were extravasation lesions. While the condition is common in pediatric practice, there is an existing deficiency in specialized, comparative literature; some domain specialists have highlighted that dedicated clinical reports focusing specifically on mucocele treatment in the pediatric population are "very rare". This clinical research gap underscores the importance of generating treatment protocols and publications that target specific age groups, such as the 7-year-old school child, where behavioral compliance and optimal post-operative functional outcomes are crucial metrics[4].

1.1. Etiology: The Role of Trauma and Lip Biting Habit

The fundamental etiology of the mucocele involves trauma or obstruction affecting the salivary ducts. For children, the primary cause is mechanical injury, frequently initiated by the habit of lip biting or chronic, repetitive irritation, such as the lower lip being caught between the maxillary and mandibular anterior teeth during chewing. Clinical case reports frequently support this mechanism; for instance, a young patient presenting with a mucocele was often able to report a history of trauma to the lower lip preceding the onset of swelling. Given the strong association with self-inflicted habits, successful therapeutic management must extend beyond simple lesion excision. The treatment strategy must incorporate patient and parental counseling aimed at eliminating the underlying traumatic habit (e.g., lip biting or lip sucking). Failure to address this core behavioral component significantly elevates the risk of recurrence, thereby complicating management efforts for the school-aged child. [5]

2. Clinical Presentation and Diagnostic Approach

2.1. Clinical Features and Functional Impact

Oral mucoceles characteristically present as soft, dome-shaped swellings that are usually asymptomatic and painless. While they can occur in various oral sites (inner cheeks, tongue, gums), they are overwhelmingly prevalent on the inner surface of the lower lip. Lesion size can vary considerably, typically ranging from 1 millimeter up to 2 centimeters in diameter. The lesion's color varies based on the depth of the mucus accumulation, presenting anywhere from a normal mucosal pink hue to the characteristic clear or bluish tone. Though mucoceles are benign, intervention is often required when the size becomes substantial enough to cause functional morbidity. Large cysts can interfere with fundamental processes such as talking, chewing, or swallowing, warranting definitive treatment rather than conservative observation[4].

3. Case Report

A 9-year-old female patient came to the Pediatric Dentist Specialist Polyclinic at RSU Haji Surabaya with complaints of swelling on her lower lip. This was the first time this bump appeared, which was there for approximately a month. Her mother said that the patient has a crowding lower anterior teeth, The swelling was flaccid and painless, with a smooth surface. The swelling was flaccid and painless, with a smooth surface. Based on the history and clinical features, the lesion was provisionally diagnosed as mucocele. Given the size of the swelling and lack of cooperation with the patient, the treatment plan called for a complete surgical excision with electrocautery.

To remove the mucocele, the electrocautery was set to mode cut + coagulant 1, speed 5, and tip number T2. Lesion was sutured with 4-0 silk suture. The excised lesion was stored in 10% formalin and sent to the Department of Oral Pathology at RSU Haji Surabaya. Post operative instructions recommended to the patient to avoid lip biting and spicy food and was prescribed with aloclair gel to relieve postoperative discomfort. After a week the suture was removed. The lesion healed and no complaint from the patient.

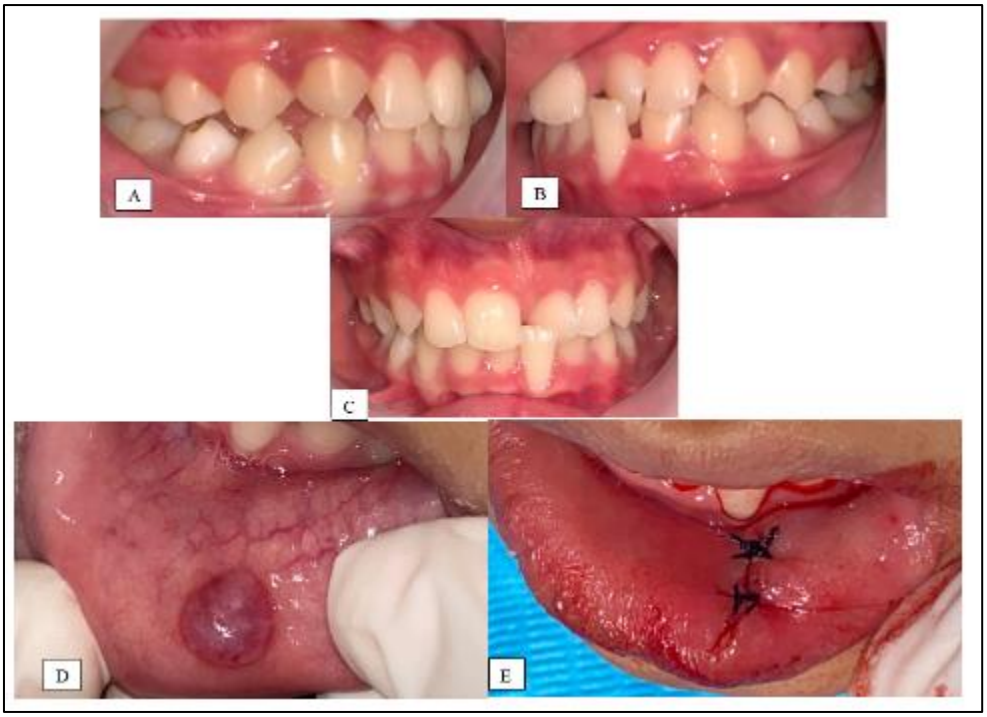

Figure 1 Right side; Figure B. Left Side; Figure C. Front side; Figure D. Pre-Op (lower lip); Figure E. Post- Op (lower lip)

Trauma is cited across the literature as the most common cause of mucocele. This trauma often involves repetitive, chronic actions. Specific recognized causal agents include accidental lip biting during chewing, or chronic oral habits such as lip biting or lip sucking, collectively termed Morsicatio Labiorum. Anterior dental crowding represents a fundamental mechanical defect that compromises the inherent protection offered by a smoothly contoured, aligned dental arch, which is designed to shield the adjacent lip and tongue mucosa [5]. The rotational and tipping deviations inherent in anterior crowding result in incisal edges that are sharp, uneven, and poorly aligned with the opposing arch. This geometric irregularity transforms the anterior occlusal plane into a source of chronic physical irritation. Dental literature has established that chronic mucosal trauma resulting from sharp teeth, faulty restorations, or ill-fitting dentures is a significant factor in localized soft tissue pathology. Crowded incisors present jagged or misdirected surfaces that can easily catch and lacerate the highly vascularized lower labial mucosa during the repetitive actions of chewing or speech, creating localized areas of vulnerability that increase the likelihood of minor salivary gland duct disruption. The risk of mucocele formation is significantly heightened in the presence of specific malocclusions that directly interfere with normal lip position and function.Furthermore, clinical case documentation explicitly identifies malocclusions such as crossbite (involving specific teeth like 11, 12, 21, 31, 41) and edge-to-edge relationships as the underlying primary etiology that predisposes the patient to the habitual lip-biting leading to mucocele formation on the lower lip. These occlusal disharmonies mechanically obstruct the comfortable rest position and functional movement of the lower lip, necessitating active muscle effort and significantly increasing the probability of tissue entrapment between the opposing incisal edges[5,6,7].

The presence of malocclusion affects the coordination between masticatory and perioral muscle activity. Individuals with lip incompetence or dysfunctional chewing patterns often exhibit significantly higher electromyographic (EMG) activity in the lower lip muscles, suggesting difficulty in maintaining a relaxed lip seal during function. The chronic habit of lip biting or sucking is recognized as essentially a mentalis muscle habit involving contracture of the mentalis muscle. Anterior crowding exacerbates the destructive consequences of this mentalis habit. When the lower lip is drawn into contact with the anterior segment—whether due to an unconscious habit driven by psychological factors or an involuntary functional requirement due to malocclusion—the misaligned, rough, or sharp incisal surfaces act as efficient instruments of trauma. The mechanical forces generated by the contracture of the mentalis muscle, combined with the compromised anatomical structure of the crowded arch, guarantee repetitive micro-trauma leading to eventual salivary duct rupture. The mechanical irritation caused by crowded and sharp dental structures falls within a spectrum of tissue damage. The existence of a link between chronic mucosal trauma caused by sharp dental edges and the development of highly aggressive pathology, such as oral cancer in rare, long-term cases , provides a profound validation of the destructive potential of occlusal disharmony. Given that mechanical trauma is acknowledged as the common initiator

for various soft tissue changes, the role of anterior crowding in precipitating a highly prevalent, benign lesion like the mucocele must be considered a critical anatomical risk factor that requires interceptive or corrective therapy[6,7].

Scalpel is one of the most-often used methods of excising a mucocele. It does not require extensive equipment, has negligible cost and can be performed by most trained dentists. It does require great precision and detailed knowledge of the mucocele and the surrounding anatomy. It also requires great control of the instrument, with accurate tactile awareness. The drawbacks of this technique are delayed postoperative healing, greater bleeding and postoperative discomfort[8]. A study by Foroughiasl comparing mucocele excision using scalpel and laser proved that postoperative bleeding is greater using scalpel than laser, as is the possibility of a more ulcerative appearance and a longer healing period.[9]

Electrocautery's ability to achieve concurrent cutting and coagulation distinguishes it markedly from the scalpel. As the electric current passes through the tissue, it vaporizes cellular water and seals small blood vessels through coagulation necrosis.[5] Comparative evidence consistently supports the claim of significantly reduced blood loss when using electrocautery. One study focusing on oral mucoperiosteal incisions reported a statistically highly significant difference ($P < 0.001$) favoring electrocautery, with mean blood loss measured at 7.9100 milliliters compared to 13.3225 milliliters for the stainless steel scalpel group[10].

This achievement of a virtually "bloodless" field of operation is crucial for maintaining excellent visual clarity.[2] In the context of mucocele excision, improved visualization directly supports the primary surgical goal: the precise identification and complete removal of the entire cyst and all associated feeder salivary glands.[7] Enhanced intraoperative control minimizes the risk of accidental damage to adjacent critical structures, which is a potential complication of invasive surgical removal[11].

4. Conclusion

Mucocele is a common benign lesion of the oral mucosa that frequently occurs in children and may result from various etiological factors. One of the contributing factors is anterior crossbite, which can lead to repeated trauma or irritation of the labial mucosa due to abnormal occlusal contact. This continuous trauma may cause rupture or obstruction of the minor salivary gland ducts, subsequently resulting in mucus accumulation and mucocele formation. The management of mucocele can be performed using several different techniques, including surgical excision, cryotherapy, laser therapy, and electrocautery. Among these, electrocautery is considered particularly advantageous for pediatric patients because it offers several benefits, such as reduced intraoperative bleeding, minimal postoperative discomfort, and shorter procedural duration, making it a more child-friendly approach.

Furthermore, to prevent recurrence of mucocele, it is essential to address the underlying etiological factor. In cases where anterior crossbite is identified as the causative factor, orthodontic intervention is required to correct the malocclusion. Proper orthodontic management not only helps prevent repeated trauma to the mucosa but also contributes to the long-term maintenance of oral health and functional occlusion in pediatric patients.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed

Statement of informed consent

Informed consent was obtained from all individual participants included in the study

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