




Lip Bumper as a Non-Invasive Treatment for Mucocele in Pediatric Patients: A Case Series

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Abstract: Introduction: A mucocele is a common benign lesion of the oral cavity, particularly affecting children and adolescents, and is typically caused by local trauma to the mucosa. Traditionally, it has been treated surgically; however, this compilation presents pediatric dental cases managed with a modified lip bumper. **Aim:** To describe a non-surgical technique for managing mucoceles, as well as to identify the conditions or factors that may influence its success or failure. **Case Reports:** Five pediatric cases of mucoceles located on the lower lip were treated using modified lip bumpers. In most instances, the non-surgical treatment led to partial or complete resolution of the lesion. However, in some cases, full resolution was not achieved. **Discussion:** According to the literature, mucoceles of the minor salivary glands rarely resolve spontaneously. While surgical removal typically offers a favorable prognosis, it often results in long-lasting fibrous scarring. Pediatric patients are frequently apprehensive about undergoing surgery and anesthesia. The use of a modified lip bumper represents a well-tolerated, non-invasive, and effective alternative, particularly in cases involving relatively recent lesions. This approach minimizes discomfort and avoids potential complications. **Conclusions:** The modified lip bumper proved to be an effective and non-invasive treatment option for oral mucoceles, especially in children and adolescents. The success of this approach appears to depend on both the lesion's characteristics and its duration.

Key words: Lip, Mucocele, Lip Bumper.

Protector labial como tratamiento no invasivo para mucocele en pacientes pediátricos - Recopilación de casos clínicos.

Resumen: Introducción: El mucocele es una lesión benigna frecuente en la cavidad oral, especialmente en niños y adolescentes, generalmente provocada por traumatismos locales en la mucosa. Tradicionalmente se ha tratado mediante cirugía, sin embargo, en esta recopilación se presentan casos odontopediátricos tratados con un protector labial modificado. **Objetivo:** Describir una técnica no quirúrgica para el manejo del mucocele, así como identificar las condiciones o factores que pueden influir en su éxito o fracaso. **Reporte de casos clínicos:** Se presentan cinco casos clínicos de pacientes odontopediátricos con mucocele en el labio inferior tratados con protectores labiales modificados. En la mayoría, el tratamiento no quirúrgico resultó en una disminución o desaparición de la lesión, aunque en algunos casos no se resolvió en forma completa. **Discusión:** La literatura indica que los mucoceles de glándulas menores no se resuelven espontáneamente, no obstante, tienen buen pronóstico con extirpación quirúrgica, siendo frecuente que presenten cicatrices fibrosas de larga duración. Los pacientes pediátricos suelen ser reacios a someterse a cirugía y anestesia. El uso de un protector labial es una alternativa no invasiva, bien tolerada y efectiva, especialmente en lesiones relativamente recientes, evitando complicaciones y molestias. **Conclusiones:** El protector labial modificado fue una opción eficaz y no invasiva para tratar el mucocele oral, especialmente en niños, niñas y adolescentes, cuyo éxito depende del tiempo de evolución y características de las lesiones.

Palabras clave: Labio; Mucocele; Lip Bumper.

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Bumper labial como tratamento não invasivo para mucocelos em pacientes pediátricos – Uma coleção de casos clínicos.

Resumo: **Introdução:** O mucocele é uma lesão benigna frequente na cavidade oral, especialmente em crianças e adolescentes, geralmente provocada por traumas locais na mucosa. Tradicionalmente, tem sido tratado por meio de cirurgia; no entanto, nesta coletânea são apresentados casos odontopediátricos tratados com um protetor labial modificado. **Objetivo:** Descrever uma técnica não cirúrgica para o manejo do mucocele, assim como identificar as condições ou fatores que podem influenciar no seu sucesso ou fracasso. **Relato de caso:** São apresentados cinco casos clínicos de pacientes odontopediátricos com mucocele no lábio inferior, tratados com bumper labial modificado. Na maioria dos casos, o tratamento não cirúrgico resultou na redução ou desaparecimento da lesão, embora, em alguns casos, não tenha ocorrido resolução completa. **Discussão:** A literatura especializada indica que os mucocelos das glândulas salivares menores não se resolvem espontaneamente; no entanto, apresentam um bom prognóstico com excisão cirúrgica, onde é comum a formação de cicatrizes fibrosas duradouras. Os pacientes pediátricos frequentemente relutam em se submeter à cirurgia e à anestesia. O uso do bumper labial é uma alternativa não invasiva, bem tolerada e eficaz, especialmente para lesões recentes, evitando complicações e desconforto. **Conclusões:** O bumper labial modificado foi uma opção eficaz e não invasiva para o tratamento do mucocele oral, especialmente em crianças e adolescentes, com o sucesso dependendo do tempo de evolução e das características das lesões.

Palavras-chave: Lábio; Mucocele; Bumper labial.

Introduction

A mucocele is a mucus retention phenomenon of the major and, more frequently, minor salivary glands. It has been described as one of the most common benign soft tissue lesions in the oral cavity¹. It is commonly observed in pediatric patients and young adults². Clinically, mucocelas present as single or multiple nodules that are soft, smooth, spherical, painless, and range in color from translucent blue to pink³. The most frequent location is the lower lip, accounting for nearly 96% of cases, although they may also occur on the palate, tongue, and floor of the mouth⁴. Local trauma is the main etiological factor associated with their development⁵, through two mechanisms: retention and extravasation, the latter being the most common⁶.

Various treatment options have been proposed in the literature,

ranging from topical corticosteroid therapy⁷ to more invasive approaches such as surgical excision, CO₂ laser vaporization⁸, erbium laser⁹, diode laser¹⁰, electrosurgery, cryosurgery, and micromarsupialization^{11,12}. In addition, a novel alternative has been described involving the replacement of surgery with intralesional injection of OK-432, an agent originally developed for cancer immunotherapy and currently used in the management of lymphangiomas and ranulas¹³⁻¹⁵. Despite the wide range of available options, these procedures remain invasive and involve a certain degree of trauma for patients, including sedation and complex postoperative processes¹⁶.

With the aim of describing a non-surgical technique for the management of mucocele and identifying factors that may influence its success or failure, five pediatric patients with a clinical diagnosis of mucocele treated at the Pediatric

Dentistry Clinic of the University of Concepción, Chile, are presented. In all cases, treatment consisted of the use of a modified lip bumper specifically designed to protect the affected area and promote spontaneous resolution of the lesion, thereby avoiding the need for surgical intervention. Both patients and their legal guardians were informed of the possibility of lesion reduction, without guaranteeing complete resolution. This study received no external funding. The clinical cases were carried out as part of the comprehensive treatment plans of patients treated at the Faculty of Dentistry, who assumed the costs of their clinical procedures.

CASE REPORTS

Patient 1

A 13-year-old female patient, cooperative, with onychophagia and cheilophagia habits. Intraoral examination revealed a fibrous nodular lesion located on the inner surface of the lower lip, well circumscribed, with a smooth surface, firm consistency, firm base, and a color similar to the labial mucosa. The lesion had been present for approximately one year and measured about 9 mm in diameter.

The initial treatment plan consisted of a non-surgical approach using a modified lip bumper to separate the lesion from contact with the teeth and prevent trauma caused by parafunctional activity, thereby allowing tissue involution and self-repair. Initially, metal bands were adapted on teeth 3.6 and 4.6 to obtain a working model, on

which a metal arch soldered to the bands and covered with transparent acrylic was fabricated (Figure 1). The lip bumper was cemented using glass ionomer cement (Ketac Cem, 3M) (Figure 1A).

A clinical follow-up was performed one month after cementation of the lip bumper, revealing a considerable reduction in lesion diameter (Figure 1B). At three months post-cementation, a marked reduction was observed, with a final approximate size of 4 mm (Figure 1C), and the habit of biting the lower lip was no longer present.

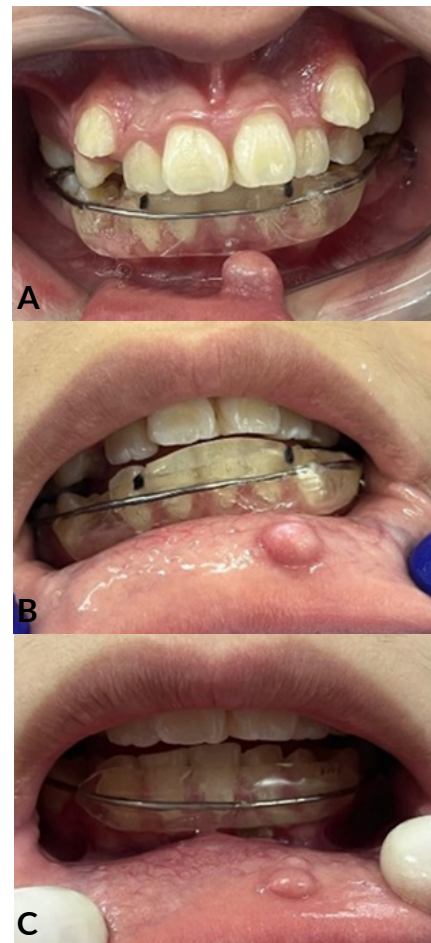


Figure 1: A: initial lesion; B: one-month follow-up; C: three-month follow-up.

Patient 2

A 2.9-year-old female patient at the time of the first appointment. Intraoral examination showed a volume increase on the lower lip measuring approximately 13 mm in diameter, asymptomatic, well circumscribed, with a smooth surface, soft consistency, firm base, and intense red color, with a three-month history (Figure 2A). Initially, a removable silicone lip shield was selected (Figure 2B). Although no discomfort was reported, the child did not wear the appliance, and it was decided to indicate a fixed lip bumper. The appliance consisted of metal bands on the second primary molars, a 1.1 mm diameter extension wire, and an anterior acrylic shield (Figure 2C-D). At the two-week follow-up, tolerance and adherence to treatment were observed (Figure 2E). After four months, the lesion had resolved, allowing removal of the modified lip bumper. Subsequent follow-ups showed normal mucosa (Figure 2F).

Patient 3

An 11-year-old female patient with a cheilophagia habit (Figure 3A). Intraoral examination revealed a mucocele located on the lower lip, well circumscribed, with a smooth surface, firm consistency, firm base, violet color, and an approximate size of 7 mm (Figure 3B), with a three-month history. Initial treatment was non-surgical, using a modified lip bumper to separate the mucocele from the teeth and prevent trauma, facilitating natural tissue recovery. Metal bands were placed on teeth 3.6 and 4.6, and a mandibular impression was taken to obtain a gypsum model. A 1.1 mm diameter metal arch was fabricated, soldered to the bands, and covered with transparent acrylic. At the one-month follow-up, a reduction in lesion size was observed (Figure 3C). At four months, the lesion had disappeared and the mucosa appeared normal. The modified lip bumper was removed (Figure 3D-E).

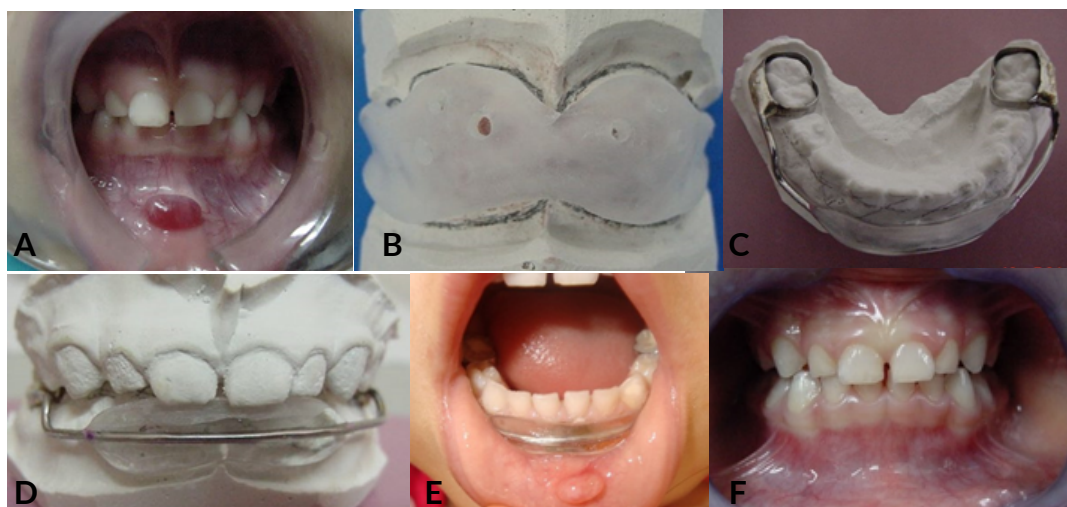


Figure 2: A: initial lesion; B: removable silicone lip shield; C: modified lip bumper on gypsum model, occlusal view; D: modified lip bumper on gypsum model, frontal view; E: two-week follow-up; F: four-month follow-up.



Figure 3: A: cheilophagia habit; B: initial lesion; C: one-month follow-up; D: four-month follow-up; E: removal of the lip bumper.

Patient 4

A 9-year-old male patient, cooperative, with a cheilophagia habit. Intraoral examination revealed an asymptomatic mucocele with soft consistency, intense red color, and an approximate size of 11 mm (Figure 4A). Metal bands were placed on teeth 3.6 and 4.6, and a mandibular alginate impression (Jeltrate Plus) was taken to obtain a gypsum model. A 1.1 mm diameter metal arch was fabricated, soldered to the bands, and covered with transparent acrylic. At the appointment scheduled for lip bumper placement, the lesion appeared torn with partial loss of its contents. The patient and parents were informed that treatment would likely be unsuccessful under these conditions. No improvement was observed during subsequent follow-ups (Figure 4B). The patient later underwent surgical excision of the lesion.

Patient 5

An 11-year-old female patient, motivated



Figure 4: A: initial lesion; B: torn lesion.

and cooperative, with a strongly established cheilophagia habit. Intraoral examination revealed a mucocele located on the lower lip near the labial commissure, well circumscribed, firm in consistency with fibrotic or keratotic characteristics, and an approximate size of 8 mm (Figure 5A), with a three- to four-year history. A lip bumper was designed for the maxillary arch, with Adams clasps on the first permanent molars, and the acrylic covered only the canines in this case (Figure 5B-C). At the two-month follow-up, the lesion had decreased in size but had not resolved completely. In subsequent follow-ups, the mucocele did not disappear but decreased to an approximate diameter of 6 mm (Figure 5D).

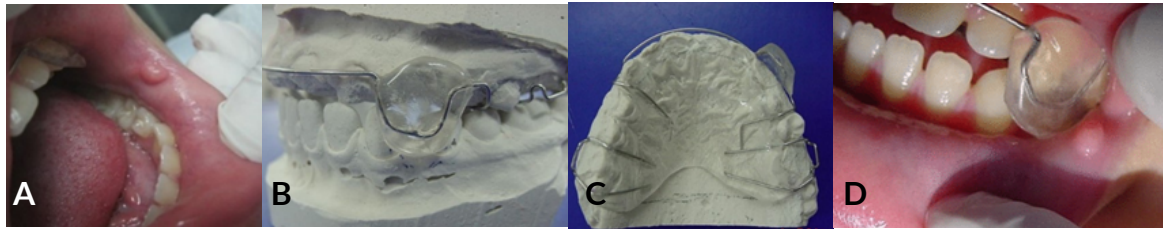


Figure 5: A: initial lesion; B: lip bumper design on gypsum models, lateral view; C: lip bumper design on gypsum models, occlusal view; D: lesion at two-month follow-up.

DISCUSSION

Mucocele of the minor salivary glands is a common benign lesion of the oral cavity that, according to the literature, rarely resolves spontaneously⁴. Surgical excision has been the standard treatment for years, demonstrating a favorable long-term prognosis³. However, current treatment options have expanded with the use of different types of lasers, such as CO₂, erbium, and diode lasers^{8-10,17}, which have proven effective with minimal postoperative complications, making them a preferred option¹⁷. Nevertheless, surgical treatments remain challenging in pediatric patients due to resistance from children and adolescents, as well as from parents and guardians, who are often reluctant to subject their children to invasive procedures^{16,18}.

Recurrence of mucocele is not uncommon⁴. In 2024, Himelfarb reported that children under 7 years of age had a recurrence rate of 2.2% after surgery¹⁹, a low percentage despite challenges related to postoperative compliance and the traumatic nature of surgery, highlighting the importance of early intervention¹⁹.

In pediatric patients, mucocele treatment faces additional challenges related to child cooperation and potential refusal of anesthesia and surgical procedures, further complicating therapeutic decision-making^{11,20}. Although surgical excision is effective, it carries risks such as visible fibrous scarring, postoperative complications, and the need for anesthesia, which may be problematic in young patients or those with behavioral disorders¹⁶. In this context, some patients and families prefer to postpone treatment until the child is older and better able to cooperate with medical instructions to reduce recurrence risk¹⁹. Concerns regarding the risks associated with general anesthesia in younger patients or those with special needs may further increase uncertainty and stress among families²¹.

Despite the effectiveness of surgical and laser treatments, these approaches do not address the underlying cause of mucocele, potentially leading to recurrence^{4,19}. Local trauma is the main etiological factor^{5,6}, yet current treatments do not directly address it. The use of lip bumpers as a non-invasive alternative may be attractive, particularly in pediatric patients, as it avoids the risks associated with surgery

and anesthesia^{11,20}. An electromyographic study showed that perioral muscles may adapt to the new balance generated by lip bumper use in orthodontic treatment, potentially modifying acquired muscular habits in functional disorders²². However, there are no publications supporting its use as a treatment for mucoceles, and further research is needed to evaluate its effectiveness.

Conclusion

The five clinical cases presented demonstrate that the use of a lip bumper appliance is an effective and non-surgical

option for the treatment of oral mucoceles, avoiding surgery and anesthesia while reducing discomfort and complications. This approach is particularly useful in the pediatric population. Successful cases corresponded to recent, uncomplicated lesions, whereas treatment failures were associated with older lesions with more than six months of evolution or with severe additional trauma resulting in tissue rupture. Treatment success appears to be closely related to specific mucocele factors, such as an evolution time of three to four months and non-fibrotic characteristics with preserved tissue integrity. The use of lip bumpers as a non-invasive alternative may be a valid option in selected cases; however, further evidence is required to confirm their effectiveness and define their role in preventing recurrence.

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