

## A clinical investigation of electrosurgical knife burning to treat Blandin-Nuhn mucoceles

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### Abstract

The aims of the present study were to investigate a new technique to treat the mucoceles of the Blandin-Nuhn gland, to evaluate the clinical effect of applying an electrosurgical knife to treat anterior tongue gland mucoceles. A total of 26 cases of tongue mucoceles were included in this study. In each case, an electrosurgical knife was used along the surface of mucoceles to excise a portion of tongue ventral mucosa and part of mucoceles without suture, and compared the recurrence rates of removal of electrosurgical knife, mucoceles alone and bilateral removal of Blandin-Nuhn glands and mucoceles. The results demonstrated that all patients were classified as class-I stage wound healing. One case relapsed during the follow-up period. The comparison of recurrence rates ( $P < 0.05$ ) showed statistical significance. In the conclusion, electrosurgical knife heat-burning treatment is superior to traditional mucoceles alone and bilateral Blandin-Nuhn glands and mucocele enucleation.

### 1. Introduction

Minor salivary glands of the tongue can be divided into three groups: posterior, middle, and anterior groups [1]. The posterior group lies beneath the mucosa of tongue-roof. The middle group, which is the smallest type of human salivary gland, lies near the vallate papillae [2]. The anterior group, also known as the

Blandin-Nuhn glands, is found in the ventral and anterior part of the tongue beneath the mucosa and above the muscle tissue. The ducts symmetrically open to the sublingual plica fimbriate. Previously, the Blandin-Nuhn glands received little attention because these glands secrete minimal quantities of saliva. Therefore, little is known about the anatomical structure of Blandin-Nuhn glands, and oral and maxillofacial literature contains no information on principles of

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diagnosis and treatments for conditions that afflict these glands. Thus, the mucoceles of the anterior glands of the tongue are mostly considered as mucus gland cysts or extravasation cyst caused by mucous glands. These are easily mistaken as ordinary labial glands, and therefore mucous buccal cysts, which leads to misdiagnosis. Traditional surgical approaches require the excision of mucoceles. Postoperative relapse rates are high due to the specialized anatomical structure of these glands [3]. Based on our experience, we recommended further investigation into the causes of mucocele relapse for the purpose of developing a more effective surgical technique. We present here 26 patient cases treated by localized heat-burning methods using an electric knife over a 20-month period.

## 2. Materials and Methods

### 2.1 Study participants

A total of 26 cases were selected between October 2011 and May 2013; of which 17 were male and 9 were female. Age of onset varied between 6 months and 20 years, predominantly focusing on a population of school age or pre-school age children. Most patients had mixed dentition. The edges of the lower incisors were sharp, with positive mechanical stimulation of the mucus membrane of ventral tongue. Four patients underwent traditional tongue gland cyst before recurrence. The other were newly diagnosed. Cyst size varied between 0.5 cm and 2.0 cm. Most were soft, translucent, oval cysts that were pink or blue in color and had a smooth surface, Cysts were located on the ventral side of the tongue, approximately 1.0 cm from the lip of the tongue.

### 2.2 Basis for diagnosis

Anterior gland mucoceles of the tongue were situated on both sides of the midline of the ventral tongue surface, approximately 0.5 cm to 1.0 cm from the tongue apex. Anterior gland mucoceles 0.3–1.0 cm in diameter were prominent on the

mucosal membrane, with or without swelling. Mucoceles were oval-shaped with a wide base and smooth surface (Figure 1a). In addition, mucoceles were light pink in color and translucent. This type of cyst was not associated with bleeding or pain [4]. Cysts of this type are easy to bite, leading to the outflow of transparent viscous liquid, similar to the white of an egg. Classical clinical characteristics soon followed [5]. After several repetitions of such phenomena, white scar protrusions appeared, with obvious decreased transparency. de Camargo Moraes et al, reported 312 cases of oral mucocele, in which Blandin-Nuhn mucocele, the second most common type, accounted for 15.4% of all cases [6]. Mucocele of the lower lip was the most common type and observed in 73.7% of patients. These aforementioned salivary gland mucoceles of the tongue are common in our clinical practice; clinical diagnosis and treatment is of vital significance.

### 2.3 Surgical method and postoperative care

Routine preoperative inspections were conducted reduce the incidence of contraindication to surgery and anesthesia. The appropriate anesthesia plan was selected based on the age of the patient and the degree of cooperation. Patients who demonstrated active cooperation were given articaine hydrochloride with 1:100,000 adrenaline for pain relief. Children that did not cooperate were given ethyl ether inhalation anesthesia or general anesthesia, with an additional local anesthetic for pain and 1:100,000 adrenaline in the area to reduce bleeding. Using a Force FX-8C high frequency electrotome (Valley Avb Corporation), power output of 25 watts, and electric coagulation setting, the surface mucous membrane of the tongue abdominal cyst was removed. The cyst wall was resected or burned by electric knife, making the diseased tissue of cyst wall gasified under high temperature without suture. Also, the active bleeding area was electrically coagulated (Figure 1b). It should be particularly noted that the local

lesion area should be fully exposed during the operation, and that the wound should not be sutured. Surgical dressing was pressed on the surgical area and maintained for 30–60 min postsurgery. Routine pathological examinations were performed on resected surface cyst wall tissues. Compared the recurrence rates of removal of electrosurgical knife, mucocoeles alone and bilateral removal of Blandin-Nuhn glands and mucocoeles, and the latter two methods were reported by Wang in 2013 [7]. Within 24 h of surgery patients were fed with cool–warm food that was semiliquid in consistency. Patients were prohibited to consume spicy food or to suck on the surgical area. On the same day as their surgery day, patients were advised to eat a moderate amount of ice to reduce reactive swelling in the local surgical area. After 24 h, patients were allowed to use mouthwash to minimize risk of infection. Also, patients were informed of OHI education.

### 3. Results

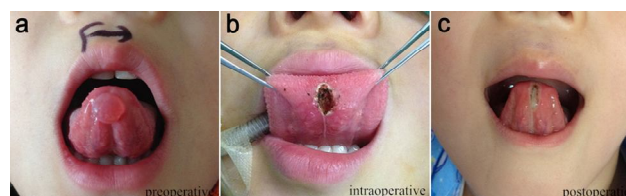
Following surgery, patients were able to flex their tongues. No patients complained of eating or speech disorders. Postoperatively, the surgical area appeared to be covered with a white pseudomembrane on day 1, with the center depressed, edges turned red similar to a more traumatic oral ulcer (Figure 1c). Patients were also able to sense pain. By day 2 or 3, a small degree of swelling appeared in the surgical area in 16 patients. Most patients recovered within 1 week, without redness, infection, or necrosis, which was defined as clinical Level I stage healing. Histopathological analysis of resected cyst walls confirmed chronic inflammation of mucosal tissue and stratified epithelium tissue hypersia in accordance with mucus gland cyst wall changes. Only 1 patient (3.85%) relapsed during the 6-month follow-up, and no relapse reoccurred following second procedure. Wang, 2013 demonstrated the influence of different surgical methods on the recurrence rate of tongue cysts. Patients (n=90) with Blandin-Nuhn

mucocoeles were randomized to 3 groups: group A (n=30) underwent removal of mucocoeles alone; group B (n=30) underwent unilateral removal of Blandin-Nuhn glands and mucocoeles; and group C (n=30) underwent bilateral removal of Blandin-Nuhn glands and mucocoeles. Six-month recurrence rates were 50%, 10%, and 0% for groups A, B, and C, respectively. We chose to compare group B with groups A and C (Table 1). In this table, group B represents electrosurgical knife ablation.

**Table 1 Recurrence rates of Blandin-Nuhn mucocoeles in different operation method.**

Sur. Methods	Patients (n)	Recurrence (n)	Recurrence rate (%)
Group A	30	15	50.0
Group B	26	1	3.85
Group C	30	0	0

The data was analyzed using SPSS17.0 statistical software and chi-square test. There was no statistically significant difference in group C and group B. The other two groups ( $P < 0.05$ ) showed statistical significance.



**Figure 1 Representative expression the clinical characteristics of Blandin-Nuhn mucocoeles in the pre-operation (a mucocoeles were oval-shaped with a wide base and smooth surface), intraoperation (b the cyst wall was resected or burned by electric knife without suture) and postoperation (c the surgical area appeared to be covered with a white pseudomembrane).**

### 4. Discussion

Most domestic textbooks do not contain a clear definition and description of the anterior group glands of tongue. Abroad, they are known as

Blandin-Nuhn glands. The Blandin-Nuhn glands are located right beneath the mucosa and over the muscle tissue symmetrically, with the ducts opening to the sublingual plica fimbriatepat, which descend deep into the muscles of the tongue [8]. Anterior tongue mucoceles occur mostly in juveniles and children [9]. This is because at that age, tissues are superficial and fragile, children frequently oscillate their tongues, and bad tongue habits easily result in mechanical damage, especially in patients with mixed dentition. The margins of the anterior lower teeth are not regular and the permanent dentition is comparatively sharp. These could cause rupture or blockage of tongue gland ducts, and also of cysts once these have formed [10, 11]. Generally, anterior gland mucoceles of the tongue are considered as mucous gland cysts or extravasation cysts caused by mucous glands, which can be easily mistaken for ordinary labial glands. The ordinary labial gland is the same as buccal mucous gland cysts and may lead to misdiagnosis, and traditional routine resection surgery of cysts and glands. However, the anterior glands are larger in size and number. Furthermore, because these glands descend deep into the muscles, it is not possible to completely remove all involved glands via traditional surgical procedures. Thus, most glands survive and result in frequent recurrence after first surgery [12].

Contemporary treatment protocols predominantly consist of conservative and surgical excision. Conservative treatment includes cystic cavity injection of 3% iodine and microwave heat coagulation treatment. Surgical excision includes the removal of the mucocele, anterior lingual gland, or the cyst. Although conservative treatment of Blandin-Nuhn gland mucoceles possess advantages such as being a simple operation that is minimally invasive, causes less bleeding, has fewer complications, and is easily consented by patients and their families, the recurrence rate is high. Ren and Tian [13], reported that during a 3-year observation period, recurrence rates of 52.4% and 42.2% were encountered with 3% iodine intra-cyst injections

and microwave coagulation treatment, respectively. Conservative treatment is no longer used due to high recurrence rates. However, it remains the primary approach for the treatment of children, and surgery is indicated if the patients relapse [14, 15]. Surgery remains the primary means of treatment in all other patients.

According to the statistic results, we can find with no difficulty that, after high-frequency electrotome ablation treatment, the recurrence rate is apparently lower than traditional mucoceles enucleation. There does not appear to be any difference in recurrence rates between bilateral tongue glands and cysts enucleation. However, the excision of bilateral Blandin-Nuhn gland mucocele and cysts must be performed on the central part of ventral tongue, with a "Y" incision. This is because a portion of the anterior glands are situated deep in the tongue muscles, produced a rather narrow operative space and potential for greater bleeding during the operation. The latter may cause poor vision during surgery. Significant anatomical structures (the deep artery and being of the tongue, and the lingual nerve) may be damaged during surgery, which may cause postoperative tongue swelling and severe complications such as numbness, difficulty in breathing, and risk to life. In addition, the surgical trauma can be grave, making it difficult to maintain the normal appearance of the tongue. Some patients are unable to flex their tongue after the surgery, which is a hindrance to diet and speech. Surgery also causes severe pain and difficult postoperative care, which makes it difficult to gain consent from patients and their families. Electrosurgical thermal burn treatment completely avoids the abovementioned problems. The disadvantages of both conservative treatments and tongue gland/cyst enucleation are also avoided.

## 5. Conclusion

Electrosurgical thermal burn treatment has a lot of advantages such as low recurrence rate, it is micro-traumatic and causes less bleeding, fewer

complications, and less harm to the outlines of tongue. The patient requires minimal postoperative period care. Finally, it is a clinically effective treatment that is relatively easy for clinical professionals to master. The advantages of this approach also make it easier for patients and families to consent to treatment.

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