

Management of Mucocele: A Review

Mahabaleshwara Chalathadka^{1*} Ajeya Ranganathan H K² Rachana PB³ Abraham Kunnilathu⁴
Mark Gera⁵ Sumanth Unakalkar⁶

¹Professor, Department of Oral and Maxillofacial Surgery, KVG Dental College and Hospital, Sullia, D.K, India.

²PG Student, Department of Oral and Maxillofacial Surgery, KVG Dental College and Hospital, Sullia, D.K, India.

³Reader, Department of Oral and Maxillofacial Surgery, KVG Dental College and Hospital, Sullia, D.K, India.

⁴Research Coordinator, Schulich Public Health, Western University; Graduate Student, Faculty of Dentistry, The University of Toronto, Canada.

⁵Research Assistant, Faculty of Dentistry, University of Toronto; Graduate Student, Schulich Public Health, Western University Ontario, Canada.

⁶Senior Lecturer, Department of Oral and Maxillofacial Surgery, KVG Dental College and Hospital, Sullia, D.K, India.

ABSTRACT

Background: Mucoceles are the most common benign soft tissue masses present in the oral cavity with a peak incidence between the first to third decade of life. Mucocele being a salivary gland disorder is most commonly seen in the lower lip. The mechanism of formation of mucocele may either be extravasation or retention. The management of the mucocele can be done with various methods ranging from conventional surgical excision of the lesion to the usage of LASERS. In this article, various treatment modalities have been reviewed and discussed.

Keywords: Mucocele, soft tissue, dentistry.

INTRODUCTION

Mucoceleles are the most common benign soft tissue masses present in the oral cavity and by definition are cavities filled with mucus^{1,2}. They affect both genders in all age groups, with the peak age of incidence between 10 and 29 years^{3,4,5,6}. According to the site of the occurrence, the lower lip is most commonly affected which is followed by the floor of mouth, palate, upper lip and ventral surface of tongue⁷.

Etiopathogenesis

The mechanisms for mucus cavity development are extravasation or retention. Extravasation is the leakage of fluid from the ducts or acini into the surrounding tissue, while the much less common retention phenomenon occurs as a result of a narrowed ductal opening that cannot adequately accommodate the exit of saliva produced, leading to ductal dilation and surface swelling.

In the case of the accessory salivary glands, the extravasation of mucus is the primary cause of mucocele formation with physical trauma as the initiating factor. This is sometimes seen in cases of nicotinic stomatitis, in which irritation from heat and noxious tobacco products can result in narrowing of the ductal openings¹.

The spillage of mucin into the connective tissue, in turn, initiates an inflammatory reaction resulting in the formation of a connective tissue wall made of granulation tissue, an attempt to confine the area of mucin spillage⁸. As mucin pooling occurs beyond the confinement of the salivary duct, it is not lined by epithelium, thus it is considered as a pseudocyst. These reactions to the spilled mucin have been described to be taking place in three evolutionary phases.

In the first phase, mucous spills diffusely from the excretory duct into conjunctive tissues where some leucocytes and histiocytes are found. In the second phase, granulomas appear during the resorption phase due to histiocytes, macrophages and giant

Received: June. 11, 2018; Accepted: July. 19, 2018

*Correspondence Dr. Mahabaleshwara Chalathadka.

Department of Oral and Maxillofacial Surgery, KVG Dental College, Sullia, Karnataka, India.

Email: mahabaleshwara_c@yahoo.com

multinucleated cells associated with a foreign body reaction. In the final phase, connective cells form a pseudo-capsule without epithelium around the mucosa⁹.

Clinical Features of Mucoceles

The mucoceles, regardless of their location, present as soft, painless swellings ranging from deep blue to normal pink in colour. The deep blue colour results from tissue cyanosis and vascular congestion associated with the stretched overlying tissue and the translucent character of the accumulated fluid beneath. The variation in colour depends on the size of the lesion, its proximity to the surface, and the elasticity of the overlying tissue¹.

The size of the mucocele may vary from a few millimetres to centimetres. The lesion is usually unilateral but can occur bilaterally. Sometimes superficial mucocele with single or multiple blisters seen on the soft palate, retromolar pad, posterior buccal mucosa and lower labial mucosa. They rupture spontaneously and become ulcerated mucosal surface and heals within few days¹⁰.

Diagnosis of Mucoceles

The case history and an objective clinical examination of the lesion are crucial for diagnosing mucoceles correctly. Sometimes, the diagnosis may require traditional radiography, ultrasonography, or advanced diagnostic methods computed tomography (CT) and magnetic resonance imaging (MRI) to visualize form, diameter, the position of the lesion relative to adjacent organs⁷.

The appearance of mucoceles is pathognomonic and the following data like lesion location, history of trauma, rapid appearance, variations in size, bluish colour and the consistency aid in the diagnosis of the lesion. Palpation can be helpful for a correct differential diagnosis. Lipomas and tumours of minor salivary glands present no fluctuation while cysts, mucoceles, abscess and hemangiomas do.

Management of Oral Mucoceles

There are various treatment modalities in the management of Oral Mucoceles which include surgery, laser ablation, cryosurgery, sclerotherapy, micro-marsupialization, LASERs and intralesional injection of sclerosing agent or corticosteroid.

Non-surgical Management of Mucoceles

Non-surgical management of Mucoceles includes aspiration, injection of steroids like betamethasone, dexamethasone and sclerosing agents like absolute Ethanol.

Injection of Corticosteroids

Corticosteroids act as the most potent anti-inflammatory agent inhibiting the expression of multiple inflammatory genes and may also increase the transcription of genes coding for anti-inflammatory proteins including lipocortin-1, interleukin-1, and interleukin-10 receptor antagonist. They also act like a sclerosing agent causing shrinkage of the dilated salivary ducts¹¹.

Combination of injection of intralesional steroid dexamethasone 4mg to the base of the lesion and micro-marsupialization of the large mucocele resulted in a gradual regression in the size of the lesion and complete healing with no recurrence and no local discomfort and hence can be regarded as a substitute to the conventional surgical procedure¹². Injection of Dexamethasone 8mg to the base of the mucocele resulted in regression of the size of the mucocele and complete healing eventually with no recurrence¹³.

Injection of Sclerosing Agent In Management of Mucocele

Administration of intralesional sclerosing agents like absolute ethanol at varying doses of 0.1ml to 0.5ml according to the size of the mucocele of glands of Blandin and Nuhn resulted in complete regression of the size of the lesion and complete healing with no clinical evidence of recurrence. Ethanol denatures the ingredients to deposit and make the epithelial cells near the gap of a mucous tubule dehydrate and undergo necrosis, which may lead to an inflammatory reaction followed by the development of scars that can close the gap to prevent the mucus from over-brimming¹⁴.

Surgical Management of Mucocele

Surgical management of oral mucocele includes conventional surgical excision of the lesion with the involved gland. Also, simpler methods like micro-marsupialization and modified micro-marsupialization are used in the literature.



Fig 1.1: Mucocoele over lower labial mucosa.



Fig 1.2: Surgical excision of the Mucocoele.



Fig 1.3: Closure of surgical site with 3-0 silk sutures.



Fig 2.1: Mucocoele in the floor of mouth.



Fig 2.2: Micromarsupialization completed.



Fig 2.3: Follow up

Conventional Surgical Management of Mucocoeles

Conventional surgical procedure in the management of oral mucocoele includes excision of the lesion along with the affected gland. The recurrence rate is very low and is considered as a

definitive treatment plan. While removing the mucocele surgically, remove the surrounding glandular acini, removing the lesion down to the muscle layer and avoiding the adjacent gland and duct damage while placing the suture will reduce the chances of recurrence¹⁰. The comparative study conducted by Bahadure et al¹⁵ on the success of conventional surgical management of oral mucocele in a group of subjects in the transitional period from mixed dentition period to permanent dentition proved that conventional surgical management of the mucoceles in the paediatric patient is the definitive treatment modality. An elliptical incision placed followed by surgical enucleation of the affected gland along with mucocele would result in minimal soft tissue injury and minimal scarring¹⁶.

Micro-Marsupialization As An Alternative Treatment Modality

Micro-marsupialization consists of draining the accumulated saliva and creating a new epithelialized tracts along the path of the sutures. Micro-marsupialization appears more likely to be successful if the lesion is treated within 90 days. Recently developed mucocele would have a thinner covering mucosa and hence the success of micro-marsupialization could be expected in these cases¹⁷.

Comparative studies conducted by Sagari et al¹⁸ and Giraddi et al¹⁹ on practicability and efficacy of micro-marsupialization over conventional surgical management concluded micro-marsupialization is the treatment option for the management of mucocele especially in uncooperative, mentally retarded, paediatric age group patients and all other patients not fit for surgical procedure¹⁹. A modified micro-marsupialization technique that involves giving the maximum possible number of sutures maintaining a short distance between entry and exit. The decreased distance between the entrance and exit of the needle is intended to facilitate epithelialization of the new pathways formed by the sutures by reducing the length of the drainage tracts²⁰.

Cryosurgery in Management of Mucoceles

Cryosurgical management of mucoceles involves exposure of the lesion to the liquid nitrogen. This technique is especially used in treating the lesion in the paediatric age group of patients. The basic

technique of cryotherapy stresses rapid cooling, slow thawing and repetition of the freezing process to maximize tissue destruction. The two methods recognized are a closed system with the use of probes and nitrous oxide, or an open system with the use of a liquid nitrogen spray or a cotton tip. Cryosurgery done with both the methods, i.e open system by using liquid nitrogen spray by Aarti Garg et al²¹ and closed system with use of cryoprobe by Aulakh KK²² et al reported to be successful in complete remission of the lesion without any evidence of recurrence, thereby considering the cryosurgery to be an alternative treatment modality in management of oral mucocele.

Cryotherapy destroys tissues by application of extreme cold via different cryogen agents such as nitrous oxide gas, liquid nitrogen spray. During the freeze cycle, the drop in temperature results in:

- (a) Crystallization of extracellular water.
- (b) Reduction of cell resistance to shrinkage due to membrane lipid hardening.

In addition, during the thaw cycle, cells at the lesion's periphery start taking up excess electrolytes and to equalize this gradient difference, water enters the cell thereby leading to swelling and cell lysis²².

LASER assisted ablation of mucocele

Recent advancement in LASERS made it useful in the management of Oral Mucocele. The management of mucocele is done using DIODE LASER and CO₂ LASER which has given similar results as that of conventional management with better post-operative comfort and aesthetics. Low-Level Laser Therapy performed by Ahmad et al²³ showed better healing process with no evidence of recurrence without any alteration in the microstructure of the biopsy specimen.

Low Pulse LASER through its photochemical, physical and biological effect stimulates increased production of ATP which result in accelerated cell division especially fibroblast, epithelial and endothelial cell and rapid production of extracellular matrix. The accelerated microcirculation leads to faster re-absorption of oedema and disposal of intermediates by causing faster changes in Capillary Hydrostatic Pressure.

Use of a Diode LASER in the management of oral mucocoeles had an advantage of the bloodless operating field and provided rapid healing. Light of wavelength of 810 nm is intensely absorbed by oxygenated haemoglobin, resulting in elevation of temperature at the operative site, promoting coagulation and carbonization of soft tissues, with minimum discomfort and scarring. A diode laser with an effective penetration depth of 2 mm in the tissue seal the small lymphatic vessels, thus minimizing postoperative oedema. No sutures or surgical packs were required, as the laser has been found to enhance wound healing by the formation of a denatured protein coagulum termed as "eschar" or "biological bandage." This layer of protein coagulum protects the wound from bacteria and friction from masticatory forces.

Soft Diode LASER used in excision of the Mucocoele had an uneventful healing process with good intraoperative visibility of site of operation and hemostasis²⁴. Comparative study on the conventional method of management of the mucocoele with CO₂ LASER ablation of the mucocoele by Jose Yagüe-García et al²⁵ revealed that the latter has lesser operating time and better postoperative course with minimal evidence of scarring, paraesthesia, bleeding and relapse when compared to that of the former.

DISCUSSION

Mucocoele is a common pathology encountered by clinicians more frequently. Oral mucocoeles occur in varying locations on the oral mucosal surfaces overlying accessory minor salivary glands. Teenagers and children are most commonly affected by mucocoeles⁷. Diagnosis of the mucocoele is mainly based on history and clinical appearance which includes rapid appearance, specific location, history of trauma, bluish colour, soft consistency and fluctuation. There are various treatment modalities which include surgical removal, CO₂ laser ablation, cryosurgery, micro-marsupialisation, marsupialisation, electrocautery, laser vaporization or laser surgery, and intralesional injection of corticosteroids or sclerosing agent⁶.

The main accepted treatment for mucocoele is surgical extirpation of the surrounding mucosa and glandular tissue down to the muscle layer, but studies have shown recurrence following surgical

enucleation of the lesion. Injection of corticosteroids like 4mg Betamethasone to the base of the lesion showed complete regression in 90% of the subjects¹¹. The combination of the micro-marsupialization and intralesional steroid injection by Mortazavi H et al¹² gave result without recurrence and post-op discomfort and can be regarded as a substitute to the conventional surgical procedure. Injection of dexamethasone 8mg to the base of the lesion resulted in complete remission of the lesion without recurrence in 77% of the cases.

Absolute ethanol as a sclerosant proved to be safe and effective has been applied in the treatment of renal tumours, cysts, and vascular malformations. The new method was attempted for observing the effect of therapy by Zhang J et al¹⁴. This method resulted in complete remission of the lesion in 64.3% of the cases and reduction in the size of the lesion in 35.7% of cases.

Conventional surgical enucleation of the lesion is the most commonly followed protocol where in 95.7% of the cases had total remission¹⁵. Micro-marsupialization is a minimally invasive technique, and most cases can be carried out under topical anaesthesia alone. The study conducted by Piazzetta et al showed the full regression of all 25 mucocoeles that had been diagnosed within 90 days of their appearance¹⁷.

Owing to the recurrence of the lesion following micro-marsupialization, Francisco AL et al²³ advocated modification to the existing technique of micro-marsupialization. Modifications to the technique include an increased number of sutures, a decreased distance between the entrance and exit of the needle, and a longer period during which the sutures are maintained.

Cryosurgery, advocated by Farah C S et al²⁶ is useful in widespread dermatological lesions, small skin cancers and intra-bony cavities after curettage to prevent recurrence. The nitrous oxide technique is useful for the treatment of various benign and malignant lesions of the oral cavity where more predictable necrosis is necessary and depth of necrosis is also a factor. It may be a useful tool in the management of oral mucocoele if available.

Low-Level Laser Therapy in the management of oral mucocoele resulted in complete remission of the

lesion without any postoperative complication and recurrence in 100% of the cases²². The comparative study between conventional surgical procedure and CO₂ LASER ablation showed better clinical outcome with latter with no complication and recurrence than former²⁷.

CONCLUSION

Mucoccele is a commonly found lesion, especially in young individuals. Proper diagnosis with the accurate location of the affected gland plays an important role in the management of Oral Mucocelles. Minimally invasive procedures such as Cryosurgery, LASER ablation or micro-marsupialization shall be preferred over aggressive surgical management which involves higher risk factors and more chances of complications and recurrence unless the lesion and the affected gland is present deep inside the tissues. These minimally aggressive treatments are useful in children with fear of injection whereas aggressive treatment like surgical excision with involved minor salivary gland may be needed in deeper seated and recurrent lesions.

The management of the Oral Mucocelles can be done surgically or non-surgically. The choice of the treatment depends on the size of the lesion, site, the age of the patient, the depth of the lesion and availability of the materials. The superficial lesions in children can be managed by micro-marsupialization whereas, for deep-seated lesions and recurrent lesions with fibrosis, surgical excision of the lesion along with involved minor salivary gland will be a better option in the management of mucocelles. The LASER and Cryosurgery may be useful if available in the clinical setup.

ACKNOWLEDGEMENTS

We acknowledge the support and guidance given by Dr Ramaraj P N, Professor and Head, Dept of Oral and Maxillofacial Surgery, KVG Dental College and Hospital, Sullia and Dr Rohit Singh Subedar and Dr Vinay V. Patil for the materials and pictures.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Baurmash HD (2003) Mucocelles and ranulas. *J Oral Maxillofac Surg* 61:369–378. [PubMed]
2. More CB, Bhavsar K, Varma S, Tailor M. Oral mucoccele: A clinical and histopathological study. *Journal of Oral and Maxillofacial Pathology: JOMFP*. 2014;18(Suppl 1): S72-S77. doi:10.4103/0973-029X.141370. [PubMed]
3. de Brito Monteiro, Bárbara Vanessa, Bezerra, T. M. M., da Silva, Éricka Janine Dantas, Nonaka, C. F. W., & da Costa Miguel, Márcia Cristina. (2015;2016;). Histopathological review of 667 cases of oral mucocelles with emphasis on uncommon histopathological variations. *Annals of Diagnostic Pathology*, 21,44-46. doi:10.1016/j.anndiagpath.2016.02.001
4. Kopp, W. K., & St-Hilaire, H. (2004). Mucosal preservation in the treatment of mucoccele with a CO₂ laser. *Journal of Oral and Maxillofacial Surgery: Official Journal of the American Association of Oral and maxillofacial surgeons*, 62(12),1559-1561. doi: 10.1016/j.joms.2003.12.044
5. Shapira, M., & Akkrish, S. (2014). Mucocelles of the oral cavity in neonates and Infants—Report of a case and literature review. *Pediatric Dermatology*, 31(2),e55-e58. doi:10.1111/pde.12264
6. Ata-Ali, Javier & Carrillo, C & Bonet, C & Balaguer, J & Penarrocha, Miguel. (2010). Oral mucoccele: Review of the literature. *Journal of Clinical and Experimental Dentistry*. 2. 10.4317/jced.2.e18.
7. Re Cecconi D, Achilli A, Tarozzi M, Lodi G. Mucocelles of the oral cavity: A large case series (1994-2008) and a literature review. *Med Oral Pathol Oral Cir Bucal*. 2010;15:e551-6. [PubMed]
8. Karthikeyan M, Varghese AK, Vasupradha G, Dinakaran J. Mucoccele: A diagnostic dilemma!! *Journal of Pharmacy & Bioallied Sciences*. 2016;8(Suppl 1):S168-S170. doi:10.4103/0975-7406.191951. [PubMed]

9. Nallasivam KU, Sudha BR. Oral mucocoele: Review of literature and a case report. *Journal of Pharmacy & Bioallied Sciences*. 2015;7(Suppl 2): S731-S733. doi:10.4103/0975-7406.163516. [PubMed]
10. Rao et al. Oral Mucocoele – Diagnosis and Management. *Journal of Dentistry, Medicine and Medical Sciences* Vol. 2(2) pp. 26-30, November 2012.
11. Rupam Sinha, Soumyabrata Sarkar, Tanya Khaitan, Arpita Kabiraj, and Anirban Maji, "Nonsurgical Management of Oral Mucocoele by Intralesional Corticosteroid Therapy," *International Journal of Dentistry*, vol. 2016, Article ID 2896748, 5 pages, 2016. doi:10.1155/2016/2896748
12. Mortazavi H, Baharvand M, Alirezaei S, Noor-Mohammadi R. Combination therapy in a large lower lip mucocoele: A non-invasive recommended technique. *Dent Hypotheses* 2014;5:127-9.
13. Baharvand M, Sabounchi S, Mortazavi H. Treatment of Labial Mucocoele by Intralesional Injection of Dexamethasone: Case Series. *J Dent Mater Tech* 2014;3(3):128-33
14. Zhang J, Wang C. The Application of Absolute Ethanol in the Treatment of Mucocoele of the Glands of Blandin-Nuhn. *The Journal of Craniofacial Surgery*. 2016;27(7):e641-e642. doi:10.1097/SCS.0000000000002993
15. Bahadure RN, Fulzele P, Thosar N, Badole G, Baliga S. Conventional surgical treatment of oral mucocoele: a series of 23 cases. *Eur J Paediatr Dent*. 2012 Jun;13(2):143-6. PubMed PMID: 22762178. [PubMed]
16. Chaitanya P, Praveen D, Reddy M. Mucocoele on lower lip: A case series. *Indian Dermatol Online J* 2017;8:205-7
17. Piazzetta, C. M., Torres-Pereira, C. And Amenábar, J. M. (2012), Micro-marsupialization as an alternative treatment for mucocoele in pediatric dentistry. *International Journal of Paediatric Dentistry*, 22: 318-323. doi:10.1111/j.1365-263X.2011.01198.x
18. Sagari S K, Vamsi KC, Shah D, Singh V, Patil G B, Saawarn S. Micro-marsupialization: A minimally invasive technique for mucocoele in children and adolescents. *J Indian Soc Pedod Prev Dent* 2012;30:188-191
19. Giraddi GB, Saifi AM. Micro-marsupialization versus surgical excision for the treatment of mucocoeles. *Annals of Maxillofacial Surgery*. 2016;6(2):204-209. doi:10.4103/2231-0746.200324. [PubMed]
20. Bansal S, Verma DK, Goyal S, Rai M. Comparison of Micromarsupialization and Modified Micromarsupialization for the Management of Mucocoele of Lower Lip: A Prospective Randomized Clinical Trial. *J Maxillofac Oral Surg*. 2017 Dec; 16(4):491-496. doi: 10.1007/s12663-017-1004-0. Epub 2017 Mar 16. PubMed PMID: 29038633; PubMed Central PMCID: PMC5628073. [PubMed]
21. Garg A, Tripathi A, Chowdhry S, Sharma A, Biswas G. Cryosurgery: Painless and Fearless Management of Mucocoele in Young Patient. *Journal of Clinical and Diagnostic Research: JCDR*. 2014;8(8): ZD04-ZD06. doi:10.7860/JCDR/2014/9959.4655. [PubMed]
22. Aulakh KK, Brar RS, Azad A, Sharma S, Anand A, Jyoti B. Cryotherapy for treatment of mouth mucocoele. *Niger J Surg* 2016;22:130-3
23. Ahad A, Tandon S, Lamba AK, Faraz F, Anand P, Aleem A. Diode laser assisted excision and low-level laser therapy in the management of mucus extravasation cysts: a case series. *J Lasers Med Sci*. 2017;8(3):155-159. doi:10.15171/jlms.2017.28.
24. Ramkumar S, Ramkumar L, Malathi N, Suganya R. Excision of Mucocoele Using Diode Laser in Lower Lip. *Case Reports in Dentistry*. 2016;2016:1746316. doi:10.1155/2016/1746316.
25. Yagüe-García J, España-Tost AJ, Berini-Aytés L, Gay-Escoda C. Treatment of oral mucocoele - scalpel versus CO2 laser. *Med Oral Patol Oral Cir Bucal*. 2009 Sep 1;14 (9):e469-74. [PubMed]
26. Farah CS, Savage NW. Cryotherapy for treatment of oral lesions. *Aust Dent J*. 2006 Mar;

- 51(1):2-5. Review. PubMed PMID: 16669469.
[PubMed]
27. Francisco AL, Manoel SAF, Pantelis VR (2007)
Ranula management: suggested modification in
the micro-marsupialization technique. J Oral
Maxillofac Surg 65:1436-1438.