

Assessment and Comparison of Four Different Techniques for the Management of a Mucocele in Children

Ravindar Puppala¹ Uday Kumar Chowdary Birapu² Ravigna Peddi³ Syed Ajmal⁴ Manoj Kumar Mallela⁵ Surendra Reddy Munnangi^{6*}

¹Professor and Head, Department of Pedodontics and Preventive Dentistry, SVS Institute of Dental Sciences, Mahabubnagar, India.

²Senior Lecturer, Department of Pedodontics and Preventive Dentistry, SVS Institute of Dental Sciences, Mahabubnagar, India.

³Reader, Department of Pedodontics and Preventive Dentistry, SVS Institute of Dental Sciences, Mahabubnagar, India.

⁴Post Graduate Student, Department of Pedodontics and Preventive Dentistry, SVS Institute of Dental Sciences, Mahabubnagar, India.

⁵Director PG Studies, Department of Pedodontics and Preventive Dentistry, SVS Institute of Dental Sciences, Mahabubnagar, India.

⁶Reader, Department of Pedodontics and Preventive Dentistry, SVS Institute of Dental Sciences, Mahabubnagar, India.

ABSTRACT

Background: Mucocele is a soft fluctuant lesion associated with pooling of mucous in the vicinity of minor salivary glands. Lower lip is one of the predominant locations in the oral cavity. Self-injurious habits such as lip biting and trauma are one of the etiological features of mucoceles. Numerous management techniques are available in the literature for mucoceles, each with its own set of advantages and disadvantages. The ideal management technique for mucocele is to remove the offending minor salivary gland along with the lesion. This paper aims at comparing the conventional management technique, use of refrigerant spray, laser, and micro-marsupialization in the management of mucocele of the lower lip in children. Refrigerant spray and micro-marsupialization are the two non-invasive novel techniques and conventional surgery and laser are the invasive techniques. The comparative analysis showed that refrigerant spray is more accepted with least amount of post treatment discomfort and pain, followed by micro-marsupialization.

Keywords: Mucocele, Pediatric dentistry, Surgery.

INTRODUCTION

Mucocele is the oral lesions associated with minor salivary glands which occur due to partial obstruction of duct and spillage of mucin following trauma. The two lesions are clinically indistinguishable.¹ They are fairly common oral pathological conditions in children.² Although not associated with significant morbidity, they can be the cause of discomfort, especially in the pediatric population. The recurrence rate is reported to be about 14%³, definitive treatment often involves excision of the lesion and the associated minor salivary glands. They present psychological and aesthetic concern to the child because of its location. The technique should cause a minimum or

no distress to the child and the parent. It should be as less invasive as possible to reduce healing time and also to minimise the level of apprehension. Many studies were reported regarding its distribution and also comparing different techniques to treat this problem. The uniqueness of this present study is to compare four different techniques in the management of mucoceles of lower lip with their post operative complications.

MATERIALS AND METHOD

A prospective study was done on children aged between 8 to 15 years with presence of mucocele, reported to the Department of Pedodontics and Preventive dentistry, from January

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*Correspondence Dr. Surendra Reddy Munnangi.

Department of Pedodontics and Preventive Dentistry, SVS Institute of Dental Sciences, Mahabubnagar, India.

Email: Not Disclosed

2012 to January 2015. A diagnosis of mucocele was established by the history and clinical assessment. Routine surgical profile was advised and those with systemic diseases were excluded. Intra-operative analgesia was obtained by local infiltration technique using 2% lignocaine with 1:80000 epinephrine where ever required. The patient was draped in the regular manner and the surface of the lesion was cleaned with iodophore (povidone – iodine) for disinfection. Based on the technique of treatment the patients were divided into four groups and allocation was done with computer randomization. Excised tissue samples were sent for microscopic analysis and the report was obtained.

Technique 1 – Refrigerant spray: (Fig. 1a - 1d)

Cold sprays such as ethyl chloride, dry ice and other commercial refrigerant sprays have been used in the diagnosis of pulp status and assessment of vitality. Butane-isobutane spray (Endo Frost, Roeko, Germany) is one such commercial product available in canisters and easy to use. It has a temperature of -50°C as described by the manufacturer. Refrigerant spray stresses on rapid cooling, gradual thawing and repeated freezing to maximise tissue destruction. Cell freezing occurs at -2.2°C and the temperature must fall below -20°C for cell death to occur.⁴ Benign mucosal lesions require a single, 2 min freeze/thaw cycle using a cryoprobe.



Fig.1a

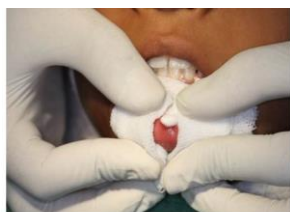


Fig.1b



Fig.1c



Fig.1d

Fig. 1a - Pre operative photograph; Fig.1b - Freezing ice ball; Fig. 1c - Thawing of the lesion; Fig. 1d - Post operative photograph.

The present case was treated based on this concept using an open method. The spray was directed on the mucocele by controlled bursts using the nozzle provided to maintain the freezing of the lesion.⁵

Technique 2 – LASER: (Fig. 2a - 2b)

The boundary of the lesion was first marked with laser in contact mode to determine the extent of the removal. Excision was performed using two different techniques circumferential incision technique (CIT) and mucosal preservation technique (MPT)⁶ using diode laser (Picasso, AMD Laser Technologies, USA; wavelength of 810 nm) using 300 μm diameter tip at 1.3 W. The patient experienced no discomfort during the treatment except for a pricking sensation at a few points. There was no bleeding during the procedure. After the vaporization, the power setting was changed to a lower value (LLLT, low level laser therapy) of 0.6 Watts and in a continuous and defocused (noncontact mode) mode, the laser tip was run around the operated area in a circular motion to provide a Laser band with instructions to maintain the site of surgery. The patient was recalled after 1 week for assessment of healing and postoperative check up.



Fig. 2a



Fig. 2b

Fig. 2a - Pre operative photograph; Fig. 2b - Demarcation of lesion boundary.

Technique 3 – Micro-marsupialization: (Fig. 3a - 3c)

A topical anesthetic (benzocaine 20%) was applied over the entire lesion for approximately 3 min, and a 3.0 silk suture was passed through the internal part of the lesion along its widest diameter. The entry and exit points of the suture thread were maintained at a distance of 0.7mm. The suture thread was then passed through the lesion, and a surgical knot was made, leaving a space between the knot and the lesion. The mucoceles were then compressed, and the accumulated saliva

extravasated around the suture. The silk suture was maintained for 10 days, and if the suture became loose during this time the procedure was repeated after 2 or 3 days. To prevent secondary infection at the site of the suture, the patient was advised with antibacterial mouth rinses.

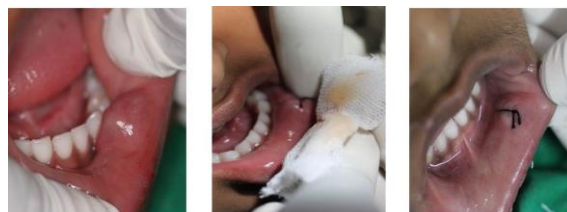


Fig .3a

Fig .3b

Fig .3c

Fig. 3a - Pre operative photograph; Fig. 3b - Suture with extravasation of mucin; Fig. 3c - Decompressed lesion with suture.

Technique 4 - Conventional surgical excision: (Fig. 4a - 4d)

The conventional surgical technique was carried out under local infiltrative anaesthesia using a No. 15 Bard Parker blade. The lesion was excised in entirety and along with the underlying glandular structures. If the lesion was found to be deeply seated and chronic in nature MPT was used. Small and superficial lesions were treated by CIT. 3-0 silk sutures were used for closing the surgical site and the patient recalled for suture removal after 1 week. The patient was advised for good oral hygiene maintenance to prevent the infection of the surgical site.



Fig.4a

Fig.4b



Fig.4c

Fig.4d

Fig. 4a - Pre operative photograph; Fig. 4b - During surgery; Fig. 4c - Decompressed lesion with suture; Fig. 4d - Healing after 1 week.

RESULTS

Least number of cases was performed with cryosurgery (n=10) and maximum with scalpel (n=16). All cases resulted because of trauma and evenly distributed according to gender. Anesthesia by infiltration was used for conventional and laser surgery, while topical agent was sufficient for refrigerant spray technique and micro-marsupialization. Minimum amount time was taken for Refrigerant spray (12 minutes) to maximum (30 minutes) for scalpel technique. Intra-operative pain was not observed in all the procedures. Postoperative swelling was observed with Laser and scalpel but less healing time was taken in these two techniques. Minor salivary gland trauma was observed in 2 cases treated with scalpel.

DISCUSSION

Several methods for cold test to check the vitality of tooth by using ice sticks (0°C), CO₂ sticks (-78°C), ethyl chloride (-5°C) and dichlorodifluoromethane ([DDM] -50°C). DDM is superior to Ethyl chloride but being a chlorofluorocarbon, has concerns of depletion of atmospheric ozone layer hence, is replaced with other gases, including tetrafluoroethane (TFE) or a propane/butane/isobutane gas mixture stored in a pressurized can (Endo Frost, Roeko, Langenau, Germany). Refrigerant spray involves rapid freezing for lesion destruction. The frozen lesion undergoes necrosis which is allowed to slough spontaneously. Open and closed cryosurgical systems are two different methods for performing this procedure. Open systems involve the direct placement of a freezing agent (i.e. liquid nitrogen) onto the lesion via a cotton swab.⁴ Due to direct contact between the cryogen and tissue, a more controlled and profound depth of freezing can be achieved with a nitrous oxide cryoprobe. The advantages of cryosurgery include, no intra-operative or post-operative bleeding, minimal surgical defects, and minimal scarring. Hence considering its use in the areas of aesthetic concern, such as the vermillion border is highly appropriate. In addition to it, no local anaesthesia is required in most of the cases and can be considered for use with the pediatric population.⁵

The closed cryosurgical system is more expensive and technique sensitive requiring the use

of sophisticated equipment to obtain/store liquid nitrogen. Considerable training is required for the inexperienced clinician to gauge the depth of freezing. Damage to deeper layers may occur if used inappropriately. Tissue damage by Refrigerant spray involves several mechanisms. The optimal temperature for most tissues to freeze is at -2.2°C and the temperature must fall below -20°C for cell death to occur.⁷ In the present case we used refrigerant spray (Endo Frost, Roeko, Germany), a 1-2 minute freeze/ thaw cycle. The temperature offered by Endo Frost is -50°C , which is sufficient to reduce the temperature of the cells to cause cell injury.⁸

The laser is a very precise ablation instrument that offers certain advantages when compared to the other methods.⁹ Laser causes minimal damage to the adjacent tissues and the coagulative ability of the lasers results in minimal postoperative bleeding. Due to minimal trauma to the adjacent tissues including the muscle layers, postoperative healing is favourable, with very little scar formation. Denatured proteins serve as a natural wound dressing hence circumventing the need for sutures.¹⁰ All the cases mentioned were treated using diode laser as per the manufacturer's instructions. Micro-marsupialization is a simple treatment approach indicated for lesions less than 1 cm in size involving the placement of a 3.0 silk suture which is tied off loosely and left in place for 10 days post-operatively¹¹ in the mucocoele without involving the underlying tissue and drainage of inspissated mucin. The time taken for this approach is less when compared to other techniques like surgical or laser and can be performed with minimum or no discomfort to the patient. As a result, re-epithelialization of the duct occurs, creating a new epithelial-lined duct, allowing the saliva to be released from the duct. The recurrence rate with this approach is slightly higher in the paediatric age group and is reported to be about 14%.¹² This recurrence can be due to the suture that has a tendency to loosen after 2 or 3 days, requiring repetition of the procedure)¹³ Berti et al. affirmed that a recently developed mucocoele would have a thinner covering mucosa, and so the higher rate success of micro-marsupialization is anticipated.¹⁴ Piazzetta et al. supported the use of micro-marsupialization in children as it caused lower

anxiety in the child and the procedure itself took negligible time.¹⁵ In this case, we noticed decreased postoperative problems in the child patient in addition to more acceptance levels from both parent and patient. The drawback of this procedure in our view is the delayed time for healing. The surgical excision is one of the conventionally used methods of excising mucocoeles. It is economical without requirement of any extensive equipment or materials. However it requires precision, detailed knowledge of the mucocoele, the surrounding anatomy along with accurate tactile awareness and a greater control of the instrument. Local anesthesia is a must, and this may pose more behavior problems in children with issues. Postoperative bleeding is a concern in comparison with other modalities and the possibility of a longer healing period with an ulcerative appearance⁹ is common. Moderate-sized mucocoeles with thick fibrous wall may be treated by dissection. If scalpel surgery as an approach is used, the minor salivary glands surrounding the lesion must be removed with considerable care to avoid injury to marginal glands and ducts to prevent any recurrence of the lesion. The excised tissue was submitted for pathological assessment to confirm the diagnosis and rule out the possibility of salivary gland tumors.¹⁶

CONCLUSIONS

The overall evaluation showed that though scalpel surgery is the most economical means of mucocoele management, the postoperative complications pain and swelling, numbness of the lower lip in some cases limits its superiority over other techniques. Refrigerant spray and laser excision is a very appealing alternate treatment modality for the patient, due to its low level of discomfort, ease of doing and minimal postoperative complications. Mucocoeles treated with micro-marsupialization have its limitations like recurrence of the lesion and the irritation caused by the suture along with the accumulation of food and microbes adds to the existing problem. Though all the techniques used in this study are effective in healing the lesion, the time period varied. In pediatric dentistry, considering the importance of behavior management in minor oral surgical procedures, the refrigerant spray followed by laser was superior compared to other techniques.

Table 1: Comparison of four techniques for the treatment of mucocele

Treatment modality		Refrigerant Spray	Laser	Micro-marsupialization	Conventional
Number		10	14	12	16
Sex	Male	4	8	6	10
	Female	6	6	6	6
Etiology		Trauma	Trauma	Trauma	Trauma
Previous occurrence		No	No	No	No
Color		Normal	Normal	Normal	Normal
Location		Lower lip	Lower lip	Lower lip	Lower lip
Side of Lip	Left	4	7	5	9
	Right	6	7	7	7
Time taken for the procedure (in minutes)		12	20	6	30
Anesthesia		Topical	Infiltration	Topical	Infiltration
Intraoperative pain		No	No	No	No
Complications					
Nerve injury		No	No	No	Yes
Infection		No	No	No	No
Minor salivary gland trauma		No	No	No	Yes (2)
Postoperative swelling/edema		No (all)	Yes (all)	No (all)	Yes (all)
Healing period (Mean)		10 day	7days	14 days	7 days

CONFLICT OF INTEREST

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

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