Micro-marsupialization: A minimally invasive technique for mucocele in children and adolescents

SK Sagari¹, KC Vamsi², D Shah³, V Singh⁴, GB Patil¹, S Saawarn⁵

Date of Web Publication 21-Dec-2012

Abstract

Background: Most common lesions seen in children are mucoceles. Different techniques have been described for their treatment; however, most of them are invasive.

Objective: Aim of the study was to compare the practicability of micro-marsupialization with surgical excision in treatment of mucoceles.

Materials and Methods: A pilot study was done on 15 patients to evaluate and compare variables like lesion evolution, surgical time period, healing, complications etc. when lesions were treated with micro-marsupialization and surgical excision.

Results: Most of the mucoceles diagnosed in this pilot study were found in lower lip. Amongst cases that were treated with micro-marsupialization, recurrence was seen only in one case, whereas there were 3 cases of recurrence seen in surgical excision group. No statistically significant difference was found between the treatment methods used.

Conclusion: Micro-marsupialization can be a non-invasive option to treat mucoceles in pediatric dentistry owing to its simplicity, fewer complications involved and as well that it's well-tolerated by patients.

Keywords: Micro-marsupialization, mucocele, surgical excision

Introduction

Mucocele is a most common type of salivary and soft-tissue cyst of minor salivary glands of lower lip that typically appear as a fluctuant, bluish, non-tender, sub-mucosal swelling with a normal overlying mucosa. [1][2] Although minor salivary glands are found in most parts of the oral cavity except the gingiva, mucoceles occur most commonly in the lower lip, probably due to the higher incidence of mechanical trauma in this region. [2]

Children are most commonly affected with equal gender predilection and with a clinical history of a painless swelling, often recurrent in nature that may be present for months or even years before the patient seeks treatment. [1][3]
Mucoceles of the minor salivary glands are rarely larger than 1.5 cm and are always superficially positioned [Figure 1]. In contrast, the lesions arising from deeper areas such as the floor of the mouth (Ranula) is considerably larger, creating problems such as discomfort, interference with speech, mastication, and swallowing. [4]

![Figure 1: Mucocele in lower lip](image)

The lesions are classified histologically as mucus extravasation and mucus retention phenomenon, depending on the presence of epithelial lining in the microscopic analysis. Different techniques have been described for the treatment for mucoceles, [5] but most of them stress on surgical excision. [6,7] Therefore, the aim of this article was to compare the practicability of the technique of micro-marsupialization with surgical excision in the treatment for mucoceles and its use as a substitute therapeutic approach for pediatric patients in particular.

**Materials and Methods**

A prospective study was done on 15 patients aged between 8 to 15 years. These patients were diagnosed with mucoceles at various sites in a private center from January 2010 to January 2012. After taking the medical history and relevant data (name, age sex, location, duration, associated symptoms etc.), the patients were divided into two groups depending on the data for the treatment of mucocele i.e., either by micro-marsupialization or surgical excision.

Micro-marsupialization was performed in 8 cases according to the following technique: The area was disinfected with a povidone iodine 0.1 solution; 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 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. To prevent a secondary infection at the site of the suture, the patient was advised to apply 0.5% chlorhexidine gel postoperatively. The sutures were removed after 1 week post operatively.

The conventional surgical technique was carried out in the other 7 cases under local infiltrative anesthesia with a scalpel. The excision included the associated overlying mucosa and glandular tissue down to the muscle layer [Figure 2]. The sutures were removed after 7 post-operative days, and fol-
low-up was done for both the groups for treatment outcome. From the records, the following data were obtained: Age, location, color, consistency and size of the lesion (maximum diameter). Evolution of lesion, surgical time period, and time taken for lesion to heal post-operatively and complications (nerve injury, infection, recurrence, inclusion cysts, and minor salivary gland damage) of procedures were as well noted. The data between groups were analyzed by Chi-square tests.

Results

Of the 15 cases used in the study, mean age of patients in group 1 was 10.10 ± 2.43 years (range 8-15 years) and for group 2, it was 11.14 ± 2.17 years (range 8-14 years) [Table 1]. [Table 2] summarizes comparison of various variables between both the groups. Mean time for evolution of mucocele treated by micro-marsupialization was 8 ± 2.61 weeks (with range of 4-12 weeks) and for surgical excision, it was 7 ± 1.0 (with range of 6-8 weeks). Surgical time required for group 1 was 7.4 ± 1.7 minutes, and for group 2 was 36.4 ± 6.9 minutes. Even though there were differences seen in the time taken for the procedures in both groups, there was no statistically significant difference seen. This could be attributed to the smaller sample size used in this pilot study. There was no statistical significance difference between both the groups in lesion evolution or post-operative healing between both the groups [Table 2].

<table>
<thead>
<tr>
<th>Groups</th>
<th>Group 1 (Micro-marsupialization)</th>
<th>Group 2 (Surgical excision)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>8.0</td>
<td>10.5</td>
</tr>
<tr>
<td></td>
<td>11.0</td>
<td>13.0</td>
</tr>
<tr>
<td></td>
<td>8.0</td>
<td>9.0</td>
</tr>
<tr>
<td></td>
<td>9.0</td>
<td>14.0</td>
</tr>
<tr>
<td></td>
<td>12.0</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td>9.0</td>
<td>8.0</td>
</tr>
<tr>
<td></td>
<td>15.0</td>
<td>11.0</td>
</tr>
<tr>
<td></td>
<td>8.8</td>
<td></td>
</tr>
<tr>
<td>Mean±SD</td>
<td>10.10±2.431</td>
<td>11.14±2.174</td>
</tr>
<tr>
<td>Kolomogorov-Smirnov Z</td>
<td>0.847</td>
<td>0.430</td>
</tr>
<tr>
<td>P-value, Significance</td>
<td>0.467, NS</td>
<td>0.993, NS</td>
</tr>
</tbody>
</table>

Table 1: Distribution of age groups in study population
Table 2: Distribution and comparison of variables

<table>
<thead>
<tr>
<th></th>
<th>Lesion evolution (in weeks)</th>
<th>Surgical time period (in minutes)</th>
<th>Post-operative healing (in days)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group 1</td>
<td>Group 2</td>
<td>Group 1</td>
</tr>
<tr>
<td>n</td>
<td>8</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Minimum</td>
<td>4</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Maximum</td>
<td>12</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Mean±SD</td>
<td>6.6±2.619</td>
<td>7±1.0</td>
<td>7.46±1.71</td>
</tr>
<tr>
<td>Kolomogorov-Smirnov Z</td>
<td>0.431</td>
<td>0.714</td>
<td>0.349</td>
</tr>
<tr>
<td>P value, Significance</td>
<td>0.992 NS</td>
<td>0.688 NS</td>
<td>1.000 NS</td>
</tr>
</tbody>
</table>

*NS=Non significant

Distribution and comparison of characteristics of lesion used in both the groups are summarized in [Table 3]. Comparison of complication between the groups was done using Chi-square test [Table 4]. Three cases of recurrence were seen in surgical excision group, whereas with micro-marsupialization, 1 case of recurrence was seen. There were no statistically significant differences seen in occurrence of complications between the groups.
<table>
<thead>
<tr>
<th>Location</th>
<th>Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 Lower lip</td>
<td>0.889, df=4, P=0.926, NS</td>
</tr>
<tr>
<td>Soft palate</td>
<td></td>
</tr>
<tr>
<td>Floor of mouth</td>
<td></td>
</tr>
<tr>
<td>Buccal mucosa</td>
<td></td>
</tr>
<tr>
<td>Group 2 Lower lip</td>
<td>1.143, df=1, P=0.285, NS</td>
</tr>
<tr>
<td>Soft palate</td>
<td></td>
</tr>
<tr>
<td>Floor of mouth</td>
<td></td>
</tr>
<tr>
<td>Buccal mucosa</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Color of lesion</th>
<th>Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 Blue</td>
<td></td>
</tr>
<tr>
<td>Pink</td>
<td></td>
</tr>
<tr>
<td>Group 2 Blue</td>
<td></td>
</tr>
<tr>
<td>Pink</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consistency of the lesion</th>
<th>Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 Soft</td>
<td>3.733, df=2, P=0.155, NS</td>
</tr>
<tr>
<td>Elastio</td>
<td></td>
</tr>
<tr>
<td>Group 2 Soft</td>
<td></td>
</tr>
<tr>
<td>Elastio</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diameter (in mm)</th>
<th>Chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 2×2</td>
<td></td>
</tr>
<tr>
<td>3×3</td>
<td></td>
</tr>
<tr>
<td>4×3</td>
<td></td>
</tr>
<tr>
<td>4×4</td>
<td></td>
</tr>
<tr>
<td>4×5</td>
<td></td>
</tr>
<tr>
<td>5×4</td>
<td></td>
</tr>
<tr>
<td>5×5</td>
<td></td>
</tr>
<tr>
<td>Group 2 2×2</td>
<td></td>
</tr>
<tr>
<td>3×3</td>
<td></td>
</tr>
<tr>
<td>4×3</td>
<td></td>
</tr>
<tr>
<td>4×4</td>
<td></td>
</tr>
<tr>
<td>4×5</td>
<td></td>
</tr>
<tr>
<td>5×4</td>
<td></td>
</tr>
<tr>
<td>5×5</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Distribution and comparison of characteristics of lesion
Table 4: Comparison of complication between micromarsupialization technique with conventional surgical excision

<table>
<thead>
<tr>
<th>Complications</th>
<th>Group 1 (n=8)</th>
<th>Group 2 (n=7)</th>
<th>Chi-square</th>
<th>P value and significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve injury</td>
<td>0</td>
<td>1</td>
<td>8</td>
<td>–</td>
</tr>
<tr>
<td>Infection</td>
<td>0</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Recurrence</td>
<td>1</td>
<td>3</td>
<td>1.143, df=2 P=0.565, NS</td>
<td>–</td>
</tr>
<tr>
<td>Inclusion cysts</td>
<td>0</td>
<td>0</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Minor salivary gland damage</td>
<td>0</td>
<td>1</td>
<td>8</td>
<td>–</td>
</tr>
</tbody>
</table>

Discussion

Mucoceles are a fairly common oral pathological condition in children, although not associated with significant morbidity; they can be the cause of discomfort, especially in the pediatric population. Mucoceles are classified as mucus extravasation phenomenon and mucus retention. Extravasation mucoceles are caused by a leaking of fluid from surrounding tissue ducts or acini, which is commonly seen in minor salivary glands due to trauma. [1] [2] [3] [4]

Bagan et al. [5] proposed 3 evolutionary phases for extravasation mucocele. In the first phase, mucous spills diffusely from the excretory duct into conjunctive tissues where some leukocytes and histiocytes are found. Granulomas appear during the resorption phase due to histocytes, macrophages, and giant multinucleated cells associated with a foreign body reaction. In the final phase, connective cells form a pseudcapsule without epithelium around the mucosa. [6] Retention mucoceles are formed by dilation of the duct secondary to its obstruction or caused by a sialolith or dense mucosa. The majority of retention cysts develop in the ducts of the major salivary glands. [7]

Surgical approach is the most common treatment of mucocele and depends on various feature; most important is the size of the lesion. [10] Mucoceles can be treated. Surgical excision of mucocele is most commonly employed; however, electrosurgery, cryosurgery, laser vaporization, or laser surgery are also proven to be equal results. [4]

There are 3 possible surgical approaches to manage mucoceles of the lips, cheeks, and palate: 1) completely excision, 2) marsupialization, 3) dissecting. [9] Lesion can be excised completely or be treated with marsupialization, because excision or dissection is problematic and risks vital structures such as the labial branch of the mental nerve; however, this technique can be used treating mucoceles that affect the palate, as the surgical access can be problematic. [9] [10]

Marsupialization is a surgical technique that involves incising into a cyst and suturing the edges of the following slit to form a continuous surface from the exterior to the interior of the cyst. [11] Micromarsupialization is a minimally invasive technique carried out under topical anesthesia, and the procedure is carried out by draining the accumulated saliva and creating a new epithelialized tract
along the path of the sutures; however, the required procedure time is approximately 3 min with no tissue damage or inflammation. [6][11]

Although micro-marsupialization has been described in the literature since 2000, mainly for the treatment for ranulas, [11] its use in the treatment for other mucoceles has been limited. In this study, 87.5% showed full resolution when treated with micro-marsupialization, whereas 57% showed full resolution when treatment was carried out by surgical excision. [6] The cases that showed recurrence in both the groups were later treated by a surgical excision. [6][11]

Sandrini et al. [12] has suggested that the sutures be maintained for 30 days, but further studies have shown that keeping sutures for such long periods in children will be a cause of discomfort and infection because of suboptimal oral hygiene. In this study, sutures were placed for 4-5 days in all of the cases, out of which 7 showed full regressions. [4] Apart from the shorter post-operative healing period, the treatment of mucocele carried out by micro-marsupialization also has the advantage of a shorter surgical time than that carried out by surgical excision. [4][12]

Conclusion

The present study shows that micro-marsupialization as a treatment option instead of surgical excision in children has certain advantages such as no need of infiltrative anesthesia, shorter surgical time, shorter post-operative healing period, and patient's tolerance is better.

References

8. Bagán Sebastián JV, Silvestre Donat FJ, Peñarrocha Diago M, Milián Masanet MA. Clinico-

