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ORIGINAL ARTICLE

Comparison of a minimal invasive technique micro-marsupialization versus surgical excision for mucocele of lower lip.

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ABSTRACT… Objective: To compare the efficacy of micro-marsupialization with surgical excision for the treatment of mucoceles originating from the minor salivary glands of the lower lip. Our primary endpoints were the mean procedural time and the duration of post-operative healing. **Study Design:** Randomized Controlled Trial (RCT). **Setting:** Department of Oral and Maxillofacial Surgery, Faisalabad Medical University, Faisalabad. **Period:** 1st July 2022 to 31th Dec 2022. **Material & Methods:** We enrolled a total of 60 patients, with 30 in each group (Group X: micro-marsupialization, Group Y: surgical excision). Random allocation was performed using a lottery method. Procedural time (in minutes) and post-operative healing duration (in days) were recorded for both groups, with follow-up assessments conducted over a 3-month period. **Results:** The study comprised 60 patients (40 males and 20 females) with a mean age of 34.60±10.15 years in Group X and 36.03±9.25 years in Group Y. In Group X, the mean surgical time was 6.23±0.935 minutes, while in Group Y, it was 34.70±2.493 minutes. A statistically significant difference in surgical time was observed between the two groups (p 0.0001). Regarding post-operative healing, Group X had a mean duration of 4.67±0.844 days, while Group Y had a mean duration of 6.57±0.504 days. A statistically significant difference was also noted in post-operative healing duration between the two groups (p 0.008). **Conclusion:** This study underscores the superiority of micro-marsupialization over surgical excision as a treatment option for mucoceles originating from the minor salivary glands of the lower lip. Micro-marsupialization offers several advantages, including significantly shorter procedural times and faster post-operative healing periods.

Key words: Minor Salivary Glands, Mucocele, Micromarsupialization, Post-surgical Healing Duration, Surgical Excision.

INTRODUCTION

Most commonly occurring benign lesion in the minor salivary glands of the lower lip is mucocele.[1,2] Clinical characteristics include a well-defined, bluish, fluctuant, non-tender cystic swelling, which has a normal overlying mucosa.[3] The underlying causes of mucocele development are minor salivary gland duct obstruction or trauma. Microscopically, mucoceles are classified as mucous retention cysts and mucous extravasation cysts. The former, considered as pseudocysts, result from traumatic events such as lip biting, while the latter are true cysts that occur from the blockage of ducts of minor salivary glands leading to retention of glandular secretions.[4]

Extravasation mucoceles exhibit a higher prevalence in individuals below the age of 30, constituting more than 80% of all mucocele cases, while retention mucoceles have a lower occurrence rate comprising approximately 20% of cases and are more common in older patients.[5] Within the oral cavity, the mucosa of the lower lip has a high frequency of involvement, however, mucoceles can also manifest in other regions of the oral cavity including the buccal mucosa, palate, tongue, and floor of mouth.[5] The prevalence of oral mucocele in American population is reported as 0.25%, 0.08% in Brazil, and 0.11% in Sweden. Mucocele is considered as the 17th most commonly encountered lesion in the oral cavity.[6]

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Different treatment approaches have been described for mucocele management. The conventional procedure is the surgical excision of mucocele and the removal of associated glands. However, considering various postoperative complications, alternative therapeutic approaches, such as micro marsupialization, which presents reduced morbidity and enhanced outcomes, have been suggested in scholarly literature.[1,7]

Micromarsupialization represents a non-surgical technique involving the passage of a 3.0 silk suture through the internal part of the lesion at its widest diameter. By the application of finger pressure at the site from where the needle penetrates the lesion, the accumulated fluid is extravasated and a surgical knot is made keeping a space between the lesion and the knot and left in situ for a period of 20 days. A new epithelial tract is formed along the path of the suture leading to the resolution of the lesion.[2,7,8] Micromarsupialization is a less invasive, economically effective, and less extensive surgical procedure.[7] It takes less time for the procedure and can be readily performed without general anesthesia on an outpatient basis in both adult and pediatric patients.[2] Studies have shown that the average surgical time is 7.46 ± 1.71 minutes required for micromarsupialization, compared to 36.4 ± 6.901 minutes for surgical excision. Furthermore, the duration of post-operative healing is documented as 4.5 ± 0.535 days for micromarsupialization, in contrast to 6.29 ± 0.95 days for surgical excision.[9]

The primary goal of this research is to conduct a comparative analysis between micromarsupialization, an alternative less invasive technique, and conventional surgical excision for management of mucoceles. Micromarsupialization technique has numerous advantages, and these include minimal morbidity, diminished recurrence potential, shorter surgical duration, fast postoperative recovery and enhanced patient tolerance.

MATERIAL & METHODS

This study was conducted in the Oral and Maxillofacial Surgery Department at Faisalabad Medical University, Faisalabad. The duration of the study was six months. The sample size was determined using the WHO sample size calculator for 2 means, considering an anticipated population mean of 4.5 and a test value of the population mean of 6.29. The pooled standard deviation was 0.77, with a power of study set at 90% and a level of significance of 5%. The final sample size for the study was 60 participants, with 30 individuals assigned to each group.

The study design was a Randomized Controlled Trial, with the sampling approach being non-probability consecutive sampling. Medical history and related data of the patients were collected and patients were categorized in two groups for performing micromarsupialization or surgical excision. The study included patients diagnosed with a recently occurring mucocele originating from the minor salivary glands on the lower lip, with a fluid-filled consistency and sessile base with an age range of 15 to 50 years of any gender.

Conversely, patients diagnosed with mucoceles of a fibrous consistency were excluded from the study. Patients who were compromised medically such as uncontrolled diabetes, cardiovascular problems and liver disease were also excluded. Patients who presented with a recurrence of mucocele were also excluded from the study. Patients with habits of smoking, alcohol, and tobacco abuse were not included as well. Non-compliant patients for follow-up visits were not considered for participation in the study.

RESULTS

This study included a total of 60 patients comprising 40 males and 20 females. The distribution of patients in both groups based on gender is summarized in Table-I. The mean age of the patients in group X was 34.60±10.15 years and 36.03±9.25 years in group Y, (age range of 19-50 years). The majority of the study cases were within the 40-50 years age range. Furthermore, the mucoceles were predominantly blue in color for most patients (a total of 44 patients, 21 patients in group X and 24 patients in group Y), as shown in Table-I. The consistency of the mucoceles was soft for the majority of patients (45 patients in total,

with 21 in group X and 23 in group Y). The mean surgical time required was 6.23±0.935 minutes in group X and 34.70±2.493 minutes in group Y (Table-I). A statistically significant difference was observed in the surgical time between the two groups (p 0.0001). The mean healing time was 4.67±0.844 days in group X and 6.57±0.504 days in group Y. A significant difference of time was noted statistically in postoperative healing among two groups (p 0.008). Furthermore, the average surgical duration and healing period were categorized based on age, gender, color and consistency of mucoceles as presented in Table-I. These findings provide important insights into the surgical outcomes of the study participants, highlighting significant differences in surgical and healing times between groups X and Y. Further details on the stratified analysis can be found in Table-II.

DISCUSSION

Oral mucocele manifests as saliva accumulation due to obstruction or blockage of minor salivary gland ducts. The condition usually manifests with a rapid onset, fluctuates in size, and has a tendency to spontaneously resolve over time.[1] Oral mucoceles are usually painless lesions and are located most commonly on the lower lip.[2]

	Characteristics	Group X	Group Y	P-Value
Gender (n=60)	Male (n=40)	21	19	0.341
	Female (n=20)	9	11	
Age (n=60) (years)	<20 Years (n=9)	6	3	0.341
	21-30 Years (n=12)	7	5	
	31-40 Years (n=15)	6	9	
	41-50 Years (n=24)	11	13	
	Mean Age	34.60±10.15	36.03±9.25	
Color (n=60)	Blue	6	3	0.386
	Pink	7	5	
Consistency (n=60)	Soft (n=45)	21	24	0.371
	Elastic (n=15)	9	6	
Mean Surgical Time (n=60) (mins)		6.23±0.935	34.70±2.493	0.0001
Mean Healing Duration (n=60) (days)		4.67±0.844	6.57±0.504	0.008

Table-I. Summary of case distribution and outcomes

	Characteristics	Group X	Group Y	P-Value
Gender (n=60)	Male	6.19±0.981	35.10±2.355	0.000
	Female	6.33±0.866	34.00±02.683	0.008
Age (n=60)	<20 Years (n=9)	6.17±0.98	33.6±3.05	0.044
	21-30 Years (n=12)	6.14±0.90	36.20±1.92	0.219
	31-40 Years (n=15)	6.33±1.21	34.67±2.29	0.154
	41-50 Years (n=24)	6.27±0.91	34.38±0.73	0.002
Color (n=60)	Blue	6.10±0.944	34.9±2.688	0.000
	Pink	6.56±0.882	33.86±1.574	0.373
Age-wise mean healing duration (n=60)	<20 Years (n=9)	5.50±1.64	6.33±1.16	0.004
	21-30 Years (n=12)	5.29±1.38	6.40±0.55	0.015
	31-40 Years (n=15)	5.67±0.52	5.78±1.20	0.075
	41-50 Years (n=24)	4.55±0.82	6.15±0.99	0.667
Color-wise mean healing duration (n=60)	Blue	4.95±1.16	6.13±0.87	0.056
	Pink	5.56±1.13	6.00±1.41	0.514
Consistency-wise mean healing duration (n=60)	Soft (n=45)	5.19 ±1.21	6.08±1.06	0.174
	Elastic (n=15)	5.00 ±1.18	6.17±0.75	0.267

Table-II. Summary of case stratification and outcomes

On a clinical basis, oral mucoceles can be divided into two types: Superficial mucoceles present superficially in the mucosa and classical mucoceles appearing in the upper submucosa. Superficial mucoceles are bluish colored, fluid-filled like swelling, whereas the classical mucoceles are present deep, nodular in nature and seen as normal pink colored mucosa.[4]

Mucoceles exhibit variability in size, with the potential to remain stable in size over a period of several months. Without intervention, these lesions have the potential to undergo alterations in their size, characterized by reaching to a very small size or significant enlargement resulting from rupture and mucin production.[10]

The pathological formation of mucocele occurs due to trauma from lip biting, which causes a breach of the salivary duct. Consequently, the excretory duct of a salivary gland ruptures and accumulation of saliva occurs within the surrounding tissues, ultimately resulting in the formation of a mucocele.[6]

Depending on the size of the lesion, surgical method is the most common treatment option employed for mucocele. However, cryosurgery, electrosurgery, and laser surgery have also been proven techniques with good results.[9]

Various surgical options for the treatment of mucoceles diagnosed on the lips, cheeks, and palate are:

1. Surgical excision
2. Marsupialization
3. Dissection

Small mucoceles can be successfully treated through surgical excision of the lesion. However, this method carries a higher risk of mucocele recurrence. On the other hand, for larger mucoceles, the most appropriate treatment approach is marsupialization, which involves an unroofing procedure. Marsupialization is preferred over other methods such as excision or dissection due to the inherent challenges and potential risks associated with the latter methods, such as the potential damage to vital structures. It is important to note that the marsupialization technique is also associated with an increased incidence of mucocele recurrences.[9]

Micromarsupialization is a non-surgical and less invasive technique performed under local anesthesia. In micromarsupialization, a 3.0 silk suture is passed through the inner surface of the lesion from its wide base and then the lesion is compressed to drain the fluid by applying digital pressure. A surgical knot is subsequently secured, leading to the formation of a newly epithelialized tract that follows the trajectory of the suture. The procedure can be completed in a short time of at least 3 minutes, and it causes less tissue injury and fibrosis.[11]

This research aimed to compare the efficacy of micro-marsupialization with that of surgical excision in the treatment of mucoceles originating from minor salivary glands of the lower lip, focusing on the mean procedure time and post-operative healing duration. A total of 60 patients with a diagnosis of mucocele were selected and divided in two groups, with 40 male and 20 female patients. The average age of study participants in group X was calculated as 34.60±10.15 in and 36.03±9.25 in group Y, ranging from 19 to 50 years. Mostly, the patients were within the 40-50 years of age range, consistent with findings from previous studies. For instance, a study by Sabrina M et al. reported an age range of 12-50 years with a mean age of 29.25 and a standard deviation of 11.57.

A majority of patients in both groups presented mucoceles with blue coloration, with a total of 44 patients. Additionally, the consistency of the mucocele was predominantly soft, with a total of 45 patients affected, including 21 in group X and 23 in group Y. The mean surgical time of the procedure in group X was 6.23±0.935 minutes, while it was 34.70±2.493 minutes for group Y. A significant difference in the surgical time of the procedure between the two groups was observed (p 0.0001). Regarding mean post-surgical healing duration, group X has a value of 4.67±0.844 days, whereas group Y has 6.57±0.504 days. There was a significant difference in healing duration

between the two groups (p 0.008).

The results of this study are in accordance with the results of a study previously performed by Sagari et al., where patients treated with micro marsupialization exhibited a mean time for mucocele resolution of 8 ± 2.61 weeks (ranging from 4 to 12 weeks), while surgical excision resulted in a mean time of 7 ± 1.0 weeks (ranging from 6 to 8 weeks). The procedural surgical time for group X averaged 7.4 ± 1.7 minutes, whereas for group Y, it extended to 36.4 ± 6.9 minutes. This pilot study employed a small sample size which may have contributed to these results. There was no statistically significant difference in the lesion resolution or duration of post-operative healing between the two groups.

CONCLUSION

The findings of this study indicated that micromarsupialization may offer several advantages over surgical excision as a therapeutic approach for mucoceles arising from the minor salivary glands. These advantages are the short procedural time of the technique employed, reduced post-operative healing period and low recurrence rate. This method is simple, easy to perform for the operator, has less postoperative complications and good patient's tolerance.

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3	Saad Hameed	Data collection and analysis.	
4	Malik Muhammad Usama	Data collection and analysis.	
5	Muhammad Shafique Ashraf	Revision and proofreading.