Comparison of Micromarsupialization and Modified Micromarsupialization for the Management of Mucocoele of Lower Lip: A Prospective Randomized Clinical Trial

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Abstract

Background This study was undertaken to compare micromarsupialization and modified micromarsupialization for the management of mucocoeles.

Materials and Methods A prospective randomized clinical study was done on thirty patients having mucocoele on lower lip. In Group A ($n = 15$), micromarsupialization and in Group B ($n = 15$), modified micromarsupialization technique was used. The outcome variables were duration of surgery, intraoperative pain, postoperative pain, healing and recurrence. t test and p values were used to compare the age, duration of lesion, duration of treatment and time taken for healing. The results were expressed as mean with SD. Statistical significance was established at the $p \leq 0.05$ level. Analysis of pain (intraoperative, on 3rd, 7th day), intraoperative bleeding and recurrence was done using Fischer's exact test ($p = 0.875$, NS).

Results The average duration of treatment for Group A was 4.10 ± 0.39 min and for Group B was 5.33 ± 0.2 min. The difference was found to be statistically highly significant (p value ≤ 0.000). The observed power was 1.000. The difference in the intraoperative and postoperative pain on 3rd and 7th day was not found to be significant as per Fischer's exact test. The mean time taken for healing of the surgical site in Group A was

7.47 ± 0.64 days and in Group B was 9.87 ± 1.88 days, and the difference was found to be highly significant. The observed power was 0.995.

Conclusions Modified micromarsupialization appears to be a safe technique for the management of mucocoeles. However, in comparison with micromarsupialization, it has a higher operating and healing time.

Keywords Micromarsupialization · Modified micromarsupialization · Mucocoele · Ranula

Introduction

Mucocoele is a common lesion of oral mucosa that results from mechanical trauma, usually to the minor salivary glands causing mucous accumulation [1]. Generally, they affect children and adults and can appear at any site of oral mucosa containing minor salivary glands. The lower lip is the most common region affected by mucocoeles (81.9%) [2, 3].

Mucocoeles do not usually cause significant problems, but they interfere with speech, mastication and swallowing. Discomfort may occur depending on the size and location of the mucocoele [4].

Several treatment options have been proposed for management of mucocoele like excision, excision with surgical removal of minor salivary gland, marsupialization, micromarsupialization, cryosurgery, laser ablation, steroid injection, injection of sclerosing agents and photoelectron radiation with varying degrees of success rates [5, 6]. However, none of the treatment is recurrence free and there is no consensus regarding the best treatment option.

Surgical excision of the mucocoele along with the associated salivary gland is the most preferred treatment

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modality. However, recurrence can occur by either incomplete removal or severance of surrounding minor salivary glands. Cardoso in 1974 suggested that micromarsupialization could be considered as a treatment modality for treating mucoceles. He suggested the placement of silk sutures into the dome of the cyst. Micromarsupialization is simple to perform, relatively atraumatic and well tolerated by the patient. It is believed that introduction of suture maintains an epithelial tract between the surface and the underlying glandular tissue preventing accumulation of fluid. Delbem et al. [5] popularized micromarsupialization for management of mucoceles in pediatric patients. Recurrence has been reported with this technique too.

Francisco et al. [6] suggested a modified micromarsupialization technique for the management of ranulas. They hypothesized that, by increasing the number of sutures, the number of epithelialized drainage pathways is increased and suggested that the exact number of sutures may vary according to the size of the lesion. Till now modified micromarsupialization has not been used for the management of mucoceles to the best of our knowledge and a literature search did not show any study comparing micromarsupialization and modified micromarsupialization. Hence, the present study was undertaken to compare micromarsupialization and modified micromarsupialization for the management of mucoceles of lower lip.

Materials and Methods

A prospective randomized clinical study was done on 30 patients diagnosed to have mucocele on lower lip, who reported to the Department of Oral and Maxillofacial Surgery, between August 2008 and September 2012. Diagnosis was done based on history and clinical presentation.

Lesions with fibrous consistency, traumatized surface and pedunculated base, history of earlier surgical intervention and those found on palate, buccal mucosa, tongue, floor of the mouth and with dimension <5 mm were not included in our study.

Patients were randomly divided into Group A and Group B by flip of a coin. In Group A ($n = 15$), patient were treated with micromarsupialization and in Group B ($n = 15$), patients were treated with modified micromarsupialization.

Surgical Procedure

The surgical site was prepared with 5% povidone iodine and topical anesthetic (2% xylocaine jelly) applied for 5 min. In Group A, 4-0 silk suture was given along the

widest diameter through the internal part of the lesion (Figs. 1, 2, 3, 4). The suture was removed on 7th day in both the groups. In Group B, maximum possible number of 4-0 silk sutures were placed (3–5 in our study) maintaining a short distance between entry and exit (Figs. 5, 6, 7). In both the groups, care was taken while tying the knot to avoid strangulation of mucosa for prevention of necrosis and loss of the suture. Postoperatively, same topical anesthetic preparation (2% xylocaine jelly) was prescribed for both the groups, to be applied at the surgical site thrice a day for 5 days.

Outcome Variables

The outcome variables were duration of surgery, intraoperative pain, postoperative pain, healing and recurrence. Duration of surgery was defined as total time taken from application of local anesthetic to placement of last suture. Pain was assessed on 1st, 3rd and 7th postoperative day. Assessment was done by using a 10-cm visual analogue scale (VAS). A printed 10-cm scale marked from 0 to 10 with 1 cm markings was used. All patients were informed to report every day from second day to 2 weeks postoperatively for evaluation of healing of surgical site. Recurrence was assessed at 1, 3 and 6 months.

Statistical Analysis

t test and *p* values were used to compare the age, duration of lesion, duration of treatment and time taken for healing. The results were expressed as mean with SD. Statistical significance was established at the $p \leq 0.05$ level. Analysis of pain (intraoperative, on 3rd, 7th day) and recurrence was done using Fischer's exact test ($p = 0.875$, NS).

Fig. 1 Mucocele of right lower lip

Fig. 2 Micromarsupialization—suture passed through the center of the lesion

Fig. 3 Micromarsupialization—immediate postoperative

Fig. 4 One month postoperative (Group A)

Fig. 5 Mucocoele of left lower lip

Fig. 6 Modified micromarsupialization with three sutures through the center of the lesion

Fig. 7 One month postoperative (Group B)

Results

A total of thirty individuals with age ranging from 16 to 47 years were selected who satisfied the inclusion and exclusion criteria.

In all but one case, the etiology was known. Lip biting was found to be the major cause in both the groups (40% in each group) followed by sports injury (26.7% in Group A and 20% in Group B) and assault (13.3% in each group).

In both the groups, right side was found to be more common than left side. There were a total of 11 cases (36.6%) involving left side when compared to 19 cases (63.3%) involving the right side. The size of the lesion was categorized in two groups; 0–10 mm and more than 10 mm. A total of 16 (53.3%) lesions were found to be <10 mm with eight lesions each in Group A and B. A total of 14 (46.7%) lesions were more than 10 mm in size with seven each in Group A and B.

The mean duration of the lesion before the patient reported to the hospital in Group A was 8.87 ± 3.00 weeks and in Group B was 9.93 ± 3.51 weeks, and the difference was found to be statistically insignificant (Table 1). The observed power was 0.139.

The average duration of treatment for Group A was 4.10 ± 0.39 min and for Group B was 5.33 ± 0.2 min (Table 2). The difference was found to be statistically highly significant (p value is ≤ 0.000). The observed power was 1.000.

Suture came out in three patients from Group A on 3rd day and resuturing was done in these cases to maintain the suture till 7th day, while four patients from Group B lost 1 suture each on 4th day, but it was not replaced.

The difference in the intraoperative and postoperative pain on 3rd and 7th day was not found to be statistically significant as per Fischer's exact test (Table 3).

The mean time taken for complete healing of the surgical site in Group A was 7.47 ± 0.64 days and in Group B was 9.87 ± 1.88 days, and the difference was found to be highly significant (Table 4). The observed power was 0.995.

There was no recurrence in either group at 1 month. At 3 months, one case, and at 6 months, three cases, had recurrence from Group A. However, the difference was not statistically significant (Table 5).

Discussion

Mucocles are the second most frequent benign soft tissue lesion of the oral cavity, following irritative fibromas, with the incidence rate of 2.5 in 1000 persons [1–3]. Mucocle

is a mucus accumulation phenomenon, mainly of minor salivary glands. Mucous accumulation phenomenon has been classified into mucous extravasation cyst and mucous retention cyst. Mucocles are generally due to extravasation and is usually traumatic in origin. Mucous retention cyst is due to obstruction of the duct of minor or accessory salivary gland. Mucocles may involve the lip, cheek, tongue, palate, floor of the mouth and rarely retromolar area, and it has been observed that 44–79% of the mucocles occur on the lower labial mucosa [4]. As such there is no gender predilection, but the studies have shown varying degree of incidence among both the sexes. Delbem et al. [5] found a high predominance among females (85.7% females) but in our study, there was male predominance (66.7%) similar to Cecconi et al. [7].

Though, mucocles have been reported to occur more commonly in the first three decades it may be seen at any age [4, 7].

Many animal and human studies have shown the co relationship between local trauma and mucocle formation and in our study also lip bite was found to be the major cause in both the groups [8, 9].

Insufficient data exists in the literature regarding the site predilection. In our study, right side (66.7%) was found to be more commonly involved.

The reported average duration of the lesion ranges from 1 to 24 months [10]. In the present study, this ranged from 5 to 18 weeks with a mean of 8.87 in Group A and 9.93 in Group B.

Mucocles are usually asymptomatic, but in some cases they may cause some difficulty in speech, swallowing, or chewing [11, 12]. All the cases in the present study presented with the complaint of swelling in relation to lower labial mucosa.

Treatment options for mucocles include surgical excision with a scalpel, laser ablation, cryo surgery, steroid injections, sclerosing agents, marsupialization and micro-marsupialization [1, 13–16].

Surgical excision is the most preferred treatment for mucocles, but this treatment option is not free of recurrence due to incomplete removal or injury to the surrounding minor salivary glands [17].

Cryosurgery is one of the established non-surgical methods. The main advantages of this procedure are its simplicity, relative painlessness and low incidence of secondary infection, hemorrhage and recurrence. However, at

Table 1 Duration of lesion (in weeks)

Group	N	Minimum	Maximum	Mean	SD	Median	<i>t</i> value	<i>p</i> value
Group A	15	5	16	8.87	3.00	8.00	0.894	0.379
Group B	15	5	18	9.93	3.51	10.00		NS
Total	30	5	18	9.40	3.25	9.00		

Table 2 Duration of treatment (in min)

Group	<i>N</i>	Minimum	Maximum	Mean	SD	Median	<i>t</i> value	<i>p</i> value
Group A	15	3.5	4.5	4.10	0.39	4.000	5.819	0.000
Group B	15	4.0	6.5	5.33	0.72	5.500		HS
Total	30	3.5	6.5	4.72	0.85	4.500		

Table 3 Pain score

Pain score	0 No. of subjects	1 No. of subjects	2 No. of subjects	<i>p</i> value
Day 1				
Group A	6 (40.0%)	7 (46.7%)	2 (13.3%)	0.865 NS
Group B	5 (33.3%)	7 (46.7%)	3 (20.0%)	
Day 3				
Group A	13 (86.7%)	2 (13.3%)		0.390 NS
Group B	10 (66.7%)	5 (33.3%)		
Day 7				
Group A	15 (100%)			NS
Group B	15 (100%)			

NS not significant

Table 4 Time taken for complete healing of surgical site (in days)

Group	<i>N</i>	Minimum	Maximum	Mean	SD	Median	<i>t</i> value	<i>p</i> value
Group A	15	7.00	9.00	7.47	0.64	7.0000	4.670	0.000
Group B	15	7.00	14.00	9.87	1.88	10.0000		HS
Total	30	7.00	14.00	8.67	1.84	8.0000		

HS highly significant

Table 5 Recurrence at 1, 3 and 6 months

Recurrence	No. of cases	<i>p</i> value
Within 1 month		
Group A	0 (0.0%)	NS
Group B	0 (0.0%)	
1–3 months		
Group A	1 (6.7%)	0.500 NS
Group B	0 (0.0%)	
3–6 months		
Group A	3 (20.0%)	0.112 NS
Group B	0 (0.0%)	

NS not significant

times, two or more sittings may be required for complete regression of lesion [15, 18].

The recently introduced carbon dioxide (CO₂) laser offers a wide range of advantages which includes rapid and simple mucocoele ablation, short surgical time and minimum complications [16]. Precise cutting with minimal damage to adjacent tissue, especially the muscular layer, as well as coagulation of small vessels, ensures a bloodless field. The main disadvantage of the CO₂ laser is that the

equipment is expensive and that adequate measures must be taken for both the patient and the staff's protection.

High potency topical corticosteroids with or without immunosuppressive agents have also been tried with varying degree of success rate [19, 20]. Few studies have described the use of sclerosing agent OK-432 with the side effects of shock, fever and local inflammatory symptoms [21].

Marsupialization is one of the more classical procedures which are usually applied on large mucocoeles to avoid damage to neighboring anatomic structures with varying degree of recurrence rates [1, 13]. It also produces high degree of discomfort and requires hygienic care to prevent local infections.

Micromarsupialization is a less invasive alternative for pediatric patients. In a study by Delbem et al. [5], out of the 14 patients treated by this technique, 12 patients presented with full regression of mucocoeles (recurrence rate of 14.2%).

Modified micromarsupialization was proposed by Francisco et al. [6] for the management of ranula, with the added advantage of simplicity in execution, low invasiveness of the procedure and no special care during recovery.

Till now no studies have been published, to the best of our knowledge, evaluating its use in the management of mucocoele. In the present study, modified micromarsupialization took a slightly higher operating time and longer duration of healing than micromarsupialization and the difference was statistically highly significant. The reason could be placement of more number of sutures. There was no statistically significant difference regarding the intra-operative and postoperative pain after 3rd and 7th day between the two groups.

However, none of the patients treated with modified micromarsupialization had recurrence compared to micromarsupialization group, which had 26.7% recurrence. Though it was not histologically verified, multiple epithelialized channels created due to multiple sutures probably were the reason for this.

Loss of the suture may occur before 7th day, however, due to multiple sutures in modified micromarsupialization, replacement of the suture is not required but in micromarsupialization resuturing is required if the suture is lost before 7 days.

Conclusions

Even though the present study lacks in the number of cases, the advantages offered by modified micromarsupialization such as performance under topical anesthesia, ease of mastering and relatively uncomplicated healing with no recurrence appear to be significant. Modified micromarsupialization appears to be a safe technique for the management of mucocoeles. However, in comparison with micromarsupialization, it has a higher operating and healing time. Presently, the preferred method of treatment in our institution is modified micromarsupialization for the management of mucocoele.

Compliance with Ethical Standards

Conflict of interest None.

Ethical Approval Institutional ethical committee clearance was obtained for the study.

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