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Comparative Study of Pyogenic Granuloma Management with Conservative Sclerotherapy to Invasive Surgical Excision: A Randomized Clinical Trial

Sangita Pandey,[1] Neha Usman, [2] Muhammad Imran Saleh, [3] Muhammad Usman Akhtar[4]

Department of Oral and Maxillofacial Surgery, de'Montmorency College of Dentistry, Lahore;
Department of Oral and Maxillofacial Surgery, de'Montmorency College of Dentistry, Lahore;
Department of Oral and Maxillofacial Surgery, de'Montmorency College of Dentistry, Lahore;
Department of Oral and Maxillofacial Surgery, de'Montmorency College of Dentistry, Lahore.

ABSTRACT

Introduction: Pyogenic granuloma is a common benign reactive mucocutaneous lesion. Various treatment options like excision, sclerotherapy, cryotherapy, laser is widely practiced.

Objective: This study was conducted to determine and compare the effect of 3% sodium tetradecyl sulfate to surgical excision in the management of oral pyogenic granuloma.

Methods: The prospective randomized controlled trial was conducted among two equal randomly allocated groups (48 each) of histologically confirmed cases. Group A was treated by surgical excision while group B was treated by 3% STDS. Both groups were evaluated weekly for a month for pain and healing and 1st, 3rd & 6th for recurrence.

Pain score is statistically significant on 1st and 2nd week follow up. No clinical and statistical difference observed in pain on 3rd and 4th week. Clinically significant recurrence was observed in group 'A' (4.1%) than group 'B' on 3 months but was statistically insignificant. 1 recurrence was observed in group 'B' on 6 months whereas, 3 were reported from group 'A' in the same duration. Healing on 1st and 2nd weeks were comparable and statistically significant in both groups however the results failed to show any significant difference on 3rd and 4th week. The demographics showed mean age 30.97±12.4 years with 60.42% of incidence in female and the commonest site being mandibular anterior teeth (25%).

Conclusion: Although, surgical excision is commonly practiced, it is associated with higher recurrence, increased pain score & prolonged healing period. On contrary, sclerotherapy with 3% STDS proved to be safer, minimally invasive and more accepted by patients with minimum postoperative morbidity.

Keywords: Granuloma pyogenic; sclerotherapy; sodium tetradecyl sulfate; surgical excision

INTRODUCTION

Pyogenic granuloma is a common benign reactive mucocutaneous lesion, also found in other body parts like liver, blood vessels, neck or upper or gastrointestinal tract.[1] The term "pyogenic granuloma" was introduced by Hartzell in 1904.[2] Poncet and Dor in 1897, first described it as a vascularized mass.[3] Causative factors include trauma, chronic low-grade local irritation and hormonal effects.[4]

Correspondence
Sangita Pandey
Email: sangitasjon@gmail.com
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Clinical history, histopathologic and radiographic evaluations are essential for accurate diagnosis. The differential diagnosis includes granulation tissue, Focal Fibrous Hyperplasia, hemangioma, Kaposi's sarcoma or peripheral ossifying fibroma.[5] Histologically it exhibits granulation tissue and fibrinous exudate with overlying atrophic/hyperplastic/ulcerated epithelium. The stroma includes endothelium lined vascular spaces and inflammatory cell infiltrate sometimes with intranuclear inclusion bodies.[6]

Despite of various treatment options, surgical excision is still commonly practiced.[2] Sclerotherapy is now considered as a more conservative approach.[7] It induces controlled destruction of the tissue via thrombosis & denaturation by permanently destructing the endothelium of the targeted vascular structure.[8]

Literature reports varying recurrence rate after surgical excision ranging from 16-43.5%[9], 15.8%.[10] The higher recurrence rate may be due to poor oral hygiene, hormonal changes or trauma.[5] This study was conducted to determine and compare the effect of 3% sodium tetradecyl sulfate to surgical excision in terms of pain, healing & recurrence in the management of oral pyogenic granuloma.

METHODS

This study is prospective randomized clinical trial performed for 1 year at Oral and Maxillofacial Surgery department, de'Montmorency College of Dentistry, Lahore. Ethical clearance was taken from the Postgraduate Medical institute, Lahore. The sample size was calculated using following formula keeping the power of study 90% and level of significance 5%.

Where, $Z_{1-\beta}$ is the desired power of study = 90%; $Z_{1-\alpha/2}$ is the desired level of significance = 5%; P_1 is the anticipated proportion of MED12 mutations in cases = 20% ; P2 is the anticipated proportion of MED12 mutations in control group = 0% ; n is the calculated sample size in each group = 48.

Total 96 patients were randomly allocated in two equal groups after taking both written and verbal informed consent. Histopathological diagnosed cases of pyogenic granuloma of <4cm were included in the study while lesion >4cm size, pregnant women & medically compromised patients were excluded.

Variables like pain score and healing were assessed weekly for four weeks using Numeric Rating Scale and Landry's healing index respectively. Recurrence was evaluated clinically on 1st, 3rd & 6th months postoperatively and followed up for 6 months. The collected data were analyzed by SPSS version 25. Quantitative variables like age and pain score were presented as Mean ± SD and analyzed using independent sample t-test. Qualitative variables like healing and recurrence were presented as frequency and percentage and compared using Chi-square test/Fisher's Exact test. P value <0.05 was considered as significant.

Local anesthesia was injected at the site of lesion in both groups after disinfecting protocol. 'A' group lesions were excised from their base. 'B' group lesions were treated with 3% STDS, injected slowly into or base of the lesion by using insulin syringe (0.8×3mm, 31G) at rate of 1ml/cm^3. Needed supportive therapy e.g.: antibiotics, NSAIDs, oral hygiene instructions and 0.12% chlorhexidine mouthwash were advised.

RESULTS

Pain score was statistically significant with p value 0.00 on 1st week and 0.02 on 2nd week follow up (Table 1). No clinical and statistical difference was observed in pain on 3rd and 4th week follow up. Clinically significant recurrence (4.1%) was observed in group 'A' in comparison to group 'B' (0%) on 3 months follow up but it is statistically insignificant (p value 0.24, >0.05). One recurrence was observed in group 'B' on 6 months follow up which presented as mild gingival hyperplasia whereas, 3 recurrences were reported from group 'A' in the same duration of follow up (Table 2). Healing on 1st and 2nd weeks are comparable and statistically significant with p value 0.001 and 0.004 respectively in both groups however, the results failed to show any significant difference on 3rd and 4th week follow up as p value is 0.02 and 0.49 respectively (>0.05) (Table 3). Preoperative demography showed 60.42% of incidence in female and 39.58% in male. The age ranged from 13-60 years with mean age 30.97±12.4 years. The commonest site for occurrence included mandibular anterior teeth accounting 25% incidence (Table 4).

Table 1: Independent t-test for pain analysis.

Groups Follow up	Surgical excision (A) (n=48)	Sclerotherapy (B) (n=48)	p value
	Mean±SD	Mean±SD	
1st week	0.77±1.49	0.23±0.51	0.00
2nd week	0.19±0.49	0.02±0.14	0.02

*There was no pain on 3rd and 4th week follow up in both groups.

Table 2: Fischer exact test for analysis of recurrence in between two groups.

Groups	Surgical excision (A) (n=48)		Sclerotherapy (B) (n=48)		p value
Follow up	Frequency	Percentage	Frequency	Percentage	
1 month	0	0.0%	0	0.0%	-
3 months	2	4.1%	0	0.0%	0.24
6 months	3	6.25%	1	2.08%	0.30

Table 3: Fischer exact test for comparison of healing between two groups Landry Healing Index.

Groups		Surgical excision (A) (n=48)		Sclerotherapy (B) (n=48)		p value
Healing follow up		Frequency	Percentage	Frequency	Percentage	
1st week	Very poor	3	6.3%	0	0.0%	0.001
	Poor	9	18.8%	2	4.1%	
	Good	27	56.3%	20	41.7%	
	Very good	9	18.8%	24	50.0%	
	Excellent	0	0.0%	2	4.2%	
2nd week	Very poor	1	2.1%	0	0.0%	0.004
	Poor	3	6.3%	1	2.1%	
	Good	22	45.8%	10	20.8%	
	Very good	21	43.8%	29	60.4%	
	Excellent	1	2.1%	8	16.7%	
3rd week	Very poor	0	0.0%	0	0.0%	0.02
	Poor	2	4.2%	0	0.0%	
	Good	10	20.8%	4	8.3%	
	Very good	21	43.8%	16	33.3%	
	Excellent	15	31.2%	28	58.3%	
4th week	Very poor	0	0.0%	0	0.0%	0.49
	Poor	0	0.0%	0	0.0%	
	Good	3	6.3%	1	2.0%	
	Very good	10	20.8%	8	16.7%	
	Excellent	35	72.9%	39	81.3%	

Table 4: Distribution of site predilection in the incidence of oral pyogenic granuloma.

Variable (Site)		Frequency	Percentage
Maxilla	Labial surface	20	20.8%
	Buccal surface	18	18.8%
	Posterior palate	9	9.4%
	Edentulous	1	1%
Mandible	Labial surface	24	25%
	Buccal surface	4	4.2%
	Anterior lingual	18	18.8%
	Posterior lingual	2	2.1%

DISCUSSION

The peak incidence was seen in third decades of life with mean age 30.9 years which is similar to other studies where the mean age was 31.2 years[11,12] but inconsistent with a study where the lesions were more common in sixth decades of life with mean age 52 years.[13] Female preponderance (60.41%) in our study with female to male ratio 1.5:1 is supported by other relatable studies.[14,15] However, male predilection (59.5%) has also been reported in the literature.[16] The observed causative factors were calculus and deposits (54.17%), pubertal hormonal changes (22.92%), trauma (10.42%) and even unknown etiology (5.21%) and were similar to those described in the literature.[17] About 7.3% of the cases were reported with the unresolved lesions during postpartum phase. The commonest site observed was mandible and is probably due to deposition of calculus favored by gravitational effect whereas the lesions were prevalent in the maxilla in a study[18] and equal prevalence in both jaws in another.[19] Among intraoral sites, gingiva was the commonest location and is relevant with other finding.[12] The probable cause of gingival involvement is plaque induced inflammation and is readily affected by hormonal changes.[20] However, other sites lip (38%)[15] and tongue[21] were also reported. The precipitating factors to the development of the lesion on labial surface may be due to trauma while tooth brushing[22], inadvertent use of toothpicks and other wooden sticks for cleaning of teeth, food impaction or mandibular anterior crowding. However, maxillary labial gingiva was reported as common site in the literature.[14]

In group 'A', we noted significant per operative and postoperative bleeding. Similar experience was reported in other studies.[23,10] Similarly, 29.16% of patients complained pain postoperatively of which 6, 5 and 3 patients (out of 48) complained of mild, moderate and severe pain respectively on 1st week follow up. On 2nd postoperative week, pain free patients increased to 41 with only 7 (14.5%) patients having mild pain. The mean pain score was 0.77±1.49 and 0.19±0.49 on 1st and 2nd postoperative week respectively. Contrary to ours', another study among 37 patients showed higher percentage of patients with postoperative pain on 1st week (100%) of which 19, 10 and 8 cases complained of mild, moderate and severe pain respectively and on 2nd week (83.8%) of which 25 and 6 cases complained of mild and moderate pain respectively. A higher mean pain score of 3±0.8 on 3rd post-operative day has been reported in another study.[23]

In group 'B', only 9 patients (18.75%) had mild pain on immediate 1st postoperative week while on 2nd week 47 (97.9%) patients were without pain. The mean pain score was 0.23±0.51 and 0.02±0.14 on 1st and 2nd week follow up respectively. In contrast to our observation, another study reported that 43.24% (32 out of 74 patients) complained of mild pain on 1st week

when treated with sclerotherapy with ethanolamine oleate.[16] In the present study, the results are statistically significant on 1st and 2nd week with p value 0.00 and 0.02 respectively whereas all patients of both groups were pain free on 3rd and 4th follow up week. The significantly reduced postoperative discomfort in sclerotherapy with mild post-injection pain which relieved within 1 week similar to ours' was explained in literature.[9,22] In group 'A', 3 (6.3%) and 9 (18.8%) patients showed very poor and poor healing respectively. In group 'B', 41.7% showed good healing while very poor healing was observed in only two patients at 1st week follow up which is closely relatable to a study that reports 37.5% good healing in same duration.[9] There was significant clinical & statistical difference in healing between both group 'A' and 'B' at 1st, 2nd & 3rd week with p value 0.001, 0.004 and 0.02 respectively. Healing score on 4th week follow up was insignificant in both groups. Further in group 'B', one lesion showed incomplete resolution on 1st injection and required 2 more sessions of treatment. Comparable results on resolution of the lesion were reported in a study among 35 cases of pyogenic granuloma of skin treated with 3% STDS in which 30 patients (85.7%) showed complete resolution while two patients (5.7%) showed 50% reduction and other two patients showed no response (5.7%).[24] All these studies favor our study and use of sclerotherapy 3% STDS.

In our study, recurrence was observed only in 6.25% in group 'A' on 6th month follow up which is consistent with a retrospective study that reported 5.8% recurrence among 108 patients treated with same procedure.[19] In contrast, high recurrence rate of 16%[25] - 43.5%[26] was reported after surgical excision. In group 'B', the recurrence was 2.08% on 6th month follow up, which is close to another study that reported 1.9% recurrence in 52 patients, treated with sclerotherapy using polidocanol.[27] Opposite to our study, 0% recurrence was reported by most of the researcher.[24,26] The recurrent lesions presented as mild gingival hyperplasia but needed further histopathological analysis to diagnose.

In this study, most of the lesions bleed on intraoperative management in group 'A'. Similar experience was reported by other scientists as well.[23,9] In our study, 9 patients complained mild postoperative pain in group 'B' of which 8 showed complete resolution within 1 week and one patient had persistent pain till 2nd week. However, in literature, many other minor complications like fever or urticaria were also observed with sclerotherapy.[28,29] This result may be because of the sample size variation. Pulmonary embolism and renal insufficiency were other rare complications reported in the literature with intravariceal injection of STDS leading to intravascular hemolysis. Nicolau syndrome was another potential but rare local complication reported in the literature. It was

due to accidental extravasation of sclerosing agent in the surrounding tissue leading to ischemic tissue necrosis.[30] We didn't observe any such issue as the procedure was performed under proper isolation and incremental injection. Sclerotherapy has been recommended by many authors as well our study shows that this procedure needs no surgical expertise, postoperative dressings or specific care and the patients can easily resume their daily activities.[11,25] Furthermore, non-surgical procedures are more easily accepted by the patients.

CONCLUSIONS

Although, surgical excision is commonly practiced for treatment of pyogenic granuloma and seems to be effective but the increased post-operative morbidity in terms of pain, healing and recurrence demands an alternative more conservative procedure. Sclerotherapy may be a better option. Proper isolation, safe dose limits and slow rate of injection can avoid most of the complications making 3% STDS as a safe and effective alternative.

Conflict of Interest: None.

NJHS

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