Original Article

Conservative Approach in the Management of Oral Pyogenic Granuloma by Sclerotherapy

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Abstract

Background: Pyogenic granuloma is a common, non-neoplastic reactive growth of the oral cavity. Treatment consists of conservative surgical excision, cryosurgery, or laser surgery. These are usually adequate but often result in scars and recurrence. Therefore, this study was undertaken to determine the effectiveness of sclerotherapy in the treatment of oral pyogenic granuloma. **Materials and Methods**: Forty clinically diagnosed cases of oral pyogenic granuloma were included in the study. After topical anesthesia application, 0.2–0.5 mL of sodium tetradecyl sulfate was delivered by insulin syringe into the base of lesions till the solution leaked out. Each patient was recalled after 1 week and evaluated. If the lesion did not resolve, second and third injections were given consecutively. **Results:** All the 40 patients showed complete regression of the lesion after one to four consecutive shots in weekly interval. **Conclusion:** Intralesional sclerotherapy can be considered as an effective non-surgical treatment procedure for oral pyogenic granuloma.

Keywords: Fibrosis, gingiva, granulation tissue, sclerosant

Introduction

Pyogenic granuloma or granuloma pyogenicum is a common tumor-like growth of the oral cavity or skin considered to be non-neoplastic in nature.[1] These lesions are neither pus-producing nor granulomatous, and thus, the terminology pyogenic granuloma essentially symbolizes a double misnomer. However, this term is universally understood, and any attempts to change it are liable to create perplexity.[2] They usually present as a red mass composed predominantly of hyperplastic granulation tissue in which capillaries are very prominent commonly seen arising from interdental gingiva. They occur at any age and are often stimulated by a foreign object such as sharp margin of a restoration, calculus, or a foreign body within gingival crevice.[1,2]

There are various treatment modalities of pyogenic granulomas such as conservative surgical excision, cryosurgery, or laser surgery. Although these are reactive hyperplasias, they have a relatively high rate of recurrence after simple excision. In cases where pyogenic granuloma is large or occurs in a surgically difficult area, choosing an appropriate treatment modality can be difficult.[3] Therefore, to find treatment alternatives, we speculated sclerotherapy to be an effective approach. Sclerotherapy is the treatment of a vascular lesion by injecting a sclerosing agent which causes permanent damage to the endothelial vessels resulting in necrosis.[4] Considering the above background, this study was undertaken to evaluate the effectiveness of sclerotherapy in the treatment of oral pyogenic granuloma.

Materials and Methods

The study was initiated after the protocol had been approved by the Institutional Committee of Research Ethics. A total of 40 patients (16 males and 24 females), age 22–45 years with clinically diagnosed oral pyogenic granulomas attending the outpatient Department of Oral Medicine were recruited for the study. All the subjects were explained about the importance of the study and written informed consent was obtained for

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the same. They were subjected to patch test to rule out any hypersensitivity reaction to the sclerosing agent [3% sodium tetradecyl sulfate (60 mg/2 mL)]. Patients with any allergy to sclerosant, cardiac disorders, and pregnant and lactating mothers were excluded from the study.

All the subjects were principally diagnosed based on history and clinical features such as oral pyogenic granuloma and selected for this study. Radiographic evaluation was also done to rule out any bony involvement. First, surface local anesthesia was applied over the lesion and 0.2–0.5 mL of 3% sodium tetradecyl sulfate (Setrol) was slowly injected by insulin syringe (0.3 × 8 mm size, 31 gauge) into the base of the lesion until the solution leaked out from the surface of the lesion [Figure 1].

All the patients were examined after a period of 1, 2, and 3 weeks to evaluate the response until the lesions became dry, necrotic, and fell off spontaneously. Consequently, the second, third, and fourth injections were planned and given at weekly interval. If the lesion resolved after the first injection, the treatment was discontinued. The greatest dimension of the lesion was considered as the size and measured by means of a dental caliper in centimeters in weekly evaluation. After the completion of treatment, all the patients were subjected to oral prophylaxis for removal of causative irritant and evaluated after 1, 3, and 6 months to check for recurrence.

Results

A total of 40 clinically diagnosed cases of oral pyogenic granulomas were selected for the study. The average age of the study population was found to be 34.65 years (males 31.57 years, females 36.3 years) with female predominance and labial gingiva being the most common site (25 cases). The size of the lesions was being measured with the help of dental caliper and the greatest dimension was measured in centimeters [Table 1]. The average size of the lesion was 0.94 cm (males 1.08 cm, females 0.86 cm). All the subjects received 0.2–0.5 mL of 3% sodium tetradecyl sulfate injection at 1-week interval till the lesion resolved. The erythematous masses turned purplish red and fibrosed ones pale after the sclerosant was delivered into the lesions [Figures 2 and 3]. They were evaluated weekly after 1, 2, and 3 weeks till the lesion resolved and periodically recalled for up to 6 months [Figure 4].

All the 40 subjects (100%) showed complete regression of the lesion with no recurrence. All the patients received a maximum of one to four consecutive shots in weekly interval [Tables 2 and 3]. The overall average change in size from first visit to second visit (after 1 week) was found to be 0.34 cm which was statistically highly significant (P-value = 0). The mean difference in size between first and second interval was 0.1 (P-value = 0.18) and from third interval to fourth interval was 0.05 (P-value = 0.152) which was statistically insignificant. The mean difference in size between second and third interval was 0.33 which was statistically significant with P value of 0.0003. No postoperative complications

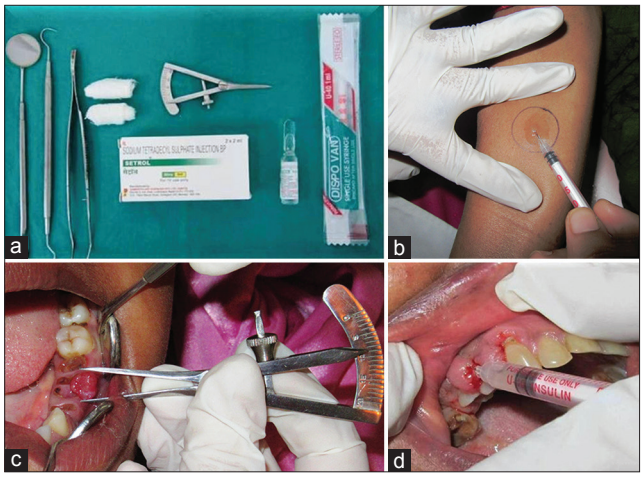

Figure 1: (a) Armamentarium, (b) patch test to rule out any hypersensitivity reaction to the sclerosing agent, (c) size of lesion being measured by dental caliper (in mm), and (d) 3% sodium tetradecyl sulfate slowly injected by insulin syringe into the base of the lesion

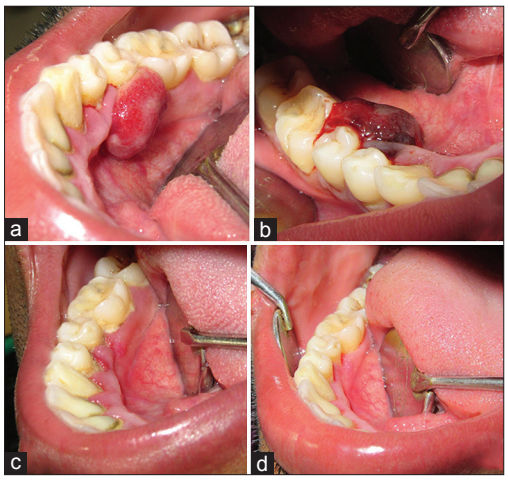

Figure 2: Case 1: (a) preoperative view of young pyogenic granuloma, (b) immediately after sclerotherapy, (c) postoperative view after four consecutive injections, and (d) after oral prophylaxis

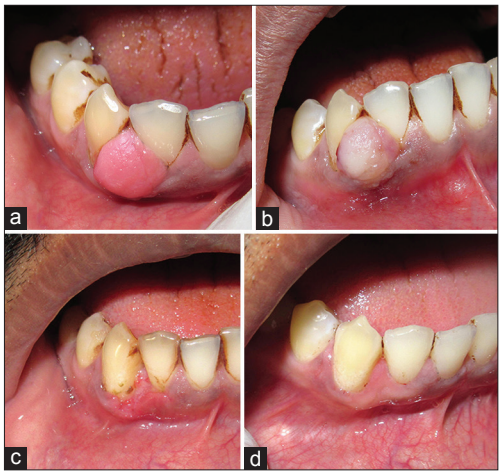

Figure 3: Case 2: (a) preoperative view of fibrosed pyogenic granuloma, (b) immediately after sclerotherapy, (c) postoperative view after 1 week, and (d) after oral prophylaxis

Table 1: Description of various lesions with respect to age, gender, and size

Age	Gender	Size (cm)	Site	Clinical appearance
32	M	0.8	Labial gingiva irt 42, 43	Pale firm smooth surface, round in nature
28	M	2.5	Lingual gingiva irt 44, 45	Erythematous globular smooth surface
62	F	0.7	Palatal gingiva irt 11, 12	Erythematous granular round
25	F	0.7	Labial gingiva irt 31, 41	Erythematous smooth surface arising from interdental papilla
50	F	0.8	Labial gingiva irt 32, 33	Erythematous arising from interdental papilla of 32. 33
30	F	0.5	Labial gingiva irt 31, 41	Pale pink, smooth surface
21	F	1	Lingual aspect irt 36	Erythematous smooth surface, oval in shape
22	M	0.6	Interdental gingiva irt 37, 38	Erythematous arising from interdental papilla of 37. 38
25	F	0.4	Lingual aspect of 46	Pale pink, smooth surface
46	F	1	Labial gingiva irt 24, 25	Erythematous arising from interdental papilla of 24. 25
75	F	0.4	Occlusal aspect of 36	Pale pink, oval in shape
14	M	1	Occlusal aspect of 16	Erythematous, lobular
39	F	1.2	Labial gingiva irt 35, 36	Erythematous, round in shape with lobulated surface
60	F	2	Buccal vestibule 25, 26, 27	Erythematous smooth surface, oval in shape
26	F	1	Labial gingiva irt 43, 44	Erythematous, round in shape with lobulated surface
18	F	0.8	Occlusal aspect of 36	Erythematous lobular
36	M	1.5	Labial gingiva irt 44, 45	Erythematous globular smooth surface
42	F	1	Labial gingiva irt 41, 42	Erythematous granular round
35	F	0.8	Labial gingiva irt 31, 41	Erythematous smooth surface arising from interdental papilla
50	M	1	Labial gingiva irt 33, 34	Erythematous arising from interdental papilla of 33. 34
43	F	0.6	Labial gingiva irt 31, 41	Pale pink, smooth surface
22	F	0.7	Labial gingiva irt 12, 13	Erythematous smooth surface, round in nature
39	F	1.5	Labial gingiva irt 15, 16	Erythematous globular smooth surface
42	M	0.9	Labial gingiva irt 11, 12	Erythematous granular round
35	F	1	Labial gingiva irt 31, 41	Erythematous smooth surface arising from interdental papilla
41	M	0.9	Labial gingiva irt 33, 34	Erythematous arising from interdental papilla of 33, 34
26	F	0.8	Labial gingiva irt 22, 23	Pale pink, smooth surface
33	M	1.5	Labial gingiva irt 35, 36	Erythematous, round in shape with smooth surface
30	F	1	Interdental gingiva irt 25, 26	Erythematous smooth surface, globular in shape
28	F	0.5	Labial gingiva irt 44, 45	Erythematous globular smooth surface
29	M	1.0	Labial gingiva irt 45, 46	Erythematous globular smooth surface
23	F	1	Lingual gingiva irt 34, 35	Erythematous smooth round
28	M	1	Palatal aspect of 26	Erythematous, smooth surface
19	M	0.6	Buccal aspect of 37	Erythematous granular round
25	F	0.4	Interdental gingiva irt 23, 24	Erythematous smooth globular
45	M	1	Labial gingiva irt 33, 34	Erythematous arising from interdental papilla of 33, 34
23	M	0.8	Labial gingiva irt 33, 34	Erythematous, smooth surface
28	F	0.5	Labial gingiva irt 25, 26	Erythematous smooth surface, round in nature
49	F	1.5	Labial gingiva irt 22, 23	Erythematous globular smooth surface
42	F	0.6	Lingual gingiva irt 42, 43	Erythematous granular round

were observed except for local discomfort and mild bleeding reported by few (two cases) which resolved within an hour.

Discussion

Pyogenic granulomas are benign, exophytic vascular tumors first described by Poncet and Dor in 1897. Although exact pathogenesis is not identified, trauma, hormonal influences, and inflammatory and infectious agents have all been hypothesized as probable factors in causation. The clinical and histopathological features are analogous with bacillary angiomatosis suggesting these lesions to be caused by *Bartonella* spp. infection.[3] The incidence of pyogenic granuloma has been depicted as 26.8%–32% of all reactive lesions with peak incidence in the third decade and age ranging from 11 to 40 years. Females are found to be more frequently affected with a predilection of 3:2 over males.[1] In this study, the average age of the study population was 34.65 years with female predominance (16 males and 24 females).

Hormonal changes in puberty and pregnancy may alter this gingival reparative response to injury producing a pyogenic granuloma. The prevalence increases toward the end of pregnancy (when levels of circulating estrogens are highest) and tend to shrivel after parturition (when there is a precipitous drop in circulating estrogens) suggesting the role of hormones in the etiology of the lesion, secondary to an increase in angiogenic factor expression and a reduction in the apoptosis of

Table 2: Difference in change in size of the lesion of 40 patients in weekly interval

Age	Gender	Initial size (cm)	First interval (cm)	Second interval (cm)	Third interval (cm)	Fourth interval (cm)
32	M	0.8	0.6	Regressed		
28	M	2.5	2	1.5	0.5	Regressed
62	F	0.7	Regressed			
25	F	0.7	Regressed			
50	F	0.8	0.5	Regressed		
30	F	0.5	0.2	Regressed		
21	F	1	0.5	Regressed		
22	M	0.6	Regressed			
25	F	0.4	Regressed			
46	F	1	0.5	Regressed		
75	F	0.4	Regressed			
14	M	1	Regressed			
39	F	1.2	0.8	Regressed		
60	F	2	1	0.5	Regressed	
26	F	1	Regressed			
18	F	0.8	Regressed			
36	M	1.5	0.6	Regressed		
42	F	1	0.4	Regressed		
35	F	0.8	Regressed			
50	M	1	0.8	Regressed		
43	F	0.6	0.5	0.3	Regressed	
22	F	0.7	Regressed			
39	F	1.5	0.8	Regressed		
42	M	0.9	Regressed			
35	F	1	0.5	Regressed		
41	M	0.9	Regressed			
26	F	0.8	Regressed			
33	M	1.5	0.8	0.5	Regressed	
30	F	1	0.7	Regressed		
28	F	0.5	Regressed			
29	M	1.0	0.7	Regressed		
23	F	1	Regressed			
28	M	1	0.4	Regressed		
19	M	0.6	Regressed			
25	F	0.4	Regressed			
45	M	1	0.5	Regressed		
23	M	0.8	Regressed			
28	F	0.5	Regressed			
49	F	1.5	1	Regressed		
42	F	0.6	Regressed			

Table 3: Proportion of patients for which the size reduced to zero (regressed) in the four intervals

Interval	Proportion of patients
First interval	0.5 (20 patients)
Second interval	0.4 (16 patients)
Third interval	0.075 (3 patients)
Fourth interval	0.025 (1 patient)

granulation tissue. They may mature and become less vascular and more collagenous progressively converting to fibrosed granulomas.[5] Henceforth, pregnancy was considered in the exclusion criteria in this study.

Clinically, pyogenic granuloma presents as red-purple nodule or may be ulcerated with a fibrinopurulent covering, usually found arising from the interdental gingiva and occurs infrequently on the lips, tongue, or buccal mucosa only in association with a puncture wound or foreign body. They often undergo rapid growth initially and then remain static in size. They bleed readily when traumatized representing inflammation and repair attempts that are thwarted because of ongoing etiologic stimulation amounting to hyperplastic granulation tissue.[2] The young lesions are highly vascular, often elevated and ulcerated, and bleed easily, whereas older lesions tend to be more collagenized and pink in appearance.[6]

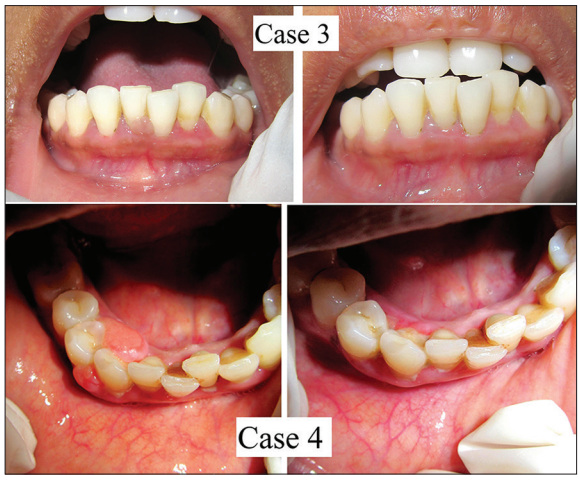

Figure 4: Cases 3 and 4: pre- and postoperative views after two consecutive injections

The clinical diagnosis of pyogenic granuloma was based on history and clinical examination in this study. Sclerotherapy prevented us from obtaining a histopathological confirmation. Biopsy is recommended for any persistent or recurrent oral pyogenic granulomas as it rarely resembles various benign and malignant pathologies.[7] Differential diagnoses include metastatic tumors in the oral cavity, angiosarcomas, gingival non-Hodgkin's lymphoma, Kaposi's sarcoma, and hemangiomas. Metastatic lesions in the oral cavity might be the first indication of an undiscovered malignancy at a remote site which has a striking resemblance to reactive gingival lesions mostly pyogenic granuloma. Other reactive gingival lesions are fibrous epulis, peripheral giant cell granuloma, fibroepithelial polyp, peripheral ossifying fibroma, and giant cell fibroma.[8]

Treatment of pyogenic granulomas consists of conservative surgical excision, cryosurgery, or laser surgery which is usually adequate but often results in scars, recurrence, and skilled expertise.[9] Therefore, sclerotherapy was considered as an alternative and effective treatment modality. Sclerotherapy is defined as the targeted elimination of small vessels, varicose veins, and vascular anomalies by the injection of a sclerosant. These are tissue irritants causing vascular thrombosis and endothelial damage leading to endofibrosis and vascular obliteration when injected into or adjacent to blood vessels. The most commonly used sclerosants are synthetic chemicals sodium tetradecyl sulfate and polidocanol, fatty-acid derivatives sodium morrhuate and ethanolamine oleate, and alcohol ethanol.

Sodium tetradecyl sulfate is a synthetic, surface-active substance composed of sodium 1-isobutyl-4-echyloctyl sulfate plus benzoyl alcohol 2% (as an anesthetic agent) and that is phosphate buffered to pH 7.6. It is a long-chain fatty acid salt of an alkali metal with properties of soap. The solution is clear and nonviscous with low surface tension and is readily miscible with blood.[10] About 3% of sodium tetradecyl sulfate (60 mg/2 mL), an anionic surfactant, was used as a sclerosant in this study.[4]

The advantages of sclerotherapy are that it is simple, non-invasive, economical, and of minimal discomfort to the patient; there is negligible blood loss; and less surgical expertise is required. There is no requirement of any postoperative dressings or specific care, and the patient can resume his daily activities immediately.[9,11] In this study, no postoperative complications were observed except for local discomfort and mild bleeding reported by two which resolved within an hour.

Samantha *et al.* (2013) presented a case series on oral pyogenic granulomas wherein four cases showed complete resolution and one fibrosed on treating with sclerosing agent.[1] Rahman *et al.* (2014) successfully treated a case of pyogenic granuloma of scalp with no recurrence.[3] Various dermatological sites with pyogenic granuloma treated with sodium tetradecyl sulfate by Moon *et al.* (2005) showed excellent results.[12] Similarly, this study also proved to be successful showing 100% results (40 cases). The overall average change in size from first visit to second visit (after 1 week) was found to be 0.34 cm which was statistically highly significant (P-value = 0). Lesions of 20 patients had regressed after 1 week, 16 patients in the second week, whereas only three and one patient showed complete regression in the third and fourth weeks, respectively.

Sclerotherapy with 3% of sodium tetradecyl sulfate has been proved to be effective as a conservative approach in the treatment of oral pyogenic granuloma. It is a simple and non-invasive procedure with a better safety profile, repeatability, and low cost of treatment even when multiple sessions are needed with low recurrence rate.

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Conflicts of interest
There are no conflicts of interest.

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