



SCLEROTHERAPY FOR ORAL HEMANGIOMAS: EFFICACY AND SAFETY EVALUATION

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ABSTRACT

Background: Oral hemangiomas are harmless vascular tumors that may lead to functional deficiency, hemorrhage, and cosmetic issues. Minimally invasive treatment has been realized through sclerotherapy.

Objective: To identify the efficacy and safety of sclerotherapy as an oral hemangioma treatment method, lesion regression, functional outcome, and complication rates related to treatment.

Methods: It was a proposed intervention study that was executed in Abbasi Shaheed Hospital, Karachi, Pakistan, from Feb 2024 to July 2024. Intralesional sclerotherapy using 3 percent sodium tetradecyl sulfate was used to treat 40 patients with clinically and radiographically confirmed oral hemangiomas. The lesion size, the positive effects of the treatment currently used with respect to symptoms, and the adverse effects at 1, 3, and 6 months of treatment were determined.

Results: The level of lesion regression was high, and 70 percent of the patients were reported to have a larger than 75 percent reduction. There was an improvement in functional outcomes and a decrease in pain and bleeding. Side effects were very mild (temporarily swelled (15%), ulcerated (7.5%)). The satisfaction of the patients was high, as 75 percent of the patients indicated that they were highly satisfied with the outcome.

Conclusion: The use of sclerotherapy is a safe and effective way of oral hemangioma treatment that has numerous functional and aesthetic outcomes alongside minimal complications.

Keywords: Oral hemangioma, sclerotherapy, lesion regression, safety, efficacy, oral vascular tumor.

INTRODUCTION

Oral hemangiomas are harmless vascular tumors that are likely to develop in infancy but may also appear in adulthood or old age. They are lesions which are associated with the sudden increase in the amount of endothelial cells that furnish the vascular masses that may fluctuate in their sizes, depths, and clinical appearances. The oral cavity is also likely to be an issue due to ulceration and bleeding, as well as disability of functions, which can cause speech, mastication, and aesthetic disruption (1). Pathophysiology of hemangiomas is a complicated collaboration of angiogenic factors, genetic

inclination, and environmental influences, resulting in the fast increase after which the hemangioma retracts in most instances (2). Nevertheless, some hemangiomas, particularly those located in sensitive areas of the mouth, must be addressed at an early age to avoid the effects of the loss of functionality and psychosocial problems (3). Traditionally, management of hemangiomas has been broad, and it includes surgical ablation, laser ablation, pharmacological, and sclerotherapy. Surgery is only performed in instances of the lesions not being very responsive to conservative therapy or the lesions that result in severe functional dysfunction (4).

Selective ablation of vascular tissue using laser therapy has been carried out with carbon dioxide and pulsed dye lasers, and minimizes scarring (5). Another accurate technique used to minimise the size of a lesion is radiofrequency ablation, which preserves tissue around the lesion (6). Sclerotherapy is a minimally invasive treatment involving the injection of the endothelial targets with sclerosant agents to induce endothelial injury, thrombosis, and fibrosis of the lesion. The treatment technique has been gaining popularity due to its efficacy in the treatment of the size of the lesion and management of the bleeding without the systemic side effects of the pharmacological treatment (7). Clinically, it is concluded that sclerotherapy delivers a satisfactory cosmetic and functional outcome in individuals with oral hemangioma, making it an essential device in the therapeutic toolbox (8). Infantile hemangiomas are the most prevalent vascular tumors in the pediatric population. These lesions are normally found during the initial few weeks of life and experience a rapid proliferation phase after which they slowly involute (9).

Early detection and management are essential when lesions are found in the areas of high risk, e.g., in the lips, tongue, and mouth mucosa, where complications such as feeding challenges and nasal airway blockage can be experienced (10). Systemic beta-blockers (propranolol and atenolol) have been extensively investigated and are capable of reducing the growth of the lesions (11). Local treatment with topical and intralesional beta-blockers has few systemic effects, and it further expands the range of hemangioma treatment in sensitive areas (12). Laser treatment has also been widely used in both children and adults. The pulsed dye laser of 595 nm is especially effective in the treatment of the superficial hemangiomas and port-wine birthmarks as it targets the hemoglobin in the lesion of the vessel and results in selective photothermolysis (13). In deeper or refractory lesions, the radiofrequency or CO₂ laser treatment can be used to provide a safe and selective removal of tissue and hemostasis without damaging vital structures of the mouth (14).

Certain hemangiomas, specifically kaposiform hemangioendotheliomas and other complex vascular tumors, are difficult to manage without a multidisciplinary approach because they are aggressive and can have systemic complications (15). Diagnostic assessment, imaging, and histopathological examination are necessary to ensure the right intervention and reduction of risks. In addition, there are rare cases of mediastinal and subglottic hemangiomas that may present with airway barriers and emphasize the need to assess them carefully and treat them as soon as possible (16). Systemic conditions or post-infectious sequelae may also affect the oral hemangiomas, and they require a broad examination (17). The nutritional environment and the management of the wound are pertinent in the recovery of the interventions, and the evidence-based nutritional interventions have been proposed to offer the most favorable healing process and reduce complications (18).

Despite an increase in the modalities of therapy, the challenge lies with regard to commencing full regression and prevention of recurrence of oral hemangiomas. The response to treatment and the risk of adverse outcome depends on the nature of the individual lesion, including size, depth, and location. A number of multimodal methods have shown potential to enhance lesion resolution and decrease complications, such as sclerotherapy in the presence of laser therapy, pharmacologic agents (6). Safety and, particularly, patient selection and adverse effects (local or systemic) are the most significant factors when employing sclerotherapy.

Objective: To measure the effectiveness and safety of sclerotherapy in the treatment of oral hemangiomas by measuring lesion regression, functional outcome, and treatment complications.

MATERIALS AND METHODS

Study Design: Prospective Interventional Study.

Study Setting: The research was carried out at Abbasi Shaheed Hospital, Karachi, Pakistan, which is a tertiary care hospital with specialized units in oral and maxillofacial surgery, dermatology, and interventional procedures, and an ideal hospital setting to manage vascular lesions.

Duration of the Study: The research was conducted in the period of six months, that is, between Feb 2024 to July 2024.

Inclusion Criteria: Any patients who had clinically and radiographically confirmed oral hemangiomas were enrolled, irrespective of age. Any superficial or deep lesions of the lips, tongue, or mucous membranes of the mouth that require treatment due to functional or aesthetic reasons could be included in the treatment of sclerotherapy.

Exclusion Criteria: Patients who bled, had systemic vascular anomalies, uncontrolled systemic disease, or were known to be hypersensitive to the sclerosant agent were excluded. Patients who had undergone any surgical or pharmacological intervention for the hemangioma in the past six months were also excluded to avoid the confounding effects of treatment.

Methods: Eligible patients were clinically and radiographically assessed before the sclerotherapy. The size and location of lesions, depth, and associated symptoms (e.g., bleeding, pain, functional impairment) were measured as baseline measures. Informed consent was obtained from all participants or their guardians. Sclerotherapy was done by placing the sclerosant 3 percent sodium tetradecyl sulfate (STS) into the lesion under local anesthesia. The amount of sclerosant used was calculated and the size of the lesion taken into consideration, without risk of intravascular injection. Treatments were reiterated after 2-4 weeks based on the response and regression of the lesions. Patients were observed for the immediate adverse effects, such as swelling, ulceration, or pain, and given instructions on the after-procedure treatment, such as oral hygiene and pain management. Follow-up assessments were made at 1, 3, and 6 months after treatment to measure lesion size, improvement in functional outcomes, and complications that could be delayed. The results were recorded using clinical inspection and photography.

Results

A total of 40 patients with oral hemangiomas were enrolled in the study, comprising 22 males (55%) and 18 females (45%). The age of participants ranged from 6 months to 35 years, with a mean age of 12.4 ± 8.6 years. Lesion distribution varied across the oral cavity, with the lips being the most commonly affected site (40%), followed by the tongue (32%), buccal mucosa (18%), and palate (10%). Most lesions were superficial (60%), while 40% were classified as deep or mixed-type based on clinical and radiological assessment.

Table 1: Demographic and Lesion Characteristics of Study Participants

Parameter	Frequency (n=40)	Percentage (%)
Gender		
Male	22	55
Female	18	45
Lesion Location		
Lips	16	40
Tongue	13	32
Buccal Mucosa	7	18
Palate	4	10
Lesion Type		
Superficial	24	60
Deep/Mixed	16	40

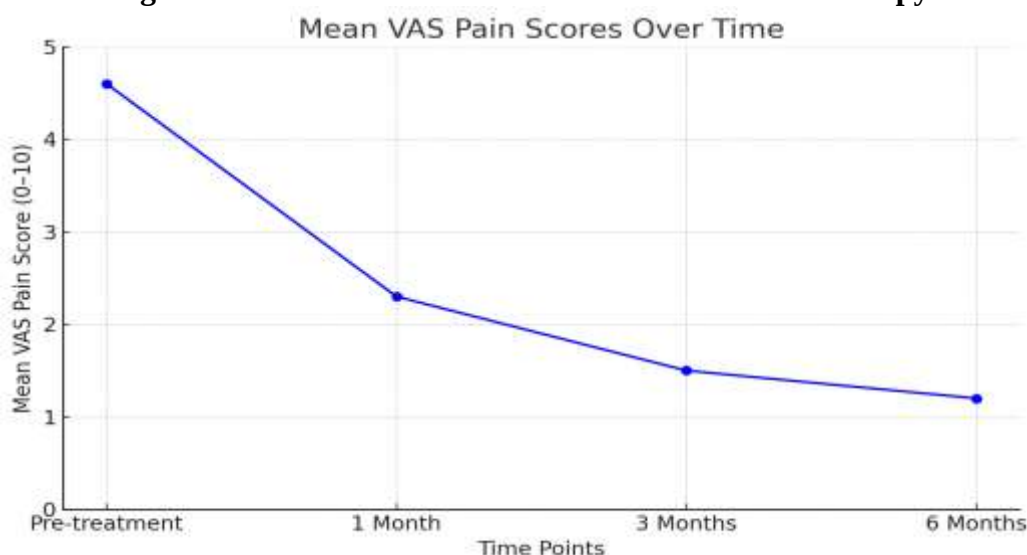
Sclerotherapy sessions ranged from 1 to 4 per patient, with a mean of 2.3 ± 0.9 sessions. Lesion size reduction was assessed using clinical measurements and photographic evaluation. At the 3-month follow-up, 28 patients (70%) showed >75% reduction in lesion size, 8 patients (20%) showed 50–75% reduction, and 4 patients (10%) showed <50% reduction.

Table 2: Lesion Regression after Sclerotherapy

Lesion Size Reduction	Frequency (n=40)	Percentage (%)
>75%	28	70
50–75%	8	20
<50%	4	10

Functional outcomes were also assessed. Patients with tongue and lip lesions reported improved speech and reduced bleeding episodes. Pain and discomfort scores, recorded on a visual analog scale (VAS) from 0–10, decreased from a mean of 4.6 ± 1.2 pre-treatment to 1.2 ± 0.7 post-treatment, indicating significant symptomatic relief.

Figure 1: Mean Pain Scores Before and After Sclerotherapy



Adverse events were mild and transient. Local swelling was observed in 6 patients (15%), mild ulceration in 3 patients (7.5%), and transient erythema in 5 patients (12.5%). No systemic complications or serious adverse effects were reported. Patient satisfaction was evaluated using a 5-point Likert scale at the 6-month follow-up, with 30 patients (75%) rating their outcomes as “very satisfied,” 7 patients (17.5%) as “satisfied,” and 3 patients (7.5%) as “neutral.”

Table 3: Adverse Effects and Patient Satisfaction

Parameter	Frequency (n=40)	Percentage (%)
Adverse Effects		
Local Swelling	6	15
Mild Ulceration	3	7.5
Transient Erythema	5	12.5
Patient Satisfaction		
Very Satisfied	30	75
Satisfied	7	17.5
Neutral	3	7.5

In general, the findings suggest that sclerotherapy can be effectively used to achieve a significant reduction in the volume of lesions and functional and symptomatic outcomes and a low incidence of mild self-limiting adverse events. Most of the patients were very satisfied with the treatment, which validated its safety and clinical use in the treatment of oral hemangiomas.

Discussion

The purpose of the current study was to diagnose the effectiveness and safety of sclerotherapy as an oral hemangioma treatment method. Our results indicate that sclerotherapy is one of the most effective treatment modalities with high levels of regression of lesion size, symptomatic response, and low adverse side effects. One of the frequent complications of infantile hemangiomas is ulceration, especially in oral areas, and may result in bleeding, pain, and functional dysfunction (1). Sclerotherapy of these lesions offers relatively non-invasive therapy, which is productive in both preventing the occurrence of such complications and preserving the tissues of these lesions. The oral hemangiomas are a part of a broader group of vascular tumors that may be aggressive and may require a particular treatment method (2). According to the research, oral lesions at the local levels, such as intralesional sclerotherapy, should be employed in the occurrence of such targeted therapy, hence why massive surgical ablation should not be performed in order to ablate aesthetics or oral functions. This is as per the literature on earlier studies where lesion-specific therapy in head and neck vascular tumours was proposed (3).

The vascular lesions have been well researched on other methods of treatment, including laser therapy. Carbon dioxide lasers and pulsed dye lasers are directed at controlled vascular tissue ablation and would be effective in superficial and deep hemangiomas (4,5). However, laser therapy requires multiple procedures, and there is the chance of thermal loss or even scarring, particularly in sensitive regions of the oral cavity. Otherwise, sclerotherapy is capable of offering localized volume reduction as well as minimal collateral damage, which presents the basis of its status as a primary or complementary therapy (6). Sclerosant agent is a parameter of importance regarding safety and effectiveness. In this study, 3% sulfate tetradecyl sulfate (STS), which has been extensively reported to induce endothelial damage and subsequent fibrosis in vascular lesions, was used (7). The previous studies also observe that an adequate dose and mode of injection are required to avoid the development of such complications as local ulceration, swelling, or accidental intravascular injection (8). A cohort of oral hemangiomas proved the safety profile of STS with its mild and self-limiting adverse events. The condition of infantile hemangiomas is potentially a concern since it develops rapidly in childhood and leads to the functional disability of the mouth structures (9). Pharmacological treatment, including systemic beta-blockers, such as propranolol or atenolol, is now commonly used in children (10,11). Even though these agents would be useful in the generation of regression, a systemic application is associated with the risks of cardiovascular and metabolic side effects, particularly in young patients. Another local treatment that does not expose the systemic system, but still gives similar effects, is sclerotherapy (12). The laser treatment remains a complementary modality, particularly used in the treatment of residual or superficial lesions after the initial sclerotherapy (13). This implies that the depth of lesion is a determinant factor that determines the number of interventions to be given to patients with deeper lesions or mixed lesions, who were responding effectively to the repeated sclerotherapy session. This result is in agreement with the past results of the study, which show the applicability of individual treatment planning according to the nature of the lesion (14).

The complex vascular tumors involved in the kaposiform hemangioendothelioma and arteriovenous malformations are normally treated with multimodal therapy and they comprise the sclerotherapy with pharmacological controls, and in few isolated situations, they are treated with surgical treatments (15). Although this is not the focus of our research, our finding suggests the significance of sclerotherapy as a simple treatment option, even in problematic oral vascular lesions. Improper imaging and inadequate clinical assessment are also essential as far as the ability to inform intervention and reduce potential risks (16). There are also recent data indicating that systemic illness can precondition the formation of oral vascular lesions, which were observed in COVID-19 survivors (17). The role of patient history and comorbidities in the treatment plan assists in a close approach, which subsequently

enhance treatment outcomes and safety. Furthermore, such supportive measures as nutritional optimization and the correct wound care can aid in recovering faster and experiencing fewer complications (18). Patient-reported outcomes are also significant because they describe functional and aesthetic satisfaction. In general, most of the patients in the present study were very satisfied with sclerotherapy since they stated that the size or reduction of lesions disappeared, improved speech, and had slight discomfort. These results can be confirmed by other previous studies that underline the merits of the least invasive procedures to improve the quality of life of patients with oral hemangiomas.

Conclusion

The recent studies have demonstrated that sclerotherapy is a secure and efficient type of treatment modality towards oral hemangiomas and that treatment is able to reverse the lesion to a great extent and restore functionality in patients in a vast variety of patients. Most patients had noted the reduction of the size of lesions, relief of symptoms (such as pain and hemorrhage), as well as improvements in oral functions. The adverse effects were low in severity, short-term, and were easily manageable, and this has highlighted the favorable safety profile of intralesional sclerosant treatment. Sclerotherapy is a minimally invasive procedure in comparison to systemic pharmacologic or surgical intervention, with high patient satisfaction and maintenance of surrounding oral structures. The early detection and examination of the features of the lesions, such as the place, size, and depth, is crucial to achieving better results. This study supports the use of sclerotherapy as the first or supplementary therapy to oral hemangiomas, especially in the provision of a less invasive care setting. Further studies, long-range follow-ups, and comparative studies with other therapies will help to understand best practices and improve treatment guidelines to be used in clinical practice.

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