

## Original Research Article

# Role of sclerotherapy in management of low flow vascular malformations

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**Received:** 25 January 2021

**Revised:** 16 March 2021

**Accepted:** 17 March 2021

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## ABSTRACT

**Background:** Low flow vascular malformations are most common in the head and neck region. Only symptomatic malformations require treatment. Sclerotherapy followed by surgery was considered the gold standard treatment but in the head and neck region, it may produce cosmetic and physiological defects. In the present study, multiple injections of sclerotherapy with 3% sodium tetradecyl sulphate was used for the treatment of low flow vascular malformations.

**Methods:** Twenty cases of low flow vascular malformations of the oral cavity who presented in the outpatient department of ESIC Model Hospital, Ludhiana from 2014-2016 were selected for the study. Only significantly sized (>4 cm) and easily accessible lesions were included. Staged sequential sclerotherapy with 3% STS under strict fluoroscopy control was used as the sole treatment.

**Results:** A total of 20 patients were taken of which, 25% required three sessions, 65% five to six sessions each and 10% required eight sessions each. All patients showed good results with complete regression and no mucosal ulceration.

**Conclusions:** Staged sequential sclerotherapy with 3% STS should be the treatment of choice in low flow vascular lesions involving mucosal and cutaneous structures of head and neck region especially anterior two-thirds of tongue, palate, gingiva, buccal mucosa and lips. Surgical removal may affect critical neurovascular structures and cause cosmetic deformity. So the removal is advisable in life-threatening conditions, lesions requiring general anaesthesia and single sitting removal.

**Keywords:** Low flow vascular malformations, 3% sodium tetradecyl sulphate, Sclerotherapy

## INTRODUCTION

Vascular malformations are thin-walled vascular channels lined by endothelium with a deficient muscular layer. These have been differentiated from hemangiomas or true vascular tumours by Mullikan and Glowacki.<sup>1</sup> Vascular malformations are clinically subdivided into high flow and low flow types based on haemodynamics and are discerned by clinical examination and magnetic resonance (MR) angiography.<sup>2</sup> High flow vascular malformations include arteriovenous malformations. Catheter angiography is

considered the gold standard in the evaluation and treatment planning of these lesions. Surgery or embolization via trans-arterial route or a combination of both is the treatment of choice.<sup>3</sup>

Low flow vascular malformations include lymphatic, capillary and venous malformations. Low flow vascular malformations may involve any organ or tissue of the body, the most common sites being mucosal and cutaneous surfaces of head and neck especially anterior two-thirds of tongue, palate, gingiva and buccal mucosa.<sup>4</sup> These are

mostly asymptomatic and do not require treatment. Indications for treatment include pain, disfigurement, muscle atrophy, impingement on other organs etc. Various treatment options include surgery, a combination of surgery and sclerotherapy, laser therapy or sclerotherapy.<sup>5</sup>

Sclerotherapy followed by surgery is the treatment modality for low flow vascular malformations.<sup>6</sup> However, in head and neck region removal of the mass may cause a cosmetic and physiologic defect.

In the present study, staged sequential sclerotherapy with 3% sodium tetradecyl sulphate (3% STS) under fluoroscopic control was used as the sole treatment in the management of 20 cases of low flow vascular malformations involving oral cavity.

## METHODS

This prospective observational study involved cases of low flow vascular malformations of the oral cavity who presented in the outpatient department of ESIC Model Hospital, Ludhiana from March 2014 - March 2016. Total 20 patients fulfilling the inclusion criteria completed the study. Patients were aged between 15-45 years.

### Inclusion criteria

The following criteria was included in the study: significantly sized (>4 cm) and easily accessible lesions; the low flow of these malformations was confirmed by clinical examination (no bruit or pulsatility) and MR angiography; and patients giving valid consent.

### Exclusion criteria

The following criteria was excluded from the study: those involving airway; necessitating general anaesthesia or requiring single sitting removal; and not giving valid consent.

3% sodium tetradecyl sulphate (STS) was used for sclerotherapy. The area to be injected was cleansed and local infiltration (2% lignocaine with 1: 200,000 adrenaline) was done at the base and periphery of the lesion. The vascular lesion was punctured with 22 gauge needle, monitoring strictly under 2-D fluoroscopy control, the correct location of the needle was confirmed by the reflux of blood at the hub. Contrast agent was injected into the lesion revealing local parenchymography draining into regional veins without extravasation. 3% STS was mixed with lipoidal in the ratio of 1:1 to make it radio-opaque and it was subsequently injected slowly under fluoroscopy control into venous malformation to completely occupy the entire capillary bed. Amount of sclerosant injected depends on the size of the lesion.

Each patient required on an average 3-7 staged sequential sessions of sclerotherapy given at an interval of 10-15 days depending upon the size and site of the lesion. Post

sclerotherapy, each patient was given analgesics and anti-trypsin along with ice-pack.

For statistical calculations statistical package for the social sciences (SPSS) software and MS excel was used.



Figure 1: Pre-sclerotherapy picture.



Figure 2: MR angiography picture.

## RESULTS

Out of 20 cases, 8 were females and 12 males.

Vascular malformations in the present study involved palate in 3 cases and dorsal surface of the tongue in three cases. These were present since birth and were increasing in size and causing difficulty in speaking and swallowing. In 8 cases, buccal mucosa was involved and was causing cosmetic deformity, occasional bleeding and difficulty in speech and swallowing. In 4 cases, upper lip was involved and lower lip in 2 cases. It was associated with the cosmetic deformity. Figure 1 and 2 show pre-sclerotherapy picture and MR angiography picture respectively.

A total of 20 patients were studied. 5 patients required 3 sessions, 13 needed 5-6 sessions each and 2 patients required 8 sessions. The time interval between staged sequential sessions ranged from 10-15 days. After each session, all patients had an immediate swelling and mild inflammatory reaction at the site of the lesion which transiently increased and then subsided in the following 5-7 days. Analgesics and antitrypsin were given to the patients. All patients showed good result with complete

regression of the lesion and no mucosal and skin ulcerations, fever and infection. None of the patients showed signs of airway compromise. Figure 3 shows the malformation post sclerotherapy.

**Table 1: Distribution according to gender.**

Sex	Number of cases	Percentage
Males	12	60
Females	8	40
Total	20	100

**Table 2: Number of lesions per site.**

Site	Number of cases	%
Lips	6	30
Buccal mucosa	8	40
Tongue	3	15
Oral surface of palate	3	15

**Table 3: Clinical presentation of patients in study group.**

Symptoms	Number of cases
Mass increasing in size	5
Bleeding	2
Eating problem	9
Cosmetic deformity	11
Pain	3
Speech problem	6
Breathing problem	1

**Table 4: Sessions of scleropathy required.**

No. of patients	Percentage of patients	Sessions of scleropathy
5	25	3
13	65	5-6
2	10	8



**Figure 3: Malformation post sclerotherapy.**

## DISCUSSION

Vascular malformations are true inborn errors in the embryological development of vascular tree and by definition are present at birth though not all are clinically

apparent.<sup>1</sup> Low flow vascular malformations are commonest of all the vascular anomalies and have a propensity for the head and neck region.<sup>4</sup> Various modalities have been used for the treatment of low flow vascular malformations like surgery, laser, embolization, sclerotherapy etc. But their management has always remained a major challenge because treatment carries a risk of morbidity and recurrence.

In the present study of 20 cases, 3% STS was used as a sclerosing agent. In all patients, there was transient swelling and inflammation which subsided over 5-7 days. No associated mucosal ulceration or any other side effect was reported. All lesions showed good results by a significant reduction of symptoms and size.

Minkow used a technique of intralesional injection of 0.1-0.5 ml of 3% STS in intralesional hemangioma at intervals of 2-4 weeks. Satisfactory results were reported in all patients with minimum side effects and disappearance of the lesion without scarring and the number of injections varied according to the size of the lesion.<sup>7</sup>

Sunita et al found 3% STS to be very effective for the treatment of oral hemangioma and total regression was seen in all cases.<sup>8</sup>

Saraf et al in a study on 40 patients found that conservative management with percutaneous STS is safe, effective and inexpensive.<sup>9</sup>

Sclerotherapy followed by surgical resection is considered the treatment of choice for low flow vascular malformations. Tyagi et al did successful removal of low flow venous malformations causing difficulty in airway or swallowing or risk of aspiration in single sitting with prior devascularisation using N-butyl cyano-acrylate (NBCA).<sup>6</sup>

Surgical resection, though definite treatment, is often not feasible except for smaller lesions because vascular malformations of the head and neck region involve multiple contiguous anatomic spaces and encase critical neurovascular structures making it difficult even after prior devascularisation. Incompletely excised lesions have a strong tendency to recur. Moreover, devascularisation with N-butylcyano-acrylate carries a risk of anaphylactic shock and pulmonary embolism.<sup>10,11</sup>

This procedure requires general anaesthesia as injection of NBCA into lesion is very painful and excision should be carried out immediately after injection. So surgery with or without devascularisation is preferred only in inaccessible lesions or those requiring removal in single sitting due to airway obstruction.

Laser treatment with Argon, Nd-Yag or combination has also been attempted. It acts by selective photo-thermolysis but has been found to be effective only for tiny superficial capillary-venous lesions and not for large-sized or deep lesions. Recurrence is common and is not cost-effective.

Rebeiz et al found that multiple sessions of photocoagulation under general anaesthesia with Nd-YAG laser were effective in decreasing the size of lesion by 75% in only half of the treated patients.<sup>12</sup>

Conventional methods of devascularisation by catheterization and embolization are not effective in these malformations as these are fed by many small feeding vessels.

For low flow malformations, percutaneous sclerotherapy with various sclerosing agents has been used in the treatment of lesions of the head and neck region especially lips, anterior two-thirds of the tongue, buccal mucosa and palate. It is done either by direct percutaneous approach or under X-ray fluoroscopic guidance.<sup>13</sup>

Sclerotherapy, the mainstay of treatment is the injection of an agent to induce inflammation and obliteration of affected veins that results in fibrosis and tissue contracture. Various sclerosing agents which can be used are absolute alcohol, polidocanol, 3% STS, ethanolamine oleate etc.

Although percutaneous injection of sclerosing agents has a relatively long history of safe application for treatment of venous malformations, complications have been reported. Frequency of complications depends on the type of sclerosant used.

Absolute alcohol is known to cause peripheral neurotoxicity, nerve injury, deep vein thrombosis and muscle fibrosis. Gomes recommended that the use of ethanol should be avoided in proximity to nerve trunks.<sup>14</sup>

Ethanolamine oleate may cause renal dysfunction. Choi et al did surgical resection of venous malformation after prior devascularisation with ethanolamine oleate but it is known to produce renal dysfunction.<sup>15</sup>

### **Sclerosant of choice**

With 3% STS as a sclerosing agent, only minor complications including primary skin ulcers and superficial skin eruptions have been reported.<sup>16</sup>

It is effective in stripping endothelium over a considerable distance and is also able to induce a hypercoagulable state, possibly by selective inhibition of protein C and platelet aggregation.<sup>16</sup>

The relatively low frequency of reported complications, reduced risk of nerve damage, higher patient comfort, ability to monitor the drug using X-ray fluoroscopy and low cost formed the basis of our decision to use 3% sodium tetradecyl sulphate.

This study is limited by the number of cases in our study. Future study with higher number of cases is needed to reconfirm the conclusion.

## **CONCLUSION**

Management of low flow vascular malformations has become increasingly complex because of the involvement of adjacent neuro-vascular structures. Since vascular malformations of head and neck involve multiple contiguous anatomic spaces and encase critical neurovascular structures, so surgical resection is difficult even after prior devascularisation. Thus multiple sessions of sclerotherapy should be the treatment of choice in low flow vascular malformations of the head and neck region. 3% STS should be the sclerosant of choice where sclerotherapy alone is selected as the treatment of choice because of a low frequency of complications, higher patient compliance, low cost and easy availability.

## **ACKNOWLEDGEMENTS**

The authors would like to acknowledge the help and support of staff nurse Yashwant Singh in patient recruitment and the patient's families for their voluntary participation.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Kaur M, Sachdeva P, Syal R, Singh S. Role of sclerotherapy in management of low flow vascular malformations. *Int Surg J* 2021;8:1234-8.