Microsclerotherapy Complications

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Abstract

Microsclerotherapy is performed by a range of clinicians from different disciplines worldwide and although side-effects to treatment are common, complications can and do occur. The Aesthetic Complications Expert Group produce evidence based, peer reviewed guidelines on the avoidance and management of complications and this guideline highlights the risks, adverse effects and management of the main complications associated with microsclerotherapy.

Keywords:

Microsclerotherapy, sclerotherapy, complication, sclerosant, telangiectasia, telangiectatic matting, hyperpigmentation, vasovagal, infection, migraine, visual disturbance, deep vein thrombosis, cutaneous necrosis, allergy, anaphylaxis

Introduction

Sclerotherapy is the treatment of unsightly or incompetent superficial leg veins, by injection of a chemical solution which acts to sclerose the intima of the vessel. It is a well-established treatment having been performed on many millions of patients worldwide over several decades[1]. Sclerosis causes a controlled thrombophlebitic reaction leading to the formation of a fibrous cord[2] and the subsequent resorption of the unwanted vein.

Microsclerotherapy refers specifically to the treatment of vessels less than 4mm in diameter.

Serious complications associated with microsclerotherapy are very rare.

It should be noted that most published papers refer to the treatment of varicose veins (CEAP Class 2) (Appendix 1), however the drugs used, and mechanisms of action are principally the same, though complication risks are higher with the larger veins.

It is difficult to substantiate the true incidence of complications pertaining to microsclerotherapy due to under reporting and less robust methods of reporting in some countries, but relative risks outlined in this paper serve as a useful indication for practitioners performing this procedure.

Expected side effects such as minor and localised erythema, tenderness, swelling and bruising are normal with sclerotherapy and are therefore considered side effects rather than complications.

Microsclerotherapy Agents

The most commonly used sclerosants for microsclerotherapy are:

Detergents	Chemical Irritants	Osmotic Solutions
Sodium tetradecyl sulphate (Fibrovein®)	Chromated glycerine (Scleremo®)	Hypertonic saline
Polidoconol (Sclerovein®) or Lauromacrogol 400 (Aesthoxysklerol)		

Patient Considerations

A medical history should be taken to identify current medical conditions, past medical history, medication and allergies.

Absolute contra-indications:

- Pregnancy and breast feeding
- Hypersensitivity or allergy to the sclerosant
- Infection or inflammation at the injection site

Relative contra-indications:

- Bleeding disorders or taking blood thinning medication
- History of DVT or thrombophilia
- Systemic disease which may increase risk of DVT
- Chronic disease which may impair healing
- Autoimmune disease
- Poorly controlled diabetes
- Arterial disease
- Immunosuppression (Medical or drug induced)
- History of cellulitis
- History of phlebitis
- Varicose veins
- Mobility issues
- Morbid obesity
- Unable to wear compression hosiery
- Lymphoedema
- Poorly controlled asthma
- Migraines
- Patients prone to fainting or needle phobia
- Body dysmorphia or mental illness
- Recent anti-inflammatory medications or alcohol
- Certain medications, such as tetracyclines[3]

A psychological assessment to assess motivation for treatment, history of anxiety or depression, recent life events and patient expectations should be helpful in identifying body dysmorphia, which should be treated as a contraindication if risks would outweigh benefits. If vessels cannot be seen at a social distance, yet the patient is anxious to have them treated, the practitioner should consider providing reassurance rather than treatment.

Assessment includes examination of the legs with the patient standing erect to identify:

- Oedema
- Surgical scars/injury
- Pigmented scars
- Skin conditions or infection
- Varicosities

Undertaking a Doppler assessment is recommended to exclude reflux in the saphenofemoral junction or popliteal fossa. Patients with varicose veins or reflux identified with Doppler assessment should be referred for duplex assessment and consultation with a vascular specialist as this could indicate incompetence of the valves in the deeper veins or perforating veins.

Practitioner Considerations

- Formal training and assessment
- Regularly undertake CPD/CME
- Technical competency
  - Select appropriate sclerosant for the treatment with respect to risks and patient factors
  - Ensuring precise intravenous injections
  - The treatment of proximal reflux first or as per training protocols
  - Use the lowest concentration of sclerosant needed for the required indication

- Low pressure injections by using a larger volume syringe. A 3ml syringe is recommended for sclerotherapy[4]
- Low volume of sclerosant per injection site
- Patients should be given clear information and advice in order to give informed consent
- Patient expectations should be realistic
- Written aftercare advice should be provided, and concordance established for compliance with after care instructions and follow up
- Advocate post procedure graduated compression[5]
- Review patient at 2-3 weeks to identify and manage any adverse events or side-effects and reduce any thrombi.

Medication Considerations

The practitioner should use licensed sclerosants unless an unlicensed alternative is clinically justified according to the best interests of the patient.

Sodium Tetradecyl Sulphate (Fibrovein®), Polidocanol (Sclerovein®) and Lauromacrogol 400 (Aesthoxysklerol®) are widely used and well documented evidence of safety and efficacy. Both Aesthoxysklerol® and Fibrovein® are licensed for use in microsclerotherapy in the United Kingdom.

Chromated glycerine (no longer available) has a greater incidence of post treatment hyperpigmentation, telangiectatic matting or tissue necrosis if extravasated. It is highly allergenic due to containing chromium.

Hypertonic saline is not widely accepted as a sclerosing agent because it is associated with significant pain, burning, and leg cramps upon injection, and in case of extravasation, it is likely to cause significant tissue necrosis[2].

Telangiectatic Matting

Complication	
Frequency	Common
Severity	Mild
Local/Systemic	Local

Incidence: 1 in 10-30 treatments[6].

The incidence of telangiectatic matting is variable in published studies and has fallen in recent years, most likely due to better techniques, improved aftercare and enhanced education of phlebologists[7].

Definition

Telangiectatic matting is a morphological description referring to vessels with a small diameter of less than 0.2 mm that can appear sporadically and in well-defined patches[8].

It can appear as a patchy blush with onset at 4-6 weeks post treatment[2]. Telangiectatic matting is usually transient and typically resolves 3-12 months post treatment, however, it can be permanent[9].

Aetiology

According to Yiannakopoulo[2], the cause of matting remains unclear. It is suggested that this represents either dilatation of pre-existing subclinical vessels or an angiogenesis due to inflammatory processes and vascular obstruction. There is some evidence to suggest obese patients, those on hormones (oestrogens) during treatment and those with a family history have a higher risk[10].

Treatment

If proximal reticular veins have been treated successfully, matting may resolve spontaneously. However, if telangiectatic matting does not disappear with time or it is causing distress to the patient, it is possible to treat with either further sclerotherapy or with laser or Intense Pulsed Light procedures[11]. In some cases, it may persist despite treatment and this should be highlighted during the consent process.

Hyperpigmentation

Complication	
Frequency	Common
Severity	Mild to moderate
Local/Systemic	Local

Incidence: 1 in 3-5 treatments[12], 10-30%[2].

The incidence of hyperpigmentation varies between sclerosants[13,14] and certain Fitzpatrick skin types are more prone to post inflammatory hyperpigmentation, notably Type 1 and Type 4-5.

Definition

Hyperpigmentation is the appearance of increased pigmentation (typically brown shadows) along the course of a vessel treated with sclerotherapy[2] and can be transient or permanent. Its onset is usually gradual, appearing at around 6-8 weeks post treatment. Hyperpigmentation may persist for months, although spontaneous resolution occurs in 70% of patients in a 6-month period and with 99% resolution occurring at 1 year[7]. Permanent pigmentation, persisting after 1 year, affects 1–2% of patients[15].

Aetiology

Hyperpigmentation is caused by the migration of the pigment melanin or by the deposition of haemosiderin in the dermis[15]. The proposed mechanism is that persistent thrombi are thought to cause inflammation around the vessel wall which can lead to extravasation of red blood cells through a damaged endothelium or by an increase in permeability of the treated endothelium. The development of post sclerotherapy hyperpigmentation is thus influenced by the extent of endothelial destruction and the volume and concentration of sclerosant used during the procedure.

Treatment

As most cases of post-treatment hyperpigmentation resolves over time without treatment, further intervention is rarely required and providing reassurance is all that is required.

If the patient is distressed by the appearance and is not prepared to wait for spontaneous resolution, topical retinoids, lightening serums or Intense Pulsed Light treatment may be helpful, but expectations should be managed.

Vasovagal Fainting

Complication	
Frequency	Common
Severity	Mild to moderate
Local/Systemic	Systemic

Incidence: Common and nonspecific.

A faint or vasovagal episode can occur with any injection or medical procedure in susceptible patients. It may be instigated by pain, the sight of a needle or the procedure itself. It is important for the practitioner to correctly diagnose the episode and manage accordingly. The greatest risk from a vasovagal episode is trauma caused by a collapse and the practitioner must ensure that the patient is protected if such an event occurs.

Minimising Risk

Ensure patients are properly prepared for treatment, have not fasted and are adequately hydrated. When examining patients, position them close to the treatment couch so that they can lie down quickly if they feel faint.

Treatment

Please refer to the Aesthetic Complications Expert Group guidelines on Management of Vasovagal Episodes.

Infection

Complication	
Frequency	Rare
Severity	Moderate/Serious
Local/Systemic	Local/Systemic

Incidence

Although rare, the potential of a localised or systemic infection needs to be considered when performing sclerotherapy. The practitioner must abide by infection control policy, aseptic working conditions, treating in an appropriate environment and correct patient selection.

Minimising Risk

- Exclude patients with a history of cellulitis or skin infections at the site of injections, poorly controlled diabetics and patients who are immunocompromised (medical or drug induced).
- Maintain an aseptic technique and follow infection control measures.
- Wear disposable examination gloves.
- Use disposable sleeves for Veinlite™ assisted treatments.
- Provide appropriate written aftercare instructions, arrange follow up and review the patient urgently if they have signs or symptoms of an infection.

Treatment

Topical, oral or intravenous antibiotics may be required. Refer to the Aesthetic Complications Expert Group guidelines on Acute Infection.

Migraine / Visual effects

Complication	
Frequency	Rare
Severity	Moderate/Serious
Local/Systemic	Systemic

Patient dependent/drug dependent/ operator dependent

Incidence: 1.4% of treatments[16]

The published papers refer to incidence following liquid and foam treatment of varicose veins with detergent sclerosants as 1.4%[16]. It is recognised that the incidence with liquid is less than that of foam[5], however, everyone who injects sclerosant may eventually have patients

who have visual sequelae and or migraine with or without aura and with or without a history of migraine. Homonymous hemianopia (loss of half of the field of view on the same side in both eyes) have been reported after the injection of Polidocanol liquid into Weiss type 1 veins, symptoms lasted about 20 minutes and subsequent treatments were performed without incident[17].

Aetiology

Sclerosants circulate systemically following treatment and although the exact mechanism for migraine or visual disturbance remains unknown, it is thought to be related to vascular spasm in the contralateral cerebral hemisphere. Recent work has suggested that detergent sclerosants may trigger an endothelin 1 response[9].

Minimising Risk

- Identify patients with a history of migraine and treat with caution
- Advise patients who have had previous visual events after treatment to remain supine and to avoid coughing, nose blowing or sneezing for 10-30 minutes post treatment[17]
- Lying beneath bright lights during treatments may induce a migraine in known sufferers, the provision of sun glasses for light sensitive patients may be helpful[17]
- Use low concentration of sclerosant and limit volume per treatment to 10mls
- Ensure migraine sufferers bring medication and are prepared to have a friend drive them home should a migraine occur

Treatment

Symptoms are usually temporary and self-limiting.

Cutaneous Necrosis

Complication	
Frequency	Rare
Severity	Moderate/Serious
Local/Systemic	Local

Incidence: 1 in 100-500 treatments[18].

Aetiology

The precise mechanism for cutaneous necrosis is not known. Possible causes include extravasation of the solution into the perivascular space, injection into a dermal arteriole, reactive vasospasm of a vessel, passing of the sclerosant into the arterial circulation through arteriovenous anastomoses, sludge formation and subsequent closure of arteriovenous shunts or excessive cutaneous pressure induced by compression techniques.

It is usually reported after perivascular injection of sclerosants in higher concentrations and rarely after properly performed intravascular injections of sclerosants in low concentrations.

Experimental data show that the likelihood of cutaneous necrosis depends on the pressure of injection and the diameter of the vessel with an increased risk with high pressure and/or with smaller vessels[5]. The risk of cutaneous necrosis is lower when using sclerosants with higher viscosities (Poiseuille's law). Detergent sclerosants are the least viscous[2] and pose a greater risk for this complication.

Cutaneous necrosis is more likely in smokers and those with a history of vasculitis[7].

Signs and Symptoms

Immediate blanching may be observed although the onset may evolve within 6-24 hours. The skin is pale and discoloured with a blue-grey, dusky appearance. Dermal sloughing may occur within 24-72 hours and a moderately tender ulcer crater can develop quickly[1].

Minimising Risk

- Low concentration of sclerosant
- Low volume per injection site (blanching should not exceed the size of a One Euro coin per injection site)
- Low pressure injections (using a larger syringe)
- Exercise specific caution when treating around the medial malleolus and dorsum of the foot

Treatment

Most cases of cutaneous necrosis heal without complication by conservative management:

- Non-adherent occlusive dressings
- Acute supportive compression
- Patient advised to keep the lesion clean, washing with soap and water
- Review to ensure no secondary infection occurs
- Regular follow up until healing has occurred

More serious cases may require specialist intervention.

Allergy

Complication	
Frequency	Rare
Severity	Moderate/Serious
Local/Systemic	Local/Systemic

A localised urticarial reaction is common due to the histamine response which can be expected when a vessel suffers trauma related to the procedure and can be easily managed with over the counter antihistamines. If the histamine reaction is more excessive and the patient is at risk of hyperpigmentation, a sparing application of a topical anti-inflammatory or steroid cream applied immediately post-treatment may be of benefit[17].

Rarely, systemic reactions may occur and the literature reports examples of acute asthma following sclerotherapy treatment, however this is rare and asthma should not be considered a contra-indication to treatment[7].

Chromated glycerine (Scleremo®) is considered highly allergenic. Chromium is among the ten most important sensitisers[19]. Chromium allergy is chronic with a poor prognosis although chromium allergies occur topically and not intravascularly. Practitioners should be aware of their own risks with repeated exposure and must wear gloves[20]. The risk is not only to provoke a severe allergic reaction in patients sensitive, but also to induce sensitisation in patients without a history.

Hypertonic saline is not allergenic, but high risk for other complications, including pain, necrosis and nerve injury.

Anaphylaxis

Complication	
Frequency	Rare
Severity	Serious
Local/Systemic	Systemic

Incidence: Approximately 0.3%[21,22]

It should be noted that there is no reliable global data and that under reporting occurs. The incidence is almost certainly higher than described but remains extremely rare given the millions of treatments administered without event.

Four fatal cases of anaphylactic shock have been reported worldwide with sodium tetradecyl sulphate. Even allowing for under reporting, we can be confident this complication is rare.

One death due to anaphylactic shock[20] has been reported 5 minutes after injection with 1ml polidoconol. Seven non-fatal cases of anaphylactic shock due to polidoconol have been reported in published papers. Three of these have been reported in detail from the Netherlands[23]. These patients were anaphylactic within 15 minutes after polidocanol injection. Two of them had taken the drug for the first time.
Symptoms occurred within 15 minutes of treatment.

Signs and Symptoms

See Aesthetic Complications Expert Group guidelines on Anaphylaxis.

Minimising risk

Ensure your history taking identifies risk factors. Exclude patients who have experienced previous allergy to the sclerosant being used. Exclude patients with poorly controlled asthma (Fibrovein® SPC, Sclerovein® SPC, Aesthoxysklerol® SPC). Exclude patients with chromium sensitivity/allergy (Scleremo®).

Test doses are recommended by some manufacturers and the practitioner should refer to the summary of product characteristics prior to use. However, since sclerosants often cause a localised tissue reaction, the interpretation of these test doses can be difficult to interpret.

It is essential that all practitioners who administer drugs, particularly intravenously, has a full understanding of symptoms and signs of anaphylaxis and they are competent and up to date in resuscitation skills and have the appropriate emergency drugs in place. According to the literature, anaphylactic reactions tend to occur within 15 minutes of treatment and patients should be observed for this amount of time and then provided with specific aftercare.

Treatment

See Aesthetic Complications Expert Group guidelines on Anaphylaxis and/or Resuscitation Council Guidelines (UK).

Deep Vein Thrombosis

Complication	
Frequency	Rare
Severity	Serious
Local/Systemic	Local/Distant

Incidence

There is an estimated incidence of less than 1 per 10,000 (sclerotherapy of varicose veins). However, it is difficult to tell how many DVTs are to be expected in

such a population where a general risk applies. The author could not find any case reports of DVT following microsclerotherapy in otherwise healthy individuals.

Aetiology

The three major factors responsible for DVT, first described by Virchow[24] over 100 years ago are endothelial damage, vascular stasis and changes in coagulability. Sclerotherapy always causes the first two[9]. Studies examining the effect of sclerosants on platelet aggregation have shown that sclerosants inhibit platelet aggregation and one that demonstrates a latent activation of the coagulation system seen up to 28 days post treatment[25]. Inflammation of the vessel wall caused by the sclerosant results in thrombi anchored to the vessel wall (sclerothrombi). Non-adherent thrombi only occur on normal endothelium[9]. Goldman[9] explores the possible mechanisms; excessive volume of sclerosing solution injected may facilitate migration into deep system via perforators (particularly if injected directly) of either the solution or a partially attached thrombus. Given the low concentrations and volumes used in liquid microsclerotherapy and that the sclerosing actions of the detergents are neutralised in a concentration gradient with the blood, the risk that microsclerotherapy could cause DVT cannot be identified.

Signs and Symptoms

- Pain, swelling and tenderness in one of the legs (usually the calf)
- A heavy aching sensation in the affected area
- Warmth and erythema over the affected area

Minimising Risk

- Exclude patients with a history of DVT
- Exclude patients with significant risk factors or multiple risk factors to DVT
  - Obesity
  - Contraceptive pill
  - Smoking
  - Thrombophilia
  - Systemic diseases (cardiovascular, renal, hepatic)
  - Cancer
  - Recent surgery (within the last 3 months)
  - Reduced mobility
  - Recent pregnancy
  - Long haul travel planned within 6 weeks of treatment
- Low volume, low concentration injections
- Symptoms of DVT or pulmonary embolism should be explained to the patient as part of the consent process, to ensure they do not delay seeking immediate medical attention
- After care advice should include instructions:
  - To walk for at least 10 minutes following completion of treatment
  - To wear compression hosiery as per clinic protocol
  - To avoid prolonged standing, sitting or inactivity

Treatment

Patients should be referred for appropriate NHS treatment, care and monitoring.

Appendix 1: CEAP Classification of Chronic Venous Disease

CEAP	Clinical classification
CO	No visible or palpable signs of venous disease
C1	Telangiectasies or reticular veins
C2	Varicose veins
C3	Oedema
C4a	Pigmentation or eczema
C4b	Lipodermatosclerosis or athrophie blanche
C5	Healed venous ulcer
C6	Active venous ulcer

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