Topic: Overview of Complications of Sclerotherapy
Date: Tuesday 18th September, 2007
Time: 1545-1600

Speaker:
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MB,BS(HONS),FACP
Phlebologist

Conference:
Australian College of Phlebology 2007 Scientific Meeting and Workshops
Basic Phlebology Certificate Course (Phlebology Part 1)
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The experienced Phlebologist should be able to promptly identify sclerotherapy complications and commence appropriate treatment immediately. Most sclerotherapy complications may be classed as minor and readily manageable without significant sequelae. Though a catastrophic event is unlikely, all treatments should be performed in a clinic properly equipped with acute resuscitative equipment. See the college for guidelines on clinic set-up.

Important references:
(Guex, Allaert, Gillet, & Chleir, 2005)
Transient Dermal Pigmentation

- Grade/Severity: minor but may persist for up to 12 months after a treatment session.
- Aetiology/Predisposing Factors:
  - Operator Dependent: more likely if high sclerosant concentrations in superficial and dermal veins.
  - Patient Dependant: more likely if patient has high FP classifications (FPC III to V)
  - Drug Dependant: HT Saline then STS more likely to produce pigmentation than Aethoxysclerol.
  - Unknown/Undiscovered: ???
- Prevention: eliminate predisposing factors and treat proximal disease first.
- Diagnosis:
  - History: gradual onset following treatment session. Peak usually at 4-6 weeks.
  - Physical Examination: non-blanching, non-tender, non-raised brown discolouration.
  - Further Investigations: CW doppler for inadequate treatment of incompetent reticular veins.
  - Exclude: Trapped blood, heamosiderin staining, tetracycline induced.
- Mechanism:
  - Pathophysiology: inflammatory mediated, increased melanin production by melanocytes. Heamosiderin and RBC degradation products produced by sclerosed vessels.
  - Anatomy:
  - Histology: Increased melanin granules within dermis and persistent heamosiderin with in the dermis and hypodermis.
- Treatment:
  - Acute: NIL
  - Long Term Management: Avoid extreme UV exposure which may cause exacerbation or permanence.
- Prognosis: Good
Permanent Dermal Pigmentation

- Incidence: 1 in 80-120 (Georgiev, 1993; Tafazzoli, Rostan, & Goldman, 2000; Thibault & Wlodarczyk, 1992; Weiss & Weiss, 1990)
- Grade/Severity: moderate
- Aetiology/Predisposing Factors:
  - Operator Dependent:
  - Drug Dependant: HT Saline.
  - Patient Dependent: Iron Supplementation, Oral Tetracycline
  - Unknown/Undiscovered: ???
- Prevention: Avoid predisposing factors.
- Diagnosis:
  - History: pigmentation >12 months duration.
  - Physical Examination: as with transient dermal pigmentation.
  - Further Investigations: Skin biopsy
- Mechanism:
  - Pathophysiology: inability of to resorb heamosiderin and iron from dermis.
  - Anatomy
  - Histology: granules in dermis.
- Hydrodynamics
- Treatment:
  - Acute:
  - Long Term Management: Q switched ruby laser
- Prognosis: Poor
Telangiectatic Matting

- Incidence: 1 in 10-30 (Davis & Duffy, 1990)
- Grade/Severity: mild-moderate
- Aetiology/Predisposing Factors:
  o Operator Dependent: high concentration, high volume, high hydrostatic injection pressure
  o Drug Dependent: related to drug sclerosing power.
  o Patient Dependent: Transparent skin, females and high oestrogen more likely, untreated proximal disease – persistent reflux.
  o Unknown/Undiscovered: ???
- Prevention: avoid predisposing factors.
- Diagnosis:
  o History: patchy pigmentation, onset 4-6 weeks post treatment.
  o Physical Examination: Blanching, visible telangiectatic matting.
  o Further Investigations: CW to identify or exclude underlying incompetent reticular veins.
- Mechanism:
  o Pathophysiology: Chemical induced angioneogenesis.
  o Anatomy
  o Histology: Diffuse thin walled vessels at the within the superficial most layers of the dermis.
  o Hydrodynamics
- Treatment:
  o Acute: Nil
  o Long Term Management: identify and treat proximal disease, treat remaining telangiectatic matting with sclerotherapy.
- Prognosis: Good if retreated.
Complications of Sclerotherapy – Basic Phlebology Certificate Course (Phlebology Part 1)

**Trapped Blood**

- Incidence: 1 in 3-5 (Kern, 2002)
- Grade/Severity: mild
- Aetiology/Predisposing Factors:
  - Operator Dependent: ?
  - Drug Dependant: ?
  - Patient Dependent: ?
  - Unknown/Undiscovered: ?
- Prevention: ?
- Diagnosis:
  - History: tender lump, onset 1 to 6 weeks post-sclerotherapy.
  - Physical Examination: tender, non-blanching, brown discolouration.
  - Further Investigations: CW Doppler used to confirm abolition of reflux, evacuation of liquefied thrombus.
- Mechanism:
  - Pathophysiology: liquefied thrombus trapped between two treated ends of vessel. Intrallesional pressure increases due to increased volume of blood or reduced volume of untreated segment of vessel.
  - Anatomy: image of treated ends.
  - Histology:
  - Hydrodynamics:
- Treatment:
  - Acute: evacuation using 19G needle.
  - Long Term Management: repeat evacuation up to 6 months after treatment.
- Prognosis: Excellent.
Dermal Necrosis/Ulceration

- Grade/Severity: mild to catastrophic.
- Aetiology/Predisposing Factors:
  - Operator Dependent: inadvertent intra-arterial or arteriolar injection (microsclerotherapy). Excessive injection pressure into the superficial veins may cause retrograde flow of sclerosant into the arterial capillary vasculature
  - Drug Dependant:
  - Patient Dependent: more likely in smokers, vasculitis (Henoch-Schonlein, Erythema nodosum, Polyarteritis nodosa, Temporal (giant cell) arteritis, Takayasu's arteritis, Wegener's granulomatosis.)
  - Unknown/Undiscovered: ???
- Prevention: Exclude risk factors such as vasculitis and cease smoking.
- Diagnosis:
  - History: onset of intense pain with in 6 to 24 hours after the ischaemic event. Skin is pale and discoloured.
  - Physical Examination: initially dermis is pale with blue-grey dusky appearance. Dermal sloughing occurs within 24 to 72 hours after the ischaemic event. Moderately tender ulcer crater develops quickly.
  - Further Investigations: Check for underlying vasculitis, duplex doppler to check for arterial wall thickness and abnormalities.
- Mechanism:
  - Pathophysiology: Ischaemic necrosis resulting from complete occlusion of arterial component of capillary vascular bed. Unrecognised arterio-venous shunts allow sclerosant to enter the arterial circulation. Compare this to occlusion of non end-artery or end-arteriole. Sclerosant may also enter the arterial capillary vasculature via retrograde flow due to excessive injection pressure.
  - Anatomy: diagram of anastomosis.
  - Histology:
  - Hydrodynamics:
- Treatment:
  - Acute: Supportive, compression, occlusive dressings
  - Long Term Management: dermal scars may need further treatment.
- Prognosis: Very good when extent of necrosis is minimal.
Superficial Thrombophlebitis

- Incidence: 1 in 30 to 90 (Coleridge Smith, 2005; Sadick, 1991)
- Grade/Severity: mild to moderate
- Aetiology/Predisposing Factors:
  o Operator Dependent: high sclerosant concentration, high injection pressure and increased contact time.
  o Drug Dependant: relates to sclerosant power.
  o Patient Dependent:
  o Unknown/Undiscovered: ???
- Prevention: Post-Sclerotherapy compression therapy.
- Diagnosis:
  o History: gradual onset of tender red track approximately 2-6 weeks after sclerotherapy.
  o Physical Examination: tender, indurated, erythematous longitudinal lesion which follows the course of the saphenous trunk.
  o Further Investigations: Duplex doppler examination is essential to establish the diagnosis and to exclude a concomitant or subsequent DVT.
- Mechanism:
  o Pathophysiology: Chemical injury causing an inflammatory reaction within the segment of saphenous vein that has been treated. Intraluminal thrombus and causes complete occlusion of the vessel but may also demonstrate antegrade progression. There is perivascular oedema and this can be readily identified on B-mode ultrasound.
  o Anatomy:
  o Histology: see diagram
  o Hydrodynamics
- Treatment:
  o Acute: compression, ambulation, anti-inflammatory medication
  o Long Term Management:
- Prognosis: Excellent
Deep Vein Thrombosis

- Incidence: 1 in 500-1000 treatments
- Grade/Severity: mild to severe
- Aetiology/Predisposing Factors:
  - Operator Dependent:
  - Procedure Dependent: prolonged procedure time, perforator vein treatment, high injection volumes, treatment of distal leg varices.
  - Drug Dependent: Aethoxysclerol may produce greater effect at distant sites, sinus thrombosis risk with periocular injections.
  - Patient Dependent: Gene mutations, thrombophilia, previous history of DVT, immobilisation, smoking, hyperhomosysteinaemia, long haul flights, dehydration.
  - Unknown/Undiscovered: ???
- Prevention: graded compression, exercise, anticoagulation.
- Diagnosis:
  - History: sudden onset of calf pain and/or ankle swelling, pain when walking.
  - Physical Examination: tenderness to palpation, positive Homan’s sign.
  - Further Investigations: Duplex ultrasound examination is essential to establish the diagnosis and assess progression of the disease.
- Mechanism:
  - Pathophysiology: Virchow’s triad
  - Anatomy: Axial veins and crural veins
  - Histology:
  - Hydrodynamics:
- Treatment:
  - Acute: Assessment, compression, anticoagulation
  - Long Term Management: CVI, CVH, recurrence, prophylaxis
- Prognosis: Good to very poor
Other Dermal Complications
  Hirsutism
  Contusion

Deep Venous Injury
  Deep Venous Thrombosis

Lymphatic Injury
  Lymphocele – Phlebectomy Only

Pulmonary Injury
  Embolism- Air/Thrombotic
  Sclerosis

Arterial Injury
  Ischaemia

Allergic (Anaphylaxis)

CNS
  Migraine (Hanisch, Muller, Krivokuca, & Winterholler, 2004)
  Thrombotic/Embolic (PFO)
  Hypersensitivity

Peripheral Nerve Injury
  Inflammation
  Scar
### Number of Complications according to Sclerosant Form

<table>
<thead>
<tr>
<th></th>
<th>Liquid</th>
<th>Foam</th>
<th>Both</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Immediate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anaphylactic shock</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Intra-arterial injections</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Vasovagal fainting alone</td>
<td>4</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Headaches alone</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Paresthesias alone</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Nausea and vomiting alone</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Visual disturbances alone</td>
<td>4</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Visual disturbance associated with 1 or more of headache, nausea, vasovagal fainting</td>
<td>0</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td><strong>Delayed</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deep venous thrombosis</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Muscular venous thrombosis</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Muscular venous extension</td>
<td>0</td>
<td>1</td>
<td>0</td>
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<tr>
<td>Perforating venous thrombosis</td>
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<td>3</td>
<td>0</td>
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<tr>
<td>Intense superficial thrombophlebitis</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Skin necrosis</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>12</td>
<td>37</td>
<td>0</td>
</tr>
</tbody>
</table>

### Number of Sessions, Sclerosing Agent, and Type of Injected Varicose Vein

<table>
<thead>
<tr>
<th>Type of Varicose Vein</th>
<th>Number of Sessions with Liquid</th>
<th>Number of Sessions with Foam</th>
<th>Number of Sessions with Both</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reticular and spider veins</td>
<td>3,631</td>
<td>2,293</td>
<td>40</td>
</tr>
<tr>
<td>Great saphenous vein trunk or junction</td>
<td>261</td>
<td>1,533</td>
<td>130</td>
</tr>
<tr>
<td>Small saphenous vein trunk or junction</td>
<td>109</td>
<td>492</td>
<td>4</td>
</tr>
<tr>
<td>Main tributaries</td>
<td>422</td>
<td>714</td>
<td>34</td>
</tr>
<tr>
<td>Small varices or nonsaphenous</td>
<td>717</td>
<td>332</td>
<td>37</td>
</tr>
<tr>
<td>Perforating veins</td>
<td>77</td>
<td>199</td>
<td>2</td>
</tr>
<tr>
<td>Postsurgical recurrences</td>
<td>217</td>
<td>832</td>
<td>97</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5,434</strong></td>
<td><strong>6,395</strong></td>
<td><strong>344</strong></td>
</tr>
</tbody>
</table>

### Australian TGA GUIDELINES
- Aethoxysklerol maximum dosage: 2mg/kg body weight per day or 5 mls of 3% solutions (equals 3gm per 100ml)
- Sodium Tetradecyl Sulphate maximum dosage: 4 mls of 3% or 10mls of 1%
Inflammation in Vascular system | Symptoms | Vasculitis
--- | --- | ---
Small veins | Purpura - large purple circles on the skin. | Henoch-Schonlein.
Deep layers | Deep, painful red bumps on the arms and legs. | Erythema nodosum.
Medium - sized arteries | Kidney failure, heart complications, gastrointestinal problems and high blood pressure. | Polyarteritis nodosa.
Inflammation of arteries in the brain and head. | Severe headaches, blindness, and stroke | Temporal (giant cell) arteritis.
Inflammation of the large arteries around the heart. | Fever and night sweats, heart attack. | Takayasu's arteritis.
Blood vessels of respiratory tract. | Coughing, shortness of breath, nose bleeds, and ear infections | Wegener's granulomatosis.


**Complications and Risks**

If performed properly, sclerotherapy is an efficient treatment method with a low incidence of complications. Nevertheless, a series of adverse events may occur in the context of the therapy. These are, in particular:

- Allergic reaction;
- Skin necroses;
- Excessive sclerosing reaction (thrombophlebitis);
- Pigmentation;
- Matting;
- Nerve damage;
- Scintillating scotomas;
- Orthostatic collapse; and
- Thromboembolism.
CONSENSUS STATEMENT

Ultrasound Guided Sclerotherapy

Diagnose venous disease and treat superficial venous incompetence with injected sclerosants under Ultrasound Guidance

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6 Risk Management

6.1 ACP/NZCAM requires written informed patient consent before UGS.
6.2 The ACP/NZCAM approved sclerosants covered by this standard are
   • Sodium tetradecylsulphate (STS)
   • Polidocanol supplied as either Sclerovein™ or as Aethoxysclerol™

6.3 Duplex/Doppler Ultrasound equipment used in delivering this standard must include a high frequency linear array probe with colour flow and Doppler capabilities.
6.4 Under this standard, liquid and foam sclerosant formulations are approved within the maximum allowable limits (Refer 6.5, 6.6, and 6.7 below).
6.5 Under the NZ Medicines Act, Foam is an unapproved use of an approved/or unapproved medicine (STS is the only approved sclerosant) but permitted when administered by a Registered Medical Practitioner provided full written informed consent has been given by the patient.
6.6 This standard restricts the use of STS in concentrations of 3% to 4 mls liquid per day (≤ .12g per patient per day).
6.7 Use of polidocanol must not exceed 2mg/kg body weight per treatment day.
6.8 The minimum resuscitation equipment required is:
   Oxygen, intravenous fluids, adrenalin, blood pressure and cardiac monitor, pulse oximetry, defibrillator, and suction.


