Sclerotherapy
Complications and Contra-Indications

Dr Paul Thibault
Phlebologist
Newcastle NSW
Sclerotherapy
Complications and Contraindications

“Not everything that needs to be known can be taught”
Sclerotherapy
Complications and Contraindications

“World-wide clinical experience has proved beyond all possible doubt that embolism is a complication not to be feared and its interest is almost purely theoretical. Properly conducted, the injection treatment of varicose veins can be carried out without the slightest risk, and if reasonable care be exercised, ulceration at the site of injection becomes a complication of extreme rarity”

Dr Victor Coppleson 1929
Patient Selection (Contraindications)

- **Absolute**
  - Acute deep venous thrombosis
  - Allergy to sclerosant
Patient Selection (Contraindications)

- Relative
  - Predisposition to thrombosis
    - Past history of thrombosis/PE
    - FH venous thrombo-embolism
    - Hypercoagulable state eg polycythaemia rubra vera
    - Long-distance travel
    - Known Thrombophilia
    - Bedrest and inability to ambulate
    - Pregnancy
    - 1st and 3rd generation Ocs
Sclerotherapy and Thrombosis

“World-wide clinical experience has proved beyond all possible doubt that embolism is a complication not to be feared and its interest is almost purely theoretical.

– Dr Victor Coppleson 1929

“The reported incidence has been less than seen in the general population”

– Dr Craig Feied  Semin Dermatol 1993

Anecdotal reports that asymptomatic DVTs are more common than recognised

– Parsi and Myers
Sclerotherapy and Thrombosis

- Large veins are probably at no greater risk than small veins
  - STS and POL are anticoagulants at concentrations > 0.3%
- There is no evidence that patients with known thrombophilia are more predisposed to post-sclerotherapy VTE than others
- Medico-Legal Indication for Prophylactic Clexane
  - Significant thrombophilia
  - Past History DVT or PE if no significant contributary cause
Diagnosis

- Asymptomatic
- Painful swollen leg
- Pulmonary embolus (chest pain, dyspnoea)
# Sclerotherapy and Thrombosis

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Sclerosant Effects on Clotting Tests (*Parsi*)

- STS prolongs all clotting tests at concentrations higher than 0.3% demonstrating potent anticoagulant activity.

- STS shortens XACT and NAPTT at concentrations less than 0.3% demonstrating pro-coagulant activity.

- STS behaves as a procoagulant phospholipid at concentrations lower than 0.3%.
Sclerosant Effects on Clotting Tests (*Parsi*)

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- STS behaves as a procoagulant phospholipid at concentrations lower than 0.3%.
Sclerosant Effects on Clotting Tests (K Parsi)

- POL has less dramatic effect on clotting time.
- POL has more procoagulant activity at low concentrations when compared with STS with increased exposure time.
- STS is a more potent anticoagulant at high concentrations when compared with POL.
Sclerotherapy and Thrombosis Prevention

- Selection of patients
- Post-treatment graduated compression stocking
  - 3-4 days day and night
  - 10 – 20 days during day
- Walk immediately after treatment 15-20 minutes
- Daily walking 45 minutes
- Prophylactic Clexane for high-risk patients
Patient Selection (Contraindications)

- Relative
  - Predisposition to thrombosis
  - Defer or avoid Rx or consider prophylactic LMWH
    - Past history of thrombosis/PE
    - FH venous thrombo-embolism
    - Hypercoagulable state eg polycythaemia rubra vera
    - Long-distance travel
    - Known Thrombophilia
    - Bedrest and inability to ambulate
    - Pregnancy
    - 1st and 3rd generation Ocs
## Allergy and Anaphylactic Reactions

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Allergy and Anaphylactic Reactions

- More likely with STS
- More likely with stronger solutions (>1%)
- Most commonly pseudoanaphylactic (anaphylactoid)
- Anaphylactic reactions can occur also
**Anaphylactic Reactions**

- Type 1 hypersensitivity reaction
- Requires previous exposure
- Always caused directly by degranulation of mast cells or basophils mediated by IgE
- Time of onset varies from minutes to hours after exposure
- Biphasic anaphylaxis (relapse within 72 hrs) occurs in 1 – 20% of cases
Anaphylaxis - Symptoms

• **Skin** involvement including generalized hives, itchiness, flushing, and swelling of the lips, tongue or throat. (90%)

• **Respiratory** symptoms may include shortness of breath, wheezes or stridor, and low oxygen. (70%)

• **Gastrointestinal** symptoms may include crampy abdominal pain, diarrhea, and vomiting (45%)

• **Cardiovascular** Hypotension can cause fainting & LOC. Due to histamine release, coronary artery spasm may occur with subsequent myocardial infarction or dysrhythmia (45%)

• **CNS** - loss of bladder control and muscle tone
  - feeling of anxiety and “impending doom”
Pseudoanaphylaxis (Anaphylactoid)

- does not involve an allergic reaction but is due to direct mast cell degranulation
- most common trigger for this mechanism is an intravenous infusion of an iodine-containing radiological contrast medium
- exact mechanism with sclerosants is unknown but may be related to degranulation (release of mediators) from endothelial cells
- occurs on 1\textsuperscript{st} exposure to sclerosant and within minutes of injection
Allergy and Anaphylactic Reactions

- **Management**
  - Awareness and early detection
  - Adrenaline (sc or im)
  - I-V line and airway (O2)
  - Corticosteroids
  - Admission to hospital

- **Avoidance**
  - Use foam rather than 1-3% STS solution as direct degranulation is dose/time-related
Patient Selection (Contraindications)

- Relative
  - Current other systemic disease
  - Lymphoedema
  - Deep venous obstruction (only about 10% of cases)
  - Patent foramen ovale - avoid foam
Local Complications

- Postsclerotherapy pigmentation
- Telangiectatic Matting
- Cutaneous Ulceration
- Superficial Thrombophlebitis and Acute Chemical Phlebitis
- Infection
- Hypertrichosis
- Skin reactions to tape, compression pads and stockings
Skin Reactions

- Allergy to tape
- Friction (cleavage) reaction to compression pads
- Allergy to stocking fibres
Postsclerotherapy Pigmentation and Telangiectatic Matting

- Most common adverse sequelae
- Commonly occur together
- Probably have common aetiology
  - disruption of endothelium
  - thrombus formation
  - inflammation
Post-sclerotherapy Pigmentation: What is it?

Perl’s stain
Haemosiderin found around dermal vessels
CELLULAR MECHANISM OF PSHP

Dermal Macrophage

- Hemoglobin → Heme
- Fe
- Ferritin

RBC's

Hemosiderin

Transferrin → Transferrin Iron Complex → Ferritin Stores

Fe
Postsclerotherapy Pigmentation: Aetiologic Factors

- Proportional to quantity of haem (Fe) in tissues
- Inversely proportional to rate of removal of Fe from tissues
Postsclerotherapy Pigmentation: Aetiologic Factors

- Sclerosing solution type and concentration
- Sclerotherapy technique
- Persistent proximal venous incompetence
- Vessel fragility (age)
- Vessel diameter
- Total body iron stores/transport mechanism
- Post-sclerotherapy management (compression)
Post-sclerotherapy Pigmentation: Causes
Solution Type and Concentration

- **Excessive endothelial destruction** predisposes to pigmentation
- Potent sclerosants (eg STS, POL, Iodide)
- Less with weak sclerosants (HS and chromated glycerin)
- Concentration dependent (STS and POL)
### Local Complications

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<tr>
<td>Ulceration</td>
<td>4 (0.15%)</td>
<td>32 (0.2%)</td>
</tr>
<tr>
<td>Significant or severe pigmentation</td>
<td>5 (0.2%)</td>
<td>30 (0.2%)</td>
</tr>
<tr>
<td>Telangiectatic matting</td>
<td>4 (0.15%)</td>
<td>7 (0.04%)</td>
</tr>
<tr>
<td>Superficial thrombophlebitis</td>
<td>3 (0.1%)</td>
<td>14 (0.08%)</td>
</tr>
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</table>
Excessive Sclerosant Concentration
Postsclerotherapy Pigmentation: AetioLogic Factors

- Sclerosing solution type and concentration
- Technique
Postsclerotherapy Pigmentation: Technique

- **Failure to treat proximal point of reflux first**
  - incompetent junctions
  - incompetent trunks
  - larger varices
  - reticular veins

- **Excessive injection pressure**
  - 2-3ml syringes therefore better than 1ml
Failure to treat proximal reflux
Postsclerotherapy Pigmentation: Aetiologic Factors

- Sclerosing solution type and concentration
- Technique
- Predisposition to pigmentation
Size of Vein and Sclerosant Concentration
Postsclerotherapy Pigmentation: Predisposition to pigmentation

- Unrelated to skin or hair colour
- Increased vessel fragility
  - post-menopausal
  - menstruation
- Minomycin - blue-grey
- Total body iron stores
Minomycin staining
Post Sclerotherapy Pigmentation
The role of Fe

- Prospective study JDSO Oct 1994 (Thibault & Wlodarczyk)
- 233 patients
- Serum Ferritin taken prior to treatment
- Followed at 3, 6, 12 months for PSP
Serum Ferritin vs Age

Index of Serum Ferritin

\( p = 0.0004 \)
Age vs Pigmentation at 3 months

pigmentation score at 3 months

p = 0.44
Age vs Pigmentation at 12 months

pigmentation score at 12 months

p = 0.07
Serum Ferritin vs Pigmentation at 3 months

Index of Serum Ferritin

pigmentation score at 3 months

\[ p = 0.0007 \]
Serum Ferritin vs Pigmentation at 6 months

Index of Serum Ferritin

pigmentation score at 6 months

p = 0.0001
Serum Ferritin vs Pigmentation at 12 months

Index of Serum Ferritin

pigmentation score at 12 months

\[ p = 0.0001 \]
CONCLUSION: The higher the serum ferritin level, the greater the risk of persistent post-sclerotherapy pigmentation.
How to remove Fe from the Skin?
How to remove Fe from the Skin?
Postsclerotherapy Pigmentation: Prevention

✓ Avoid iron supplements before, during and for 3 months after treatment

✓ Meticulous technique
  ✓ Avoid excessive injection pressures
  ✓ Select appropriate solution and strength
  ✓ Treat proximal to distal
  ✓ Evacuation of retained blood and microthrombi
  ✓ Adequate postsclerotherapy compression
Compression Bandaging Vs Graduated Compression Stockings

<table>
<thead>
<tr>
<th></th>
<th>no. treated</th>
<th>no. success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduated compression stockings</td>
<td>156</td>
<td>144</td>
</tr>
<tr>
<td>30 - 40 mmHg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elastocrepe bandages</td>
<td>147</td>
<td>117</td>
</tr>
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</table>

\( p < 0.01 \)

(Scurr JH, Coleridge-Smith P, 1985)

- Superficial thrombophlebitis less in GCS
- Pigmentation less in GCS
Compression in Treatment of Leg Telangiectasia

<table>
<thead>
<tr>
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<th>Pigmentation</th>
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<tbody>
<tr>
<td>Compression</td>
<td>28.5%</td>
</tr>
<tr>
<td>Non - Compression</td>
<td>40.0%</td>
</tr>
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Study by Goldman, Marley, Butie et al. Patients with symmetrical disease. One leg compressed for 72hrs with Class 2 stocking

- Ankle and calf oedema also reduced
- No increase in effectiveness for vessels < 0.5mm diam
- No increase in effectiveness in thigh
Post-sclerotherapy Compression Study of Duration

- Weiss, Sadick, Goldman - Dermatologic Surgery 1999
  - Class 1 GCS during daytime only
  - Reticular and spider veins
  - Effectiveness at 6, 12, and 24 weeks
  - Side effects
    - Post-sclerotherapy pigmentation
    - Telangiectatic matting
    - Oedema
    - Ulceration
Post-sclerotherapy Compression Study of Duration - Conclusions

- **Effectiveness**
  - **AT 6 WEEKS**
    - 3 weeks > 1 week > 3 days > None (p<0.004)
  - **AT 24 WEEKS**
    - 3 weeks > 1 week > (3 days, None) (p<0.006)

- **Side Effects**
  - **POST-SCLEROTHERAPY PIGMENTATION**
    - (None, 3 days) > 1 week > 3 weeks
  - **TELANGIECTATIC MATTING, ULCERATION, OEDEMA**
    - Not significant
Postsclerotherapy Pigmentation: Treatment

- Chemical exfoliants - non specific
  - trichloroacetic acid, glycolic acid
- Physical exfoliants
  - CO₂, liquid nitrogen
- Chelating agents - topical EDTA
- Laser treatment
Fig. 3. Absorption spectra of haemosiderin granules.

(a) , Formalin-fixed, lipid-extracted, paraffin-embedded tissue; average of six determinations.

(b) , Freshly frozen tissue; average of two determinations.

From NATURE 1962.
Chronotherapy or “Flashbulb” Therapy
Telangiectatic Matting

- New vessels < 0.2 mm in diameter
- Post-sclerotherapy
- Post-surgical
- Thigh affected > calf
- Age related
- F > M
Telangiectatic Matting

- Incidence – 5% - 75% (Goldman)
- Say 18%
  - 6% will get better spontaneously (inflammatory)
  - 6% will get better with further treatment (related to venous hypertension)
  - 6% is permanent (Duffy)
Telangiectatic Matting
Telangiectatic Matting
Aetiology

Patient predisposition
- Extensive telangiectasias
- Obesity
- Oestrogen hormones

Technique
Telangiectatic Matting: Aetiologic factors

- **Angiogenesis** - release of angiogenic factors from:
  - damaged endothelial cells (disruption of endothelium)
  - peri-vascular mast cells (peri-vascular inflammation)
- **Arterio-venous anastomoses**
- **Persistence of proximal sources of reflux**
Telangiectatic Matting Technique

- Failure to control proximal sources of reflux
- Excessive thrombosis in superficial veins (Interleukin-8)
Telangiectatic Matting

Failure to control proximal sources of reflux
Telangiectatic Matting

Failure to control proximal sources of reflux
Telangiectatic Matting Management

- As for post-sclerotherapy pigmentation
- Look for untreated proximal sources of reflux
- Chronotherapy
- Review and retreat cautiously every 3 months and progress will be made
Telangiectatic Matting: Prevention and Treatment

✓ Treat all proximal sources of reflux including reticular veins
✓ Use compression
✓ Withdraw oestrogen therapy if not essential
✓ “chronotherapy” - review every 3 months
✓ Daily walking or other exercise to improve muscle tone
Post Sclerotherapy
Cutaneous Necrosis
Cutaneous Necrosis

- Most common with hypertonic saline (extravascular injection)
- Less common with detergents – a variety of mechanisms – all ischaemic
Cutaneous Necrosis

- Direct intra-arterial injection
- Stellate necrosis causing necrosis of large area of skin
- High risk sites
  - Popliteal fossa
  - Medial distal calf (PTPVs)
  - Groin
Veno-arterio Reflex

- Most common cause with detergents
- High venous pressure or sclerosant concentration causes reflex arteriolar spasm
- Cigarette smokers may be at greater risk
Veno-arteriolar Reflex

- Stellate purpura post-sclerotherapy of intersaphenous vein complicated by VAR vasospasm of small saphenous artery
Treatment of Cutaneous Necrosis

- Awareness and early detection
- Local vasodilator (2% nitroglycerin ointment)
- Compression
- Clexane or aspirin
Treatment of Cutaneous Necrosis
Treatment of Cutaneous Necrosis
Treatment of Cutaneous Necrosis

Before and after treatment images of a knee area with skin necrosis.
Treatment of Cutaneous Necrosis
Superficial Thrombophlebitis and Chemical Phlebitis

- **Common**
- **Factors**
  - Excessive sclerosant concentration
  - Not controlling proximal reflux
Superficial Thrombophlebitis and Chemical Phlebitis
Treatment

- Compression
- Walking
- NSAIDs
- Look for proximal reflux and treat
Hypertrichosis

- Rare
- Transient
- STS and iodine
- Release of angiogenic cytokines
Infection

- Rare
- May be unusual bacteria such as Pseudomonas
Infection

- Differential Diagnosis
  - Thrombophlebitis
  - Intra-arterial injection

- Treatment
  - Appropriate oral or systemic antibiotic