Cutaneous Venous Hypertension

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Disclosure

• Minority shareholder in dermaka Skin Care Products, LLC
Why You Are Here Today

(Bush, 2018)
CEAP

• The CEAP classification consists of categories listed as: C0 to C6.
• Except for categories, C0 & C2, the manifestations of venous disease are confined to the dermal layer
• C2 is varicosities that are subdermal
• There may be isolated skin changes associated with varicosities i.e. eczema
CEAP 1

- CEAP 1 is simple venous telangiectasia (Spider Veins)
- The causative factor is transmitted venous pressure with resultant vessel wall dilatation
- Spider veins are located from 300 – 1000 microns below the squamous epithelium
CEAP 2

- CEAP 2 is reserved for verification for veins that are subdermal
- Only the valves are abnormal, not the vein itself
CEAP 3

- CEAP 3 is manifested as edema in the dermal and subdermal tissue
CEAP 4

- CEAP 4 refers to stasis changes in the lower leg or signs of chronic venous disease
- Hemosiderin is deposited in the dermal tissue as the result of red cell extravasation
Histology of Skin With Stasis Changes
CEAP 5

- CEAP 5 classification if for patients with healed venous ulcer and skin sequelae, secondary to chronic inflammatory process
This classification is reserved for patients with active ulceration
Cutaneous Venous Hypertension

• The manifestations of cutaneous venous hypertension range from:
  – Spider veins
  – Varicose veins
  – Stasis dermatitis
  – Atrophic blanche
  – Venous ulceration

• Most patients seek consultation for spider veins
Cutaneous Venous Hypertension

• Most spider veins are related to an area of venous hypertension

• Reticular veins are the final pathway for transmission of venous hypertension in the majority of patients but not all

• Volume overload in pregnancy is the main etiology of reticular vein dysfunction
Cutaneous Venous Hypertension

• However, reticular veins are usually connected to a deeper source of pathology

• The branches of the reticular complex in the majority of clinical situations, are the final pathway leading to cutaneous telangiectasia

(Bush, 2018)
Cutaneous Venous Hypertension

• The GSV, SSV, AAGSV, and Thigh Extension Branch if incompetent, may transmit abnormal pressure to the skin via an incompetent branch that may or may not connect to a reticular vein

• Refluxing perforators may also transmit abnormal pressure to the skin resulting in cutaneous venous dilatation (Spider Veins)
Cutaneous Venous Hypertension

• Conversely, a refluxing branch may arise from a normal truncal vessel

• This is not an uncommon occurrence

• In this case, the truncal vessel is not treated but only the refluxing vessel that will be discussed later in the presentations
Cutaneous Venous Hypertension

• It is imperative to treat the etiology of the cutaneous manifestation, or one of the following events may happen:
  – Non-Clearance
  – Recurrence
  – Angiogenesis
Cutaneous Venous Hypertension

• The US is indispensable in diagnosing deeper pathology. Use the US at 2 cm depth to trace reticulars to origin of hypertension

• All pathologic pathways will reflux

• Skin illumination only allows visualization to a depth of 2 cm but, is helpful as a mapping aide for reticular veins

• Only an US can determine pathology of the reticular vein
Cutaneous Venous Hypertension

- The etiology of cutaneous venous hypertension must always be alleviated at the time of spider vein treatment.
Theories of Spider Vein Formation

- Sommer A, et al, described the O2 & CO2 difference between red and blue telangiectasia
- Their conclusion is that all telangiectasia are assumed to be in the capillary bed
- This would involve arterioles in continuity with dilated venous structures
- We do not see this on our histological exams

(Sommer, 1997)
Theories of Spider Vein Formation

• However, our biopsy specimens are limited to 1 mm diameter
• Another theory is the ‘Microshunt histology theory’
• Bihari et al, described a theory that many of the telangiectasia are associated with an AV microshunt
• The specimens for study were 2.5 cm by 1.5 cm

(Bihari, 1999)
Theories of Spider Vein Formation

• In a greater percentage of their patients using continuous wave doppler US, they identified arteriole pulsations over spider telangiectasia

• This is only subjective in that arterial pulsations can be heard transmitted from varying depths

• It is a rare event to see pulsatile flow on US when examining telangiectasia except when perforators are present or high flow states are in the reticular branch
Theories of Spider Vein Formation

• However, we have heard multiple transmitted arterial signals that could not be accurately located

• When the etiology of the signals could be located it was usually at a considerable distance below the subdermal layer
Theories of Spider Vein Formation

• Mariani et al, 2000, proposed that all telangiectasia are related to a pathologic perforating vein located beneath the spider vein complex

• In essence, the authors are correct that there is a perforating vein but this is a branch that comes from a reticular vein and not a deeper source
Theories of Spider Vein Formation

• Another interesting point is that the authors report in the 3-year follow-up, there were new spider telangiectasia in 59% of cases

• Only 5% recurred in the previously treated area

(Mariani, 2000)
Why Do Spider Veins Occur?

• What we know based on our clinical and histological studies is that spider veins are secondary to high venous pressure
• The effect of high pressure causes dilatation of the smooth vessel wall of the venules in the reticular dermis
• In all specimens examined the one constant finding in a spider telangiectasia is vessel wall hypertrophy.

(Bush, 2014)
Why Do Spider Veins Occur?

- This pressure must be transmitted from a distal source.
- We know from US exams in over 500 patients with spider telangiectasia, that all reticular veins associated with spider telangiectasia demonstrate reflux.
Why Do Spider Veins Occur?

- Based on US and histological studies of branches and perforators in association with reticular veins, there is always an abnormal valve.
- So what occurs is the following:
- For whatever reason; volume overload from pregnancy, genetic induced reflux, etc...there occurs transmission of high venous pressure to the reticular vein.
Why Do Spider Veins Occur?

• The reticular veins are conduits of flow and pressure
• Due to incompetent valves in the draining branches, perforators, or volume overload from increased flow, there is a buildup of pressure in the reticular system
• This pressure is transmitted to reticular branches with ultimate dermal perforator involvement
Why Do Spider Veins Occur?

• The length of a spider vein is proportional to the amount of pressure it receives from the subcutaneous circulation
Types of Spider Vein Complexes

• There are 4 different types of spider veins according to their location and etiology
• The US is indispensable as mentioned before in diagnosing the exact etiology
• One type of complex is that associated with a true perforator from a deeper source
Perforator Leading to Spider Complex
Perforator Leading to Spider Complex

(Bush, 2018)
Spider Telangiectasia Associated with a Perforator

- When the spider complex is isolated and dilated, there is always a perforator

(Bush, 2018)
Incompetent Branches From Truncal Vessels

• Second group of spider veins occur from incompetent branches of the GSV, SSV or AAGSV

• Like spider veins associated with perforators there is usually a single isolated large group of spider veins

(Bush, 2018)
Case Study: Spider Veins From an Incompetent Branch of the GSV

(Bush, 2015)
Case Study: Spider Veins From an Incompetent Branch of the GSV

(Bush, 2015)
Veins Associated with Dermal Perforators

• The third group of common spider vein patterns consist of incompetent reticular veins with a dermal perforator giving rise to the complex

• The reticular veins are abnormal but, always associated with a deeper pathology

(Bush, 2018)
Red Telangiectasia

• There are 3 types of red telangiectasia
• Secondary to cutaneous venous hypertension (Most Common) responds to sclerotherapy or heat modalities
• Generalized Essential Telangiectasia (GET)
• Responds poorly to sclerotherapy
• Cutaneous Collagenous Vasculopathy (CCV) responds poorly to sclerotherapy
Telangiectasia Secondary to Venous Hypertension

- Vessel wall hypertrophy
- Many endothelial cells located 300 – 500 microns below the squamous layer
- The reddish hue is secondary to smaller blood volume and lack of mixture with large amounts of desaturated blood
GET or CCV?

- Components of both are present in this patient
- There is a thickened wall with hylan and not smooth muscle
- Very few endothelial cells are present
- Other vessels show telangiectasia without a thickened wall
GET or CCV?

- This patient had treatment with the V-Beam Laser
- Wave lengths of 590 with either a laser or IPL seemed to be the most effective for this condition
Determining Response of Treatment

- Multiple marked areas represent different energy and pulse duration to find best treatment option
Unloading Cutaneous Venous Hypertension

- 4 Steps to Treating Spider Telangiectasia
- Unload the cutaneous venous hypertension
- Treat the spider vein
- Assess collateral flow
- Minimize sequelae
Unloading Cutaneous Venous Hypertension

• Identify the source
• Use US
• Trace from complex ➔ reticular ➔ source (Perforator, branch, GSV, AAGSV or SSV)
Unload the Cutaneous Venous Hypertension

• Surgical – Punch or Phlebectomy
• Chemical – Foam sclerotherapy – USGS or retrograde injection from complex
• Combination of chemical and surgical
Ultrasound Spider Complex

• The following video will demonstrate the actual appearance of a spider complex by ultrasound
• In this video, it was possible to see the branch from the incompetent vein that gives rise to the spider complex
• There is usually a branch from the underlying reticular vein that gives rise to spider complexes
(Bush, 2015)
Unloading the Cutaneous Venous Hypertension

- The white arrow points to the origin of the spider complex – Where the branch of the reticular becomes superficial
- A punch biopsy at this location unloads the cutaneous hypertension & interrupts the spider telangiectasia

(Bush, 2015)
100 Patients Examined for Origin of Telangiectasia

6. Results
72% of patients had multiple sites of origins of cutaneous venous hypertension. The common sites were lateral thigh (55%), medial thigh (40%), lower leg and ankle (25%), and posterior thigh and calf (11%). 18% of patients had pathology confined to the lateral thigh only with no other patterns of telangiectasia. All telangiectasia could be traced to a refluxing branch of the Greater Saphenous vein (GSV), Small saphenous vein (SSV), Posterior intersaphenous branch, Anterior Accessory Greater Saphenous Vein (AAGSV), or anatomically defined perforators. 30% of patients had co-existing GSV insufficiency as well. 95% of patients with lateral thigh telangiectasia have an associated superior or lower thigh perforator. 95% of medial thigh telangiectasia are secondary to a refluxing branch of the GSV. Telangiectasia of the lower leg and ankle may originate from multiple sources. Telangiectasia of the posterior calf and thigh originate from multiple sources including the SSV, posterior intersaphenous branch or perforators from the popliteal or gastrocnemius vein. Two patients had small AV fistulas as origin of spider complexes usually after previous procedures.
Conclusion

- There is always a source for spider varicosities
- The source may be the GSV, AAGSV, SSV or a perforator
- Find the source and treat with either foam sclerotherapy or phlebectomy (In some cases, thermal ablation)
- Find the end point and unload the spider complex at this level (Where the spider vein branches out or begins)
Conclusion

• Disconnect collateral flow if present
• Treat the spider veins with the appropriate concentration
• When using foam, use dilute concentrations, incise the vein and flush
References


Treating Peri-Ocular Vein Through the Temporal Vein
Peri-Ocular Vein

- Patient has large peri-ocular vein
- Using vein illumination the vein & feeding branches are visualized
Peri-Ocular Vein
Peri-Ocular Vein

- Using a 27-gauge butterfly, 3 ml of Sotradecol 0.3% is injected
Peri-Ocular Vein
Peri-Ocular Vein
Peri-Ocular Vein

• One month post treatment the venous plexus was obliterated
Peri-Ocular Vein
Evaluation of Clinical and Histological Findings Using Varying Sclerosant Concentrations for the Treatment of Spider Telangiectasia
Histology of Spider Veins After Treatment

- Desired functions of sclerosing agents are destruction of endothelial cells and exposure of subintimal layers to the sclerosant with eventual fibrotic occlusion of the vein.
- Undesirable effects of sclerosants are vessel wall necrosis with extravasation of red cells.
- The above extravasation leads to inflammatory changes and/or angiogenesis.

(McAree, 2012) (Rao, 2005) (Green, 1998)
Sclerosants

- In this study, the sclerosing agents are Sotradecol® and Asclera® (Polidocanol)
- These are detergent agents that act by altering the surface tension around endothelial cells causing lysis
- The subintimal layer is exposed and depending on time of exposure and strength of solution, degradation of smooth muscle wall may occur
Sclerosants

• Evidence of muscle wall damage is visible on microscopic analysis as fibrin replacement of smooth muscle cells

• This phenomenon is desirable if complete necrosis of wall does not occur

• Sub intimal damage is manifested by a ragged appearance of the former lining of the vessel wall
Sclerosants

• The best sclerosant concentration will cause total lysis of endothelial cells and subintimal damage with minimal intraluminal debris such as red cells
Evaluation of Clinical and Histological Findings Using Varying Sclerosant Concentrations for the Treatment of Spider Telangiectasia

• This study was designed to correlate histologic findings and clinical results to determine the ideal sclerosant concentration using Sotradecol

• Additional histologic determination of veins treated with Polidocanol were also done

• There may be variability in clinical findings in the same patients using the same concentration for the same size vein
This variability exists due to the presence or absence of cutaneous venous hypertension.

In this study, all attempts were made to abolish cutaneous venous hypertension prior to treating the telangiectasia.

1 mm punch biopsies were done at the time of phlebectomy and these biopsies were performed through the treatment site.
Actual size of biopsy in all studies for spider telangiectasia

The talented staff at Water’s Edge Derm Path Lab

(Bush, 2018)
Intradermal Veins

- This specimen is a 1 mm biopsy of a patient with staining
- The red arrow points to a normal vein in the reticular dermis as far as size is concerned
- Note there is no venous wall dilatation

(Bush, 2018)
Untreated Spider Telangiectasia

Histology of an Untreated spider vein – Copyright 2012 by www.veinexperts.org

(www.veinexperts.org, 2012)
Sotradecol 0.3%

- Note large amount of red cells in lumen
- Wall disruption
- Complete replacement of smooth muscle vessel wall with fibrin
- In this case, angiogenesis is possible

(www.veinexperts.org, 2015)
Sotradecol 0.2%

- 100% endothelial cell loss
- Subintimal changes
- Intraluminal debris
- Vein wall replacement with fibrin in some areas

(Water’s Edge Dermatology, 2018)
Sotradecol 0.15%

- 100% endothelial cell loss
- Mild subintimal changes
- Upper vessel wall replacement with fibrin

(www.veinexperts.org, 2015)
Sotradecol 0.15%

- The same concentration however, from a compounding B pharmacy
- Note the larger amount of intraluminal debris
- Also, thinning of vessel wall inferiorly

(Water’s Edge Dermatology, 2017)
Sotradecol 0.1%

- Complete loss of endothelial cells
- Intact vein wall with no fibrin replacement
- No intraluminal debris

(www.veinexperts.org, 2015)
Sotradecol 0.05%

- Incomplete endothelial loss
- No subintimal damage
- Very little histological findings

(www.veinexperts.org, 2015)
Polidocanol 0.5%

- Perforation of vessel wall
- Extravasation of RBC’s
- This will lead to hemosiderin deposition & prolonged staining
Polidocanol 0.375%

- 100% endothelial cell loss
- Mild subintimal changes
- Minimal intraluminal debris

(www.veinexperts.org, 2015)
Polidocanol 0.31%

- Complete loss of endothelial cells
- Subintimal damage
- Vessel wall intact with no fibrin replacement
- No intraluminal debris
- The ideal concentration based on histology

(www.veinexperts.org, 2015)
Polidocanol 0.33% ½ NS

- Note that using ½ NS produces more intraluminal damage
- This is manifested by apposition of the vein walls

(Bush, 2018)
Polidocanol 0.25%

- 50% endothelial loss in 1 mm vein
- No subintimal changes
- Can be tried initially for vessels < 0.5 mm
This paper was based on research done over a 2-year period ending in early 2016.

With our new research, this is already dated.
0.1% Sotradecol ½ NS

- Further studies using hypotonic dilutions have revealed that an even better concentration is 0.1% Sotradecol ½ NS as the diluent.

(Water’s Edge Dermatology, 2018)
0.1% Sotradecol ½ NS

• We use this concentration for almost all spider veins
• We even use this concentration for foam production in treating spider veins as well
• Prevents refilling

(Water’s Edge Dermatology, 2018)
Using Hypotonic Solutions for Dilution

- This image is of a 1 mm spider vein treated with 0.15% Sotradecol diluted with 0.45% saline (10 min post subdermal tumescent)
- Notice that histologically the damage is 2-3 times greater than 0.15% Sotradecol diluted with NS

(Water’s Edge Dermatology, 2018)
Subdermal Infusion of Tumescent

- Infusion of tumescent subdermally is done quite frequently in our practice
- Within 10 minutes many treated vessels will have intraluminal thrombosis

(Water’s Edge Dermatology, 2018)
Subdermal Infusion of Tumescent

- By doing tumescent infusion, most collateral flow is ablated & spasm occurs in the vessel itself leading to rapid thrombosis of many of the treated vessels
- Clotting must be removed before completion of procedure

(Water’s Edge Dermatology, 2018)
Subdermal Infusion of Tumescent

- If you remove the thrombosis by the techniques we show you in this seminar, you will have minimal staining & rapid resolution of the treated complex

(Water’s Edge Dermatology, 2018)
Before & After Subdermal Tumescent
3 Weeks Post Sclerotherapy

- Lumen filled with fibrin
- Vessel wall thickened but, intact
- No inflammation around treated vessel
Sotradecol 0.1% Foam in 2mm Reticular Vein

(Bush, 2015)
Legal Ramifications of Sclerosants

• I think compounding A pharmacies should be totally avoided when purchasing Sotradecol or Polidocanol
• I am aware of many cases of adverse results with these compounds
• Legally, you must have a prescription for each patient and a separate vial labeled specifically for them
Legal Ramifications of Sclerosants

• If you do not do the above, you are in violation of Federal Law
• Using compounding B pharmacies allows for more margins of safety due to stringent FDA requirements
• However, unless you obtain the sclerosants in small concentrations, you face the problem of sterility with repeated needle sticks into the vial
Legal Ramifications of Sclerosants

• After entry into the vial the solution is no longer considered sterile even though it may be

• Using the FDA approved compounds at the concentrations recommended, most patients can be treated for less than $20/session
Conclusion

• This study provides evidence for appropriate concentrations of FDA approved sclerosants for treating spider telangiectasia's
• Sotradecol and Polidocanol were diluted with 0.9% NS for this study
• Remember, if you use bacteriostatic water to dilute the sclerosant the damage is multiplied by a factor of 2-3
Conclusion

• Ideal concentration is 0.1% ½ NS or 0.15% NS
• This concentration range provides adequate treatment of telangiectasia, desired histological results and minimal post treatment sequelae
• The ideal concentration of Polidocanol for 1 mm spider telangiectasias may be 0.33% diluted with ½ NS
Conclusion

• Polidocanol 0.25% can be used for vessels < 0.5 mm

• Histological findings with Sotradecol foam 0.1%, 0.2%, 0.3% and Polidocanol foam 0.3% are identical
References


Aestheticveintraining.com