GUIDELINE

Application of Clinical Practice Guidelines for the Management of Varicose Veins and Chronic Venous Disease to Canadian Practice

Part Two: Treatment, Post-Treatment Follow Up and Ongoing Management

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INTRODUCTION: Management of Chronic Venous Disease: A Canadian Perspective

Chronic Venous Disease is very common with the prevalence in adult populations that can exceed 60 per cent with at least half (more than 30 per cent) presenting with symptoms and or signs that impact their health and or quality of life[1-3]. Chronic venous disease is indeed chronic with symptoms and findings that can persist and often progress over time[3-4].

Virtually all primary care practices in Canada will have significant numbers of patients with Chronic Venous Disease (CVD). Practitioners will have varying degrees of experience and comfort in managing patients with CVD. In our preceding paper ("Part One") we discussed Presentation, Assessment and Classification of Chronic Venous Disease with the goal of providing an overview and general understanding of the etiology, clinical and imaging assessment, and an approach to classification of CVD. This paper ("Part Two") will focus on treatment and follow up of CVD. This will provide guidance for primary care practitioners in initiating treatment for CVD and help identify those patients who may benefit from further assessment and intervention by those with further training and a specific practice interest including Phlebologists, Vascular Surgeons, General Surgeons, and Interventional Radiologists.

PURPOSE AND SCOPE

The overall goal of this paper (as for part one) is to provide a practical approach to providing treatment to our patients with varicose veins and chronic venous disease in a manner that recognizes and is consistent with current resources and accessibility in Canada. We recognize that there may be regional differences and disparities in practice and that; as for everything in medical practice; there will be ongoing evolution and innovation in the delivery of care.

For those in primary care, we hope to review and provide an understanding of the treatment options available to patients with varying levels of severity of Chronic Venous Disease. It is our goal for primary care providers to feel comfortable with conservative and medical treatment modalities and as well identify those patients who would most benefit from specialist referral and possible further intervention.

Physicians and surgeons who have a particular interest in CVD may find this review helpful in the organization and structure of their practice. A concise review of contemporary practice and treatment options can help in communication with patients and referring physicians.

As for Part One, we will refer to the consensus guidelines published by the leading international organizations focused on management of chronic venous disease, namely the Society for Vascular Surgery / American Venous Forum, the European Society for Vascular Surgery, and the American Vein and Lymphatic Society[5-9]. We will also reference key papers and developments, which have helped in the establishment of these guidelines or occurred in the years following their publication. Finally, and central to the purpose of this paper, we will apply these guidelines to Canadian practice in Chronic Venous Disease.

ORGANIZATION AND OUTLINE

A preceding complimentary paper provided an initial introduction *to Presentation, Assessment and Classification*. This paper focuses on *Treatment* and *Post-Treatment Follow up* in Chronic Venous Disease. We will begin with conservative measures and move progressively through more invasive interventions.

TREATMENT

A. Conservative and Medical Management for Chronic Venous Disease

Definition / Terminology

We define conservative and medical management as lifestyle measures, compression stockings and medications.

Conservative Management

	Description	Mechanism of action	Recommendations
Lifestyle – Leg exercises	Aerobic activity, stationary calf pumping exercises	Facilitates use of the calf muscle pump	For all patients C1-C6
Lifestyle – Leg elevation	Elevating the legs when at rest; avoidance of prolonged periods of time in a dependent position	Used to drain blood to the deep venous system	For all patients C1-C6
Compression Garments	Used to physcially improve the venous flow from the lower extremities back into circulation. Types of compression include: elastic stockings, non-elastic bandages, elastic bandages, intermittent pneumatic compression	Graduated pressure gradient compresses the distended veins, allowing the venous valves to close and pushes the blood back into the deep venous system	For patients with C1-C6 disease. Refer to vascular specialist if ABIs <0.5
Medication – Venotonic Medications	Natural or synthetic; can help alleviate the symptoms of chronic venous disease[12-14]	Decreases capillary permeability, diminish release of inflammatory mediators and improve venous tone	Used in conjunction with compression. For CVD symptom relief
Medication – Pentoxifylline	Hemorrheologic agent used to increase blood flow	Reduces white cell activation	Used as an adjunct to compression therapy for treatment of venous ulcers
Medication – Acetylsalicylic Acid	Non-selective cyclooxygenase (COX) inhibitor	Anti-inflammatory effect	Used as an adjunct to compression therapy for treatment of venous ulcers

*Other simple conservative measures include avoidance of prolonged standing or sitting and weight loss as appropriate.

Compression

Elastic stockings improve patient symptoms and should be used after venous ulcer healing (at least 25-35mmHg at the ankle)[5-10]. For C6 disease, compression bandages or non-elastic compression (Unna boot or Velcro bands), 4 layer compression bandage need to be wrapped to have at least 40 mm Hg compression to be effective. Intermittent pneumatic compression for refractory edema and significant leg ulceration is recommended after standard methods for 6 months failed (compression wraps/stockings)[10].

Post venous procedures (surgery, endovenous ablation, sclerotherapy), compression is recommended to reduce pain, leg volume and complications[11].

Generally, most patients with C2 symptomatic disease would be recommended to be in Class II stockings (20-30 mmHg) (knee, thigh or pantyhose) and C3-C6 would benefit with Class III stockings (30-40 mmHg)[5-9]

Contraindications for compression garments include untreated congestive heart failure, pulmonary edema, untreated deep venous thrombosis or phlebitis, septic phlebitis, oozing dermatitis, advanced peripheral

neuropathy and severe peripheral arterial disease. For garments in 30-40 mmHg, ABI should be above 0.8. For patients with mixed arterial and venous disease and ABI's between 0.5-0.8, compression of 20-30 mmHg is tolerable. For patients with ABI's less than 0.5, they should be referred to a vascular specialist.

Venotonic medications

Venotonic medications should be considered a treatment option for swelling and pain caused by chronic venous disease. For patients with venous ulcers, sulodexide and micronized purified flavonoid fraction should be used adjunctive to compression[12-14].

Application to (Canadian) Practice

In Canada, compression stockings usually require a medical prescription for stockings over 20mmHg. These are usually covered under private insurance plans. This should be given for patients with symptomatic chronic venous disease and for high risk patients (pregnancy, occupations of long sitting/standing).

Venotonic medications in Canada are over the counter and contain bioflavonoids. The one with the most evidence based available in Canada is micronized purified flavonoid fraction (MPFF). This can be recommended safely for adult patients that are not pregnant and not breastfeeding.

Conservative and Medical Management Recommendations

Recommendation	Existing guidelines	Additional support or references	Applicability to Canadian practice
1. The CSVS recommends compression therapy to treat patients with symptoms or findings of chronic venous disease	SVS/AVF – Grade 2 Level C* ESVS – Class I Level B**		No barriers Compression therapy widely available
2. The CSVS recommends compression therapy as a primary treatment for venous ulcers and for prevention of recurrence following ulcer healing	SVS/AVF – Grade 1 Level B ESVS – Class I Level A	10	No barriers Compression therapy widely available
3. The CSVS recommends compression therapy following sclerotherapy, surgery, or endovenous treatment of superficial venous incompetence	SVS/AVF – Grade 1 Level A ESVS – Class I Level A	11	No barriers Compression therapy widely available
4. The CSVS recommends the use of Venotonic (in particular MPFF) medications in conjunction with compression to treat patients with symptomatic CVD and or venous ulcers	SVS/AVF – Grade 2 Level B ESVS – Class II Level A	12-14	No significant barriers – widely available
5. The CSVS recommends considering adding pentoxifylline and in some cases ASA together with compression in the treatment of refractory venous ulcers	SVS/AVF – Grade 2 Level B ESVS – Class III Level C	12	No significant barriers

*The SVS/AVF use 2 grades (1,2) of recommendations and 3 levels of evidence (A,B,C)[7,16]

** The ESVS use 3 classes (I, II, III) of recommendations and 3 levels of evidence (A,B,C)[9]

B. Sclerotherapy

Definition / Terminology

Sclerotherapy is the act of injecting dilated veins with chemical agents that will cause inflammation of the endothelial lining and ablate the vein. It can be liquid or foam sclerotherapy. Chemical agents include polidocanol, sodium tetradecyl sulphate (STS), morrhuate sodium, glycerin and hypertonic saline[15-17].

Brief Summary of the consensus guidelines : Sclerotherapy

	Guidelines
ESVS	Liquid and foam sclerotherapy only used as primary treatment in select cases of C2-C6; not recommended as first choice treatment. Recommended as second choice treatment of C2-C6 for patients with saphenous incompetence not eligible for surgery or endovenous ablation. Recommended as primary treatment for recurrent varicose veins, elderly/frail patients with venous ulcers. Liquid sclerotherapy for treatment of telangiectasia and reticular veins (C1).[7]
SVS / AVF	Recommended for treatment of non-truncal varicose veins by sclerotherapy, ambulatory phlebectomy or powered phlebectomy in symptomatic C2-C6. Appropriate as treatment for disease tributaries of ablated saphenous veins concomitantly or as staged procedure[5,6].
ACP	Recommended treatment of tributary veins by stab phlebectomy, liquid sclerotherapy or foam chemical ablation. Ultrasound guided liquid or foam sclerotherapy for varicosities that are not visible but symptomatic for the patient[18].

Application to (Canadian) Practice

For patients that have symptomatic varicose tributaries either in the setting of no saphenous reflux or after the main truncal superficial disease is treated (ablation or surgery), then it is appropriate to have these treated either with sclerotherapy or phlebectomy. Sclerotherapy may be done a number of times to increase efficacy. Foam is more effective but can have increased side effects (DVT/PE/cerebral embolic event if right to left cardiac shunt). Other side effects include skin necrosis, telangiectatic matting, hyperpigmentation and allergic reactions.

Sclerotherapy Recommendations

Recommendation	Existing guidelines	Additional support or references	Applicability to Canadian practice
1. The CSVS recommends liquid or foam sclerotherapy as an alternative to phlebectomy for varicose tributaries in the absence of saphenous incompetence and or for recurrent varicose veins	SVS/AVF – Grade 1 Level B ESVS – Class II Level B	15-17	No barriers Many experienced practitioners
2. The CSVS does not recommend sclerotherapy as primary or first choice treatment for saphenous incompetence	SVS/AVF – Grade 1 Level B ESVS – Class III Level A	18-26	No barriers Foam sclerotherapy for saphenous incompetence not widely used

C. Treatment / Interventions of Saphenous Incompetence:

Definition / Terminology

The *great and small saphenous veins* are the main superficial veins of the legs. Saphenous reflux can be segmental or involve the entirety of the vein, and has been long recognized as an extremely common and important contribution to varicosities and chronic venous disease, including to the development of severe C6 ulcerative disease.

There are a number of treatment options or interventions for saphenous incompetence – most commonly open surgical stripping (OS) or one of a number of endovenous techniques to ablate or close the vein. Endovenous thermal ablation (ET) can be performed with laser or radiofrequency as the heat source. Non-thermal endovenous techniques can include closure with cyanoacrylate adhesive (CA), mechanical occlusion with chemical assistance (MOCA) and ultrasound guided foam sclerotherapy (UGFS) using either proprietary or physician-compounded foam.

Brief Summary of the consensus guidelines

Overall findings: A multitude of randomized trials comparing the various approaches to saphenous reflux have been published allowing for several systematic reviews and meta-analyses[19-26]. Generally, procedurally treating refluxing saphenous veins is safe and effective when added to standard conservative management. It consistently affords incremental symptom and quality of life improvements, including durable and long-lasting benefits with relatively rare serious complications. It is never appropriate to strip or ablate a saphenous vein with no reflux[9].

Endovenous techniques are less invasive than OS, can be done in an office setting rather than requiring a hospital and affords a better recovery profile. However, beyond the initial procedure and first few weeks, both endovenous and surgical approaches achieve comparable and durable symptom and quality of life benefits.

Symptomatic varicosities can recur over the ensuing years with any and all saphenous treatments but there are differences between techniques. UGFS for saphenous reflux may be falling out of favour as saphenous recanalizations and recurrent / persistant symptomatic varicosities are significantly higher than for OS and endovenous thermal ablation. The more recent advances in non-thermal endovenous ablation such as cyanoacrylate adhesive and MOCA are less studied but also appear to be superior to UGFS.

Large varicose tributaries can be treated with sclerotherapy or phlebectomy at the time of saphenous stripping or ablation or if they persist or recur following treatment of the saphenous reflux.

Society specific guidelines

	Guidelines
SVS / AVF – 2011	Strong recommendation for appropriate patients with C2-C6 disease be offered saphenous vein procedures rather than conservative management alone. Outline of both the initial recovery benefits of ET and the longer term outcome data supporting OS.
NICE (UK) – 2013[27]	Recommendations emphasized the importance of initial referral of symptomatic patients to "A team of healthcare professionals who have the skills to undertake a full clinical and duplex ultrasound assessment *and provide a full range of treatment*" . For saphenous reflux, recommended ET, UGFS or OS, favouring less invasive approaches if available.
ESVS – 2015	Recommendation for procedural rather than conservative management alone. Recommend offering ET if available or OS as it is "not inferior" to less invasive approaches in the medium and long term. For surgery, high ligation and stripping recommended over high ligation alone. During surgery, tumescent anesthesia should be considered to reduce post-operative side effects.
European Venous Forum / International Union of Angiology / Cardiovascular Disease Educational and Research Trust (UK) / Union Internationale de Phlebologie – 2020[28]	Strong recommendation to offer procedural care to patients with symptomatic saphenous reflux and those with more severe disease. Consideration of OS or ET, noting only minor advantages and disadvantages associated with each. UGFS simple and relatively effective, although with higher technical failure rates. The choice of procedure will depend on many factors including safety, effectiveness, healthy system differences, local expertise and availability.

Application to (Canadian) Practice

Patients with demonstrated saphenous reflux and symptomatic varicose veins, and or more advanced clinical stages of chronic venous disease should be considered for surgical or endovenous treatment of the incompetent saphenous vein(s). Primary care physicians should identify and refer to specialists with training and interest in venous disease and who are in a position to advise and offer all appropriate treatment options. There are regional / provincial differences in availability, wait times and coverage for surgical and endovenous treatments – in most cases endovenous ablation is not funded by provincial plans. The treating specialist should consider and discuss the near and long term pros / cons, including financial implications when necessary, to allow the patient to make a well-informed decision on their preferred choice of treatment.

Treatment of Saphenous Incompetence Recommendations

Recommendation	Existing guidelines	Additional support or references	Applicability to Canadian practice
1. The CSVS recommends that patients who require or may benefit from treatment of saphenous incompetence be evaluated by healthcare professional(s) who are in a position to offer a full range of treatment options	SVS/AVF – N/A ESVS – N/A	NICE(UK) (27)	May be regional variations in access to or wait for consultation
2. The CSVS recommends endovenous ablation or open surgery as treatments significant symptoms and or advanced stages of venous disease in the setting of saphenous incompetence	SVS/AVF – Grade 1 Level B ESVS – Class I Level A	19-26	Endovenous ablation not covered by majority of provincial health insurers
3. The CSVS recommends high ligation and stripping over high ligation alone for patients who have surgery for saphenous incompetence	SVS/AVF – Grade 1 Level B ESVS – Class I Level A	19-26	Practice may vary between practitioners

D. Treatment / Interventions for Perforating Vein Incompetence

Definition / Terminology

Perforating veins (as discussed earlier) connect the superficial venous system with the deep system. There are multiple (>150) perforating veins in the lower extremities and if there is perforating vein incompetence – where blood refluxes from the deep system into the superficial system – this can lead to varicose veins and or contribute to more advanced clinical findings of chronic venous disease.

It is not uncommon to see reflux in perforating veins on duplex but it is generally considered to be significant or "pathologic" reflux if the diameter of the perforating vein is 3.5 mm or greater and reflux time is 500ms or greater.

There are a number of potential interventions for perforator vein incompetence including (subfascial) ligation / clipping, thermal ablation and ultrasound guided sclerotherapy[5-7,29-32].

Brief Summary of the consensus guidelines

Perforating vein reflux can often be seen together with superficial (saphenous) reflux and can sometimes resolve after treatment of the saphenous incompetence alone. Accordingly it may be most prudent to treat the superficial incompetence first before any decision is made on addressing incompetent perforating veins.

It is not recommended to treat incompetent perforating veins in the setting of simple varicose veins (C2)[5,6].

It is appropriate to treat "pathologic" perforator veins that are contributing to advanced (C4-6) disease. Ultrasound guided sclerotherapy is a simple cost-effective and increasingly preferred alternative to subfascial perforating vein surgery or attempts at thermal ablation of the perforating vein[5-7,29-30].

Application to (Canadian) Practice

Primary care physicians need simply to be aware of the concept of perforating vein incompetence. Recognition and treatment of significant or "pathologic" perforating vein reflux requires special interest and experience and should be managed by a specialist in venous disease.

Perforating Vein Incompetence Recommendations

Recommendation	Existing guidelines	Additional support or references	Applicability to Canadian practice
1. The CSVS recommends treatment of "pathologic" perforating veins only when they contribute to advanced (C4-6) chronic venous disease	SVS/AVF – Grade 2 Level B ESVS – N/A	29-30	Experience variable
2. The CSVS recommends sclerotherapy (liquid or foam) as the preferred treatment of perforating vein incompetence	SVS/AVF – Grade 2 Level C ESVS – N/A	29-30	Experience variable

E. Treatment / Interventions for Deep System Disease

Definition / Terminology

In general treatments of chronic venous disease (reflux or obstruction) involving the deep system are separated anatomically by the inguinal ligament into either infrainguinal, or ilio-femoral/ilio-caval treatment. Treatments are focused on relieving the obstruction and/or improving valvular function through open surgical (increasingly rare), endovenous, and hybrid techniques[5-7,33] .

Brief Summary of the consensus guidelines

	Guidelines
SVS / AVF	Patients with IVC or iliac vein chronic total occlusion or severe stenosis, iliac vein or IVC stenting for C4-C6 disease is appropriate first line treatment if there is no superficial truncal disease[5,6].
ESVS	Patients with symptomatic chronic iliocaval or iliofemoral obstruction or patient with symptomatic non-thrombotic iliac vein lesions, percutaneous transluminal angioplasty and stent placement using large self expanding stents should be considered[7]

*Deep venous obstruction should be treated first, before considering treatment of deep venous reflux.

Application to (Canadian) Practice

Despite the many advances in treatment options for deep venous reflux and obstruction in recent years, only endovenous angioplasty and stenting of ilio-caval/ilio-femoral obstruction for severe venous disease has enough clinical evidence and expert consensus to be recommended in Canada at this time. That being said, there only a few centers across Canada with enough experience and willingness to treat these often challenging patients. With better education and training in the future, it is hoped that there will be at least one center in each province that can offer these patients advanced endovenous obstruction treatment.

Treatment of Deep System Disease Recommendations

Recommendation	Existing guidelines	Additional support or references	Applicability to Canadian practice
1. The CSVS recommends evaluation and potential treatment of deep venous obstruction be limited to centres of excellence	SVS/AVF – N/A ESVS – N/A	***Update***	Barriers – available only in small number of centres

Post-Treatment Follow up and Assessment

Definition / Terminology

Outcome assessment measures response to treatment of chronic venous disease and should be incorporated into a structured follow up program. Outcomes measures may include change in disease severity, symptoms and or reported quality of life, findings on pictures and imaging studies, and documentation of any treatment failures or complications.

Brief Summary of the consensus guidelines

Change in *disease severity* can be measured by comparing CEAP classification and VCSS scores pre and post treatment. Patient reported *symptoms and quality of life* can be assessed by change in scores on the various instruments Aberdeen Varicose Vein Questionnaire (AVVQ), the Chronic Venous Insufficiency Questionnaire (CIVIQ)., and Venous Insufficiency Epidemiologic and Economic Study of Quality-of-Life (VEINES-QOL)[34,35] .

Pre and post treatment *photos* provide one objective means of comparing cosmetic results. *Imaging* studies, in particular venous duplex, can be employed to assess for successful vein removal / ablation or persisting segments with reflux or neovascularization in the treatments of superficial venous incompetence. In deep system disease duplex or more rarely venography can assess for patency and reflux.

Treatment failures and complications – classified as minor and major – must be tracked and documented[5].

Application to (Canadian) Practice

Canadian specialists who treat chronic venous disease will vary with respect to both the nature and duration of follow up post treatment. Many will employ a comprehensive and structured program employing measurement instruments and imaging as above. Others may not schedule follow-up beyond the initial post treatment assessment and rely more on the primary care physician for ongoing conservative management and to recognize persistent or recurrent disease that may require referral back to the consultant.

Post-Treatment Follow up Recommendations

Recommendation	Existing guidelines	Additional support or references	Applicability to Canadian practice
1. The CSVS recommends structured follow up of patients post-intervention to assess for any complications of treatment and for clinical response to treatment	SVS/AVF – Grade 1 Level B ESVS – Class II Level B	***Update***	No single standard. Very wide variability in practice

SUMMARY AND CONCLUSIONS

Chronic Venous Disease is very common and can be found in the majority of adult Canadians. In a preceding paper we discussed the etiology, clinical presentation, assessment and classification of chronic venous disease. This paper focused on the myriad of treatment options available to address symptoms and or treat or avoid complications / progression of disease.

We have outlined conservative and medical management options that can be initiated by primary care practitioners. An overview of further interventions provided a general understanding of options and preferred modalities for the wide spectrum of clinical scenarios and underlying anatomy that may be encountered in these patients. This understanding can hopefully help with decisions on whom and when to refer, and facilitate communication with both our patients (in common) and with treating physicians.

The vascular surgeons of the Canadian Society of Vascular Surgery recognize and appreciate the key role of our primary care colleagues in the recognition, treatment and follow up of patients with CVD. We remain committed to the provision and advancement of evidence based, contemporary and timely care of those who require or seek treatment for all stages of venous disease.

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