Position Statement

Routine Use of Concurrent Fluoroscopic Imaging during Superficial Endovenous Interventions:

A position statement of the International Union of Phlebology (UIP), the Australasian College of Phlebology (ACP), the Australia and New Zealand Society for Vascular Surgery (ANZSVS), the American Venous Forum (AVF), the American Vein and Lymphatic Society (AVLS) and the Interventional Radiology Society of Australia (IRSA)

Kurosh Parsi[1,2], Peter Subramaniam[3], Alun H. Davies[1], Antonios Gasparis[4], Peter Gloviczki[4,5], Mark Meissner[1,4,6], Christopher Rogan[2,7] and Andre van Rij[2]

1 International Union of Phlebology (UIP)
2 Australasian College of Phlebology (ACP)
3 Australia and New Zealand Society for Vascular Surgery (ANZSVS)
4 American Venous Forum (AVF)
5 Society for Vascular Surgery (SVS)
6 American Vein and Lymphatic Society (AVLS)
7 Interventional Radiology Society of Australasia (IRSA)

The following statement has been published on behalf of International Union of Phlebology (UIP), American Venous Forum (AVF), American Vein and Lymphatic Society (AVLS), Australasian College of Phlebology (ACP), Australia and New Zealand Society for Vascular Surgery (ANZSVS), Society for Vascular Surgery (SVS) and Interventional Radiology Society of Australasia (IRSA). The contribution has been co-published in Phlebology [DOI:_____] and Journal of Vascular Surgery: Venous and Lymphatic Disorders [DOI:_____]. The publications are identical except for minor stylistic and spelling differences in keeping with each journal's style.

Ultrasound guidance during superficial venous interventions including endovenous thermal ablation (ETA), ultrasound-guided sclerotherapy (UGS) and cyanoacrylate closure (CAC) is an essential element of the procedure to ensure safe and effective outcomes. International evidence-based guidelines recommend the use of intraoperative ultrasound guidance in preference to other imaging modalities that involve radiation when performing routine superficial endovenous interventions.[1-8]

For superficial endovenous interventions we recommend against the use of routine intraoperative fluoroscopy and other forms of imaging involving radiation. Pre-operative assessment using a range of appropriate modalities including venography, alone or in combination with CT or MR, may be indicated in a small and select group of patients where there are clinical indications for further investigations. Examples of such indications include clinical suspicion of central venous obstruction, certain deep venous pathologies, pelvic-origin extra-pelvic varices and complex vascular malformations.

The ionising radiation exposure, risk of contrast associated complications including anaphylaxis, contrast-induced nephropathy, contrast extravasation and the added cost to the healthcare systems, do not outweigh the benefits for the vast majority of patients undergoing routine superficial endovenous interventions. Accordingly, the routine use of fluoroscopy and other radiation-based modalities in treatment of superficial venous disease cannot be recommended. (Grade 2C, Table 1)

REFERENCES

1. National Institute for Health and Care Excellence (NICE). *CG168 Varicose veins in the legs: The diagnosis and management of varicose veins*. 2013 [accessed 2022 May 22]; Available from: https://www.nice.org.uk/CG168
2. Gloviczki P, Comerota AJ, Dalsing MC, *et al*. The care of patients with varicose veins and associated chronic venous diseases: clinical practice guidelines of the Society for Vascular Surgery and the American Venous Forum. J Vasc Surg 2011; 53: 2s–48s.
3. Maeseneer MG, Kakkos SK, Aherne T, *et al*. Editor's Choice - European Society for Vascular Surgery (ESVS) 2022 Clinical Practice Guidelines on the Management of Chronic Venous Disease of the Lower Limbs. Eur J Vasc Endovasc Surg. 2022 Feb;63(2):184-267.
4. Australasian College of Phlebology (ACP). Endovenous Laser Ablation Standard. 2010 [accessed 2022 May 22]; Available from: https://www.phlebology.com.au/standards
5. Farah MH, Nayfeh T, Urtecho M, *et al.* A systematic review supporting the Society for Vascular Surgery, the American Venous Forum, and the American Vein and Lymphatic Society guidelines on the management of varicose veins. J Vasc Surg Venous Lymphat Disord. 2021;24:S2213-333X(21)00421-2.
6. Parsi K, Roberts S, Kang M, *et al*. Cyanoacrylate closure for peripheral veins: Consensus document of the Australasian College of Phlebology. Phlebology. 2020;35(3):153-175.
7. Nicolaides A, Kakkos S, Baekgaard N, *et al*. Management of chronic venous disorders of the lower limbs. Guidelines According to Scientific Evidence. Part I. Int Angiol. 2018 Jun;37(3):181-254.
8. Nicolaides A, Kakkos S, Baekgaard N, *et al*. Management of chronic venous disorders of the lower limbs. Guidelines According to Scientific Evidence. Part II. Int Angiol. 2020 Jun;39(3):175-240.

ACKNOWLEDGEMENT

We would like to thank Dr Mina Kang for assisting with the preparation of the manuscript.

Table 1. Published English language literature on the experience with routine use of fluoroscopic guidance during superficial venous interventions.

1	Authors	Ramon L. Varcoe, Shannon D. Thomas, Victor Bourke, Nicole M.K. Rübesamen, Andrew F. Lennox
	Title	Utility of Adjunctive Digital Subtraction Venography for the Treatment of Saphenous Vein Insufficiency
	Methods	Multi-centre retrospective cohort study of patients who underwent digital subtraction angiography guided interventions for superficial venous incompetence. Exclusions included pregnant patients, those with contrast allergy or renal impairment precluding the use of iodinated contrast, patients who underwent truncal vein ligation and stripping, simple phlebectomy, pelvic vein embolization, or interventional treatment for May-Thurner syndrome.
	Results	542 venograms performed in 268 limbs of 200 patients. 66% of patients had anomalies or abnormalities within the target vein ('anomalies' included stenosis, aneurysm, duplicate saphenous system, large incompetent perforator, major commmunications with the AAGSV, organised filling defect within the saphenous vein and segmental saphenous vein occlusion). 44% of patients required an endovascular manoeuvre to successfully complete the ablation and 17% of cases were deemed "impossible" (subjectively declared by operator) to complete without adjunctive fluoroscopic guidance. Per-patient comparison of intraprocedural venography with preoperative venous duplex reports identified 21 (11%) patients with abnormalities detected on ultrasound (23 anomalies) compared with 123 (64%) on venography (193 anomalies). This gave ultrasound a 17.1% sensitivity, 100% specificity and positive predictive value, and 40.7% negative predictive value.
	AE	No contrast-related complications during the procedure, at discharge, or at the 30-day follow-up.
2	Authors	Yongqiang Zhu, Dingquan Wu, Donghui Sun, Kui Song, Jie Li, and Jing Lin
	Title	Ultrasound- and fluoroscopy-guided foam sclerotherapy for lower extremity venous ulcers
	Methods	Single-centre retrospective cohort study of patients who underwent ultrasound- and fluoroscopy-guided foam sclerotherapy for chronic venous disease (CEAP C6). Patency of the deep veins and iliac vein was verified by digital subtraction venography and not intravascular ultrasound.
	Results	In the 35 patients (42 limbs) receiving ultrasound- and fluoroscopy-guided foam sclerotherapy for venous ulcers, the healing rate was 100% (42/42) and the 1-year recurrence rate was 2.9%. Among the 33 limbs (27 patients) with ultrasound examination at 12 months, 28 (84.8%) limbs had complete occlusion; the remaining five (15.2%) had recanalization of the great saphenous veins.
	AE	Twenty-one (50%) limbs developed superficial thrombophlebitis. Pigmentation occurred in the majority of patients but dissipated gradually in weeks or months in most cases. Cough and chest tightness occurred in two patients immediately after foam sclerotherapy but dissipated after oxygen inhalation. No deep venous thrombosis, pulmonary embolism, transient blindness, or overt renal damage was noted.
3	Authors	Guang-xin Yang, Jing-yuan Luan, and Zi-chang Jia

	Title	Radiofrequency obliteration of varicose veins of lower extremity guided by combined venography and ultrasonography
	Methods	Single centre retrospective cohort study of patients who underwent fluoroscopic or ultrasound guided radiofrequency obliteration
	Results	The intraoperative radiation dose was 1.78-10.12 mGy (mean 6.56 mGy), and the exposure time was 61-448 s (mean 161 s). By 3 months follow-up, the symptoms were alleviated in all the 37 patients, and the occlusion rate was 100%.
	AE	No complications such as skin burns, ecchymosis and deep venous thrombosis were found.
4	Authors	Yusuke Enta, Makoto Saigan, Akiko Tanaka, Masaki Hata, and Norio Tada
	Title	Venography and Selective Ablation for Recurrent Varices after Surgery Using Radiofrequency Ablation Catheter
	Methods	Case report of one patient who underwent venography guided radiofrequency ablation for REVAS
	Results	The patient remains asymptomatic for 2 years after the procedure, and there has been no recurrence of her varicose veins. Venography allows better visualisation of the source of REVAS than ultrasonography.
	AE	No occurrence of DVT, renal damage, or any other complications
5	Authors	Sang Woo Park, Ik Jin Yun, Jae Joon Hwang, Song Am Lee, Jun Seok Kim, Seong-Hwan Chang, Hyun Keun Chee, Ho Chul Kim, Ms,Yzj Kyung Sun, Sang Joon Park
	Title	Fluoroscopy-Guided Endovenous Foam Sclerotherapy Using a Microcatheter in Varicose Tributaries Followed by Endovenous Laser Treatment of Incompetent Saphenous Veins: Technical Feasibility and Early Results
	Methods	Single-centre prospective cohort study of patients who underwent ultrasound or fluoroscopy guided selective microcatheterisation and endovenous foam sclerotherapy of varicose tributaries, followed by EVLT
	Results	312 patients with 437 limbs treated. Technical success was seen in 410 of 411 limbs (99%). Continued closure of the saphenous veins and the complete sclerosis of varicose tributaries were noted in 332 of 373 limbs (89%) at the 1-month follow-up, all 307 limbs (100%) at the 3-month follow-up, and all 274 limbs (100%) at the 6-month follow-up.
	AE	No major complications such as skin burns, skin necrosis, pulmonary embolism, cerebral infarction, or allergic reaction. Minor complications included hyperpigmentation 53%, paraesthesia 1.6%, transient visual disturbance 0.2%, superficial thrombophlebitis 0.8%

AAGSV, anterior accessory great saphenous vein; AE, adverse events; CEAP, clinical, etiologic, anatomic, pathophysiologic classification of venous disease; DVT, deep vein thrombosis; EVLT, endovenous laser therapy; mGy, milligray unit of ionising radiation dose; REVAS, recurrent varices after surgery.