

Introduction

Normal venous return in the lower extremities moves blood from the legs to the heart against gravity. Valves, calf muscle pump activity, and an intact venous wall play a major role here. Chronic Venous Insufficiency (CVI) is a progressive disorder caused by dysfunction of the venous valves, caused by incompetent valves in the legs, leading to significant venous reflux. The valves are often damaged due to certain conditions, such as prolonged standing, obesity, pregnancy, or a history of venous thrombosis. In a healthy functioning body, blood in the veins of the lower extremities flows from the legs back to the heart, even against gravity. This process is supported by three main factors: venous valves, contraction of the calf muscles (also known as the calf muscle pump), and healthy vein walls. When the valves are unable to perform, they become incompetent and allow blood to flow in a reverse direction, a process called venous reflux. This often leads to increased venous pressure, vein damage, and eventually leads to a condition called CVI, which can cause leg swelling, skin changes, ulcers, and other serious complications (Figures 1 and 2).

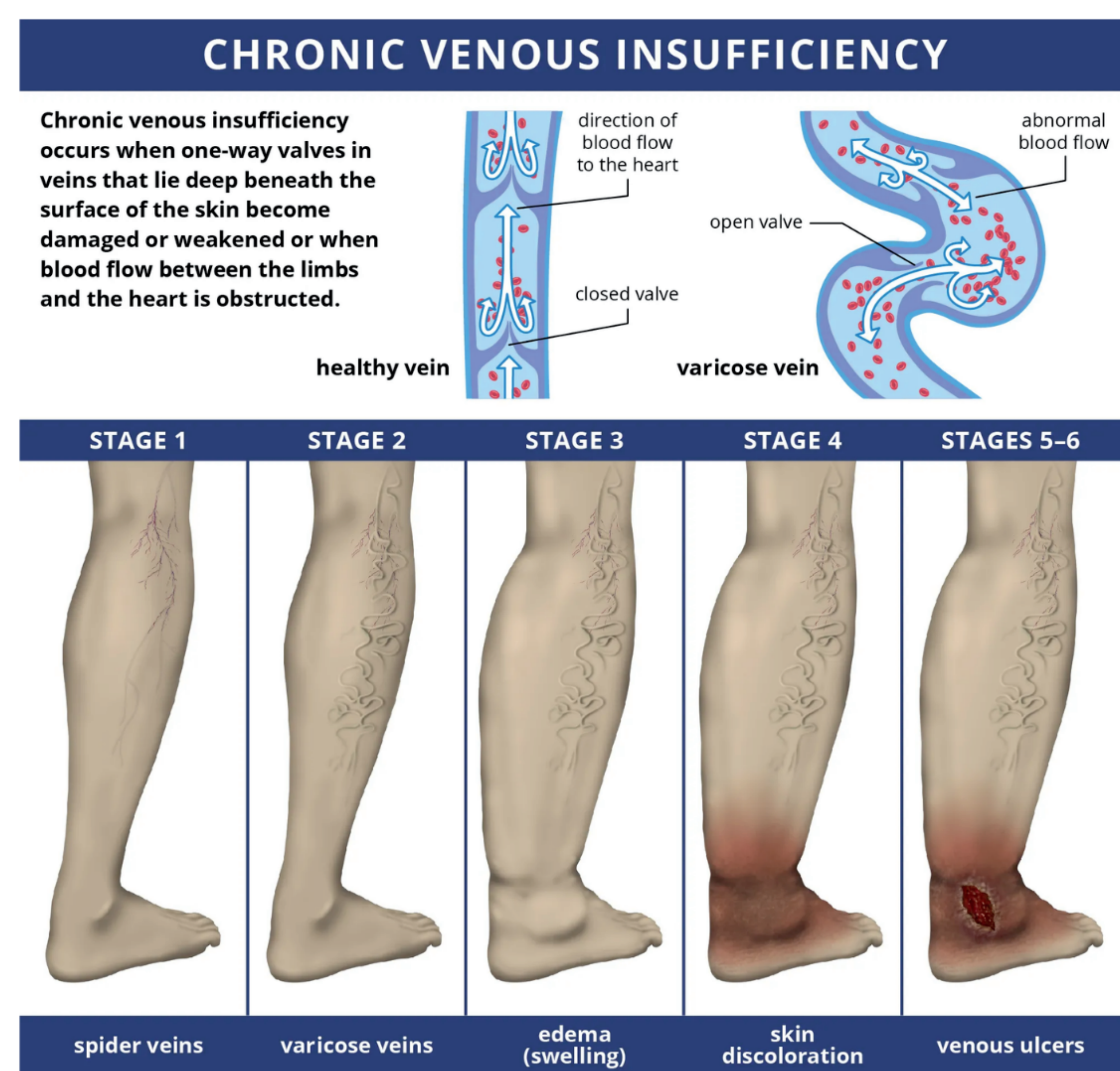


Figure 2: Displaying Stages of Progression in CVI
Objectives: The objective of our study was to better understand the mechanisms and risk factors of CVI by reviewing current published research.

Physiology

Normally, blood flows from the legs to the heart against gravity, aided by skeletal muscle contractions. Veins contain bicuspid valves that open to allow blood flow to the heart and close immediately to prevent backward flow. During movement, leg muscles contract, squeezing the veins and helping pump blood upwards. The valves ensure one-way blood flow; however, if the valves become weakened/damaged, they may not close properly. This leads to blood flowing backward and pooling in the legs, reducing efficient circulation.

Causes/Symptoms

- DVT: Blood clots in deep veins can damage valves, leading to post-thrombotic syndrome, a type of CVI.
- Valve weakening due to aging: Natural wear and tear can reduce valve efficiency.
- Prolonged sitting or standing: Increases venous pressure and can weaken valves over time.
- Congenital or primary vein problems: Some people are born with vein abnormalities or develop primary valve dysfunction.
- Other medical conditions: Pelvic tumors or abnormal blood vessels may contribute.
- Women, especially after pregnancy, are more prone to CVI, and the condition is more common in older adults.

Symptoms (Figure 3)

- Leg heaviness or fatigue, especially after standing for long periods.
- Aching or throbbing pain
- Cramping (particularly at night) and an itching/burning sensation in the legs.
- Edema, or swelling in the legs and ankles
- Visible varicose veins
- Skin discoloration
- Leg heaviness/fatigue
- Aching/throbbing pain
- Cramping
- Itching/burning
- Changes in skin texture, such as thickening or hardening

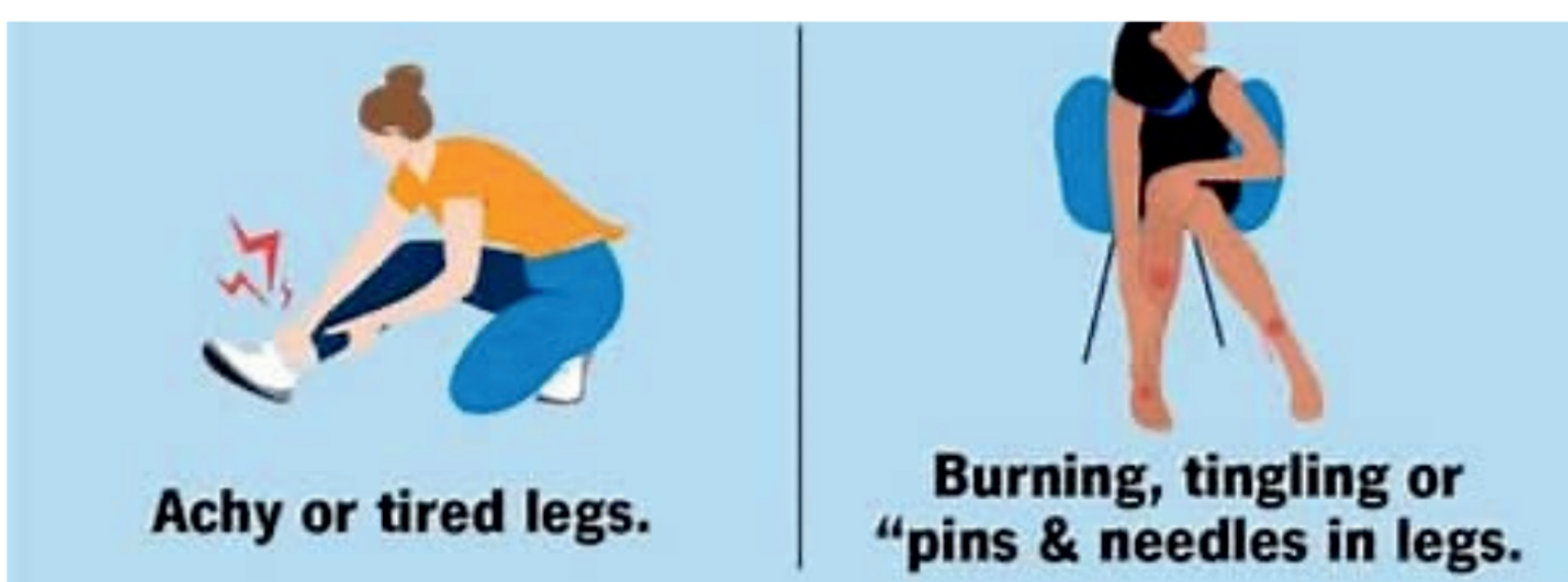


Figure 3: Typical symptoms of CVI

Diagnosis

- Physical examination and a review of the patient's medical history.
- Assess for edema, skin discoloration such as hemosiderin staining, and the presence of varicose veins or venous ulcers.
- Venous duplex ultrasound combines B-mode imaging to evaluate vein structure, Doppler ultrasound to assess the direction and speed of blood flow, and clot screening. (Figure 4).

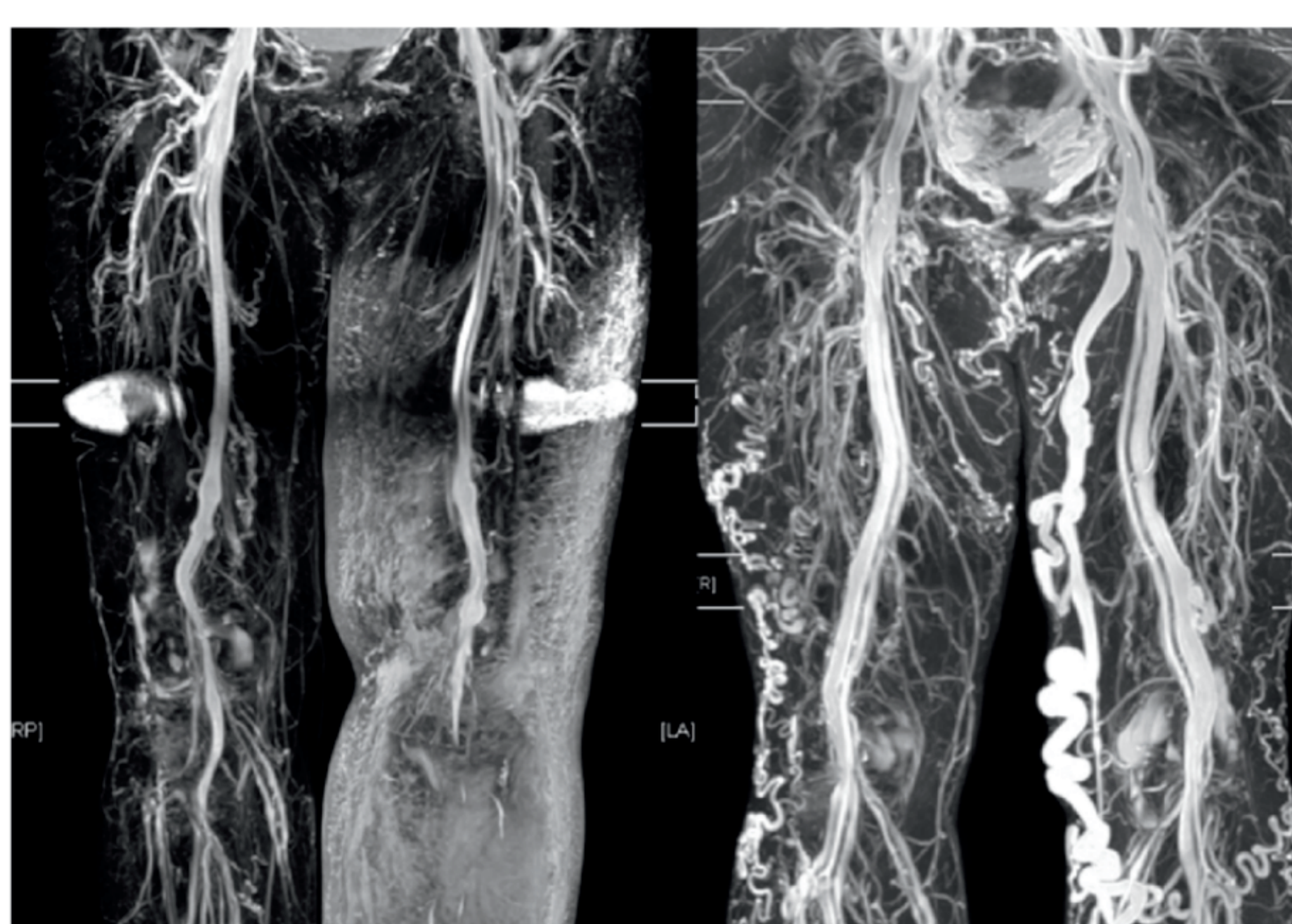


Figure 4: Comparing healthy Veins to enlarged Veins Displaying Venous Insufficiency

Prognosis

- CVI is a chronic and progressive condition and has good prognosis
 - CVI does not heal on its own.
 - Lifestyle changes and medical management can control symptoms and prevent complications
- Complications:
- Chronic venous hypertension from persistent blood pooling
 - Permanent skin damage and Recurrent venous ulcers
 - Deep Vein Thrombosis (DVT) due to extremely slow blood flow
 - Lipodermatosclerosis, Cellulitis, Venous stasis ulcers

Treatment

- Long-term condition that needs ongoing treatment to improve blood flow and reduce venous pressure.
- Early treatment helps reduce symptoms and prevent complications.
- Conservative treatments include compression stockings, leg elevation, exercise, and avoiding long sitting or standing.
- Severe cases may require medications or minimally invasive procedures like sclerotherapy or endovenous laser therapy.

Results

Reviewed literature identifies venous valve incompetence as the primary mechanism underlying Chronic Venous Insufficiency (CVI), resulting in venous reflux, blood pooling, and venous hypertension. Risk factors include aging, prolonged standing, obesity, pregnancy, and previous venous thrombosis.

Conclusion

In conclusion, Chronic Venous Insufficiency is a progressive disorder driven by venous valve dysfunction, resulting in blood reflux and sustained venous pressure. Risk factors include aging, prolonged standing, obesity, pregnancy, and prior thrombosis. Early recognition and management are essential to prevent complications. Treatment involves conservative therapy, with minimally invasive procedures used when necessary.