The purpose of Deep Venous Valve repair or creation is:

To correct the hemodynamic disorder determined by deep venous incompetence

Deep venous incompetence based on etiology can be classified as:

- Primary
- Secondary (PTS)
- Valve agenesis

In primary deep venous incompetence ($E_p$)

Valves are usually present but malfunctioning

Internal Valvuloplasty is the best option
In congenital deep venous incompetence ($E_c$)

- Valve agenesis
- Hypoplasia

Valves are absent or rudimentary

In secondary deep venous incompetence ($E_s$) (usually post thrombotic)

Valve cusps are usually destroyed

When a direct valve repair is not possible, as in post thrombotic syndrome or in valve agenesis, we can apply three techniques:

- Transposition
- Neovalve
- Valve transplant

In treating these patients we must take into account the involvement of the superficial and perforator system and possible associated deep venous obstructions.

In Primary deep venous incompetence

The superficial venous insufficiency is frequently associated
Is it preferable to treat first the deep venous reflux or the superficial reflux?

We know that

In primary incompetence we can frequently obtain the competence of the deep venous system only by treating the superficial system alone.

We discovered that these variable results were correlated with two anatomical conditions:

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<th>Primary incompetence with symmetrical cusps</th>
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| Primary incompetence with asymmetrical cusps |

To plan a correct strategy it is crucial to identify the valve morphology, because in the presence of:

- **Symmetrical cusps:**
  The treatment of superficial system is advisable as first step.

- **Asymmetrical cusps:**
  Valve reconstruction should be the first option because the reduction of deep overload is not able to restore the valve function.

We know that

In primary incompetence we can frequently obtain the competence of the deep venous system only by treating the superficial system alone.

In these cases the deep reflux can be the consequence of a functional overload of the deep system caused by the associated superficial reflux.

However, in almost half of the patients the deep venous reflux persists after superficial ablation and the only result we will obtain will be a varicose vein recurrence.

We discovered that these variable results were correlated with two anatomical conditions:

- **Primary incompetence with symmetrical cusps**

- **Primary incompetence with asymmetrical cusps**
Valve Agenesis

Superficial reflux and deep venous reflux due to valve agenesis are constantly associated

Patient Features:
- Absence of valve in the entire venous tree
- Young age
- Severe CVI
- Low QoL level

Valvuloplasty is not performable and other direct surgical options may only obtain transitory results

So, we apply as first step two indirect actions:
- Ensure a functional and efficacious flow by treating the proximal non thrombotic lesions when associated
- Increase the calf pump efficacy

The need to treat the deep system through a direct approach is reserved to patients in C4b-C6

A good option is neovalve

The treatment strategy in post thrombotic syndrome (PTS) (secondary deep venous incompetence) is a challenge

PTS is correlated with two hemodynamic disorders:
- Obstruction
- Reflux
Both (Obstruction and Reflux):

Are the responsible of a common microvascular disorder correlated with venous ambulatory hypertension (VAH)

VAH (venous ambulatory hypertension)

Is the consequence of:

- Proximal high resistance
- High distal volume
- Reduced flow velocity
- Calf pump insufficiency
- Valve incompetence

First step:

We should consider the treatment of proximal obstruction (at iliac level)

By venous stenting (venous bypass)

Second step:

We should address our attention to common femoral obstruction. The obstructive lesions at this level are an obstacle in a crucial point of the leg

For two reasons:

1. Almost half of the patients can improve without other surgical procedures
2. The increased flow allows us to correct the reflux in half of the patients without clinical improvement
It can be corrected applying endophlebectomy, which consists in the surgical removal of intraluminal fibrosis and we can increase the venous diameter by means of a patch.

Third step:

We must attentively evaluate the femoro-popliteal segment.

Always considers only responsible for the reflux, it is on the contrary a problem of reflux and obstruction associated.

Fourth step:

We must consider the correction of parallel refluxes by means of endovascular procedures.

Fifth step:

In patients without improvement, we can consider deep venous reflux correction:

- Transposition
- Neovalve
- Transplant

Sixth step:

Consider the selective correction of perforators.

In which patients is venous valve repair or creation indicated?

In patients:

- Eligible for deep vein reconstruction
- Non responding to conservative therapy
- Without compliance for compression
- With improvable Q.o.L.
What is needed for a correct indication to treatment?

Diagnostic protocol

Ultrasound assessment

- Venography
- Air plethysmography
- Microcirculatory evaluation

- Suspected proximal obstruction
- Anatomical anomalies

IVUS
MRCT

The more the diagnostic is accurate, the more the applied treatment strategy will be appropriate.

Thank you