The Challenges of the Common Femoral Vein in Deep Vein Thrombosis

How to assess involvement of the common femoral vein in patients with acute and chronic deep vein thrombosis and the approach to treatment in patients with chronic disease.

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Venous stenting has grown in popularity and is now an accepted treatment option for patients with both acute and chronic deep vein thrombosis (DVT), as well as patients with symptoms attributable to May-Thurner compression.[1] The available literature shows that patients have better outcomes if they have good inflow and if the stent does not extend below the ligament into the common femoral vein (CFV), as compared with those who require stent extension. The challenge in these patients is the adequacy of inflow from the diseased thigh vessels (the femoral vein and profunda vein) as they form the CFV. In venous stenting, it is imperative to have adequate flow from the profunda vein in particular to ensure the stent remains patent.[2] However, it is well established that stenting below the ligament is reasonable to ensure adequate stent patency.[3]

ASSESSING THE COMMON FEMORAL VEIN

Preoperative workup mandates assessment of the CFV in all patients being considered for venous stenting. This process differs for acute patients as compared to those presenting electively for treatment of chronic disease.

Acute DVT Patients

In the setting of acute DVT, assessment of the CFV is frequently achieved on completion of lysis, as preprocedural imaging is likely to indicate that the CFV is involved with acute clot. In addition, in patients with acute DVT, transformation of the profunda vein may not have occurred in the absence of previous chronic disease. Therefore, it is important to ensure that both inflow vessels are protected. It is frequently necessary to extend the stent system below the inguinal ligament even in acute DVT patients, and failure to extend far enough caudally is a frequent cause of early stent thrombosis.

Assessment of the CFV in acute cases can be achieved in three ways: (1) table duplex scanning, (2) venography, and (3) intravascular ultrasound (IVUS).

Table duplex scanning may give an indication as to the diameter of the vein, persistence of web and spurs, thickening of the vessel wall, and presence of residual clot.[4,5] Any of these features should suggest that it may be necessary to extend the stents even if venography shows a reasonable lumen.

Venography provides information on flow (although there is no standardized method that indicates "adequate" flow), lumen diameter, residual clot, and presence or absence of collateral vessels. It is possible to delineate the profunda and femoral vein confluence using venography by either having the patient perform a Valsalva maneuver during injection of contrast (provided the patient is under local anesthetic) or by using a balloon to occlude the external iliac vein and injecting contrast under pressure.

In the author's opinion, IVUS is an essential addition to CFV assessment that has the advantage of providing clear imaging of vessel wall quality, accurate diameter, and a precise assessment of the profunda and femoral vein confluence. The presence of edema in the vessel wall is particularly well visualized, and in this context, even if the vessel diameter appears reasonable, it may be necessary to extend the stents caudally to cover these regions (Figure 1).

The aim is to combine information from all of these imaging modalities to ensure that the principle of treatment from "good vein to good vein" is applied.

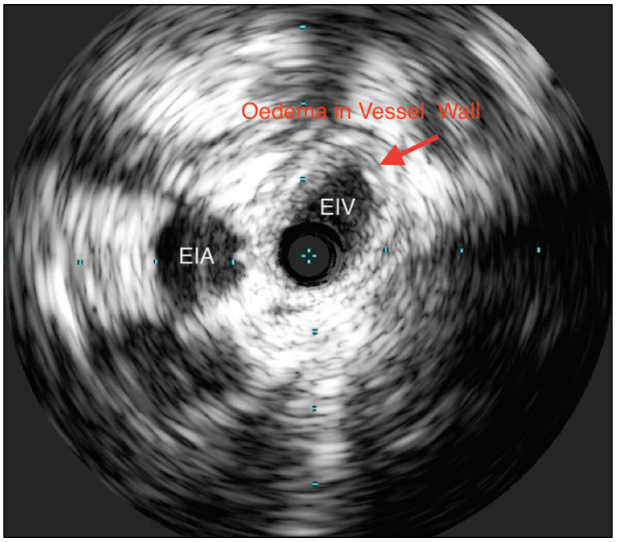

Figure 1. IVUS of the CFV after acute DVT lysis, showing evidence of vessel wall edema. In some patients, this may progress to form a stenosis, and careful consideration should be given to including segments with significant edema in the stented area.

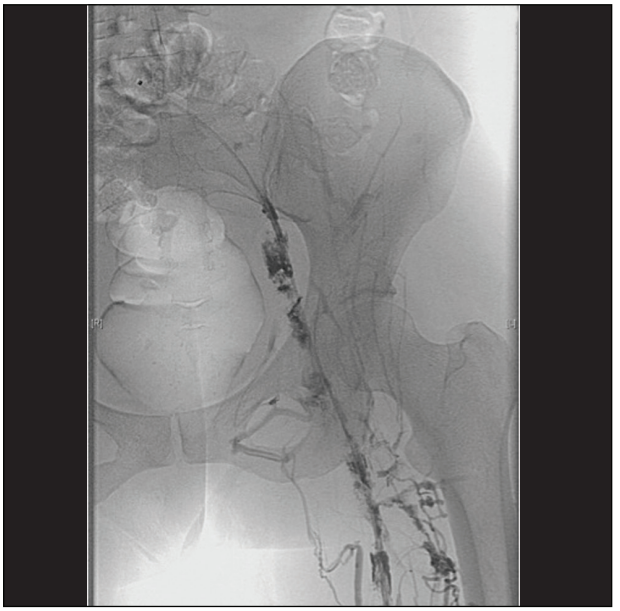

Figure 2. Inflow vessels as assessed by venography. Poor inflow is demonstrated into a significantly diseased CFV. In these patients, it may be preferable to delay treatment and allow sufficient time for profunda transformation to take place.

Chronic DVT Patients

Patients with chronic DVT provide significantly more challenges if it is evident that the CFV is involved, and this assessment is critical in the workup of these patients. As with acute patients, assessment of the CFV is multimodal. In our institution, we rely on magnetic resonance venography as a standard preoperative evaluation combined with duplex ultrasound imaging. The aim of the baseline cross-sectional imaging is to establish the degree of involvement of the CFV in the chronic disease process. In some cases, these images may show limited disease in the CFV. In particular, stenting can be considered with relative confidence if it is clear that the segment between the confluence of the femoral and profunda veins and the subsequent great saphenous vein is free of disease.

If the initial workup shows that the CFV is more heavily involved, further evaluation is aimed at clarifying the state of the femoral and profunda vein inflow vessels. Extensive disease in the CFV often implies poor inflow vessels, and if these are inadequate, it may be necessary to consider conservative management in these patients.[2] In patients with extensive disease in the CFV, workup should include formal venography performed from the popliteal or posterior tibial vein to ensure that an adequate inflow vessel can be demonstrated (Figure 2).

Provided the aforementioned steps are taken and patients proceed to intervention, then evaluation of the CFV takes place at the time of the interventional procedure. Patients should be prepared for the procedure to involve either primary stenting alone or endophlebectomy with or without fistula.[6,7] The creation of an endophlebectomy and fistula significantly increases the potential procedural complications, and patients should be appropriately informed.

TREATMENT OF CHRONIC DISEASE INVOLVING THE COMMON FEMORAL VEIN

The decision as to whether endophlebectomy is necessary is principally related to whether a common inflow can be maintained into the stent system from the profunda and femoral vein. If only a single inflow vessel remains (typically the profunda), the assessment is predicated on ensuring that the exit "channel" from this vessel is maintained and feeds into the stent system. Although informed by preoperative imaging, this decision can only be made with certainty after IVUS evaluation of the vessel, in the author's opinion. The IVUS catheter can be introduced after recanalization of the occluded venous segment, which is necessary regardless of whether endophlebectomy is being considered. IVUS evaluation should take place before any balloon dilation of the vessel or other instrumentation of the vessel has been performed. Balloon dilation will alter the structure and position of the trabeculations within the vessel lumen and make evaluation more complicated.

The principal question is whether a sufficient landing zone for the stent can be identified (however small), which will allow the inflow vessels from the leg to run into the stent. In particular, evaluation needs to assess whether the trabeculations, once stented, will be pushed away or toward the profunda confluence. In the latter

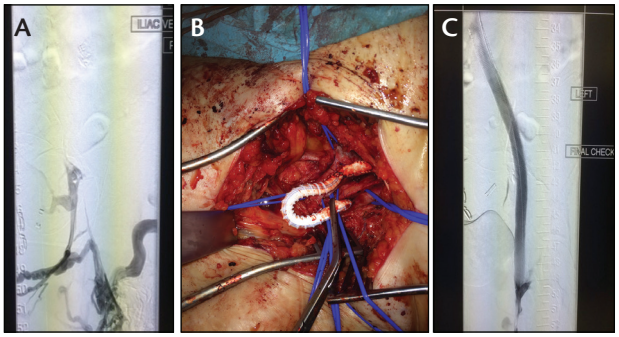

Figure 3. Venography at time of a procedure demonstrating significant CFV disease (A). No suitable landing zone could be identified, and therefore, an endophlebectomy and fistula was performed (B), with the final venogram demonstrating a patent stent with good flow from the fistula (C). The fistula is typically closed at 6 weeks using an Amplatzer vascular plug (Abbott Vascular [formerly St. Jude Medical]) if adequate inflow is demonstrated on a test occlusion of the fistula using a balloon.

scenario, this will compromise inflow, and the patient will then require an endophlebectomy.

If a common luminal channel is identified, stenting the entirety of the diseased venous tract is feasible with the aim of landing the caudal stent as precisely as possible on the profunda vein. On completion of the procedure (if the inflow is uncertain), both the profunda and femoral veins can be accessed from the cranial approach (either jugular [preferred] or contralateral "up-and-over" access) to ensure that both vessels can be cannulated and balloon dilation can be performed if necessary.

If a common inflow channel cannot be identified and trabeculations are clearly extending into both the femoral and profunda veins, an endophlebectomy will be necessary. This requires extensive dissection of the groin vessels to expose the CFV and all its tributaries. The technique of endophlebectomy has been described elsewhere.[7-9] In our experience, we have made liberal use of adjunctive measures to attempt to reduce the rate of postoperative seroma formation inclusive of the use of a Harmonic scalpel for dissection, the application of sterile talc on completion, and use of postprocedural negative pressure dressings. Despite these measures, this procedure carries a significant increase in morbidity, and it is not yet clear that the patency gain, both short and long term, is justified (Figure 3).

If the inflow vessels are poor and stents have been extended to the confluence of the profunda and femoral veins (with or without endophlebectomy), the decision is often faced as to whether to extend the stents into either the profunda or the femoral vein.

Stent extension below the confluence should only be considered as a last resort, as there is very little evidence to suggest that it allows for improved long-term patency. Furthermore, it is clear that if stents are extended into the femoral vein frequently, this requires extension down to the level of the popliteal vein, which carries significant risk of making the patient significantly worse if the stents occlude and may compromise the origin of the profunda, thereby occluding collateral drainage of the leg.

Despite the above caveats, it is occasionally necessary (if the profunda vein is the only inflow vessel) to extend the stents caudally into the profunda itself. However, as a general principle, any stent extension below the lesser trochanter should be considered only as a last resort. Far more frequently, a useful tactic is to aggressively venoplasty the entirety of the femoral vein and run lytic therapy overnight followed by repeat venoplasty. This approach is the basis of the ACCESS PTS study as advocated by Dr. Mark Garcia and may provide improved inflow without the risk posed by extensive stent extension. More work is undoubtedly required to understand and improve on strategies for dealing with poor inflow vessels.

CONCLUSION

The CFV and inflow vessels remain an area of significant controversy. Extension of the stents caudally to include the CFV is required in the majority of patients with extensive disease, and therefore, careful evaluation of the CFV is required to determine whether an interventional procedure is possible. Although endophlebectomy and fistulas may be required in some patients, they can be avoided in most cases through the diligent use of IVUS and careful stent placement. ■

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