Focus Note

Ischemic Steal Syndrome (ISS) Management by Distal Revascularization-Interval Ligation (DRIL)

ISCHEMIC STEAL SYNDROME (ISS)
Ischemic steal syndrome following hemodialysis is an uncommon but devastating complication of an AV access. It occurs mainly in diabetic patients with multiple previous AVFs. ISS management challenges the clinician to maintain a functional hemodialysis access while relieving distal ischemia. One way to correct steal syndrome is to increase resistance in the fistula through banding or lengthening the fistula. This counterproductively reduces blood flow through the fistula which may then lead to a thrombosis.

Distal revascularization-interval ligation (DRIL) technique is an alternative way to manage ISS. The procedure (Fig. 1):

a) Eliminates the potential pathway for steal syndrome by ligating the artery distal to the origin of the AV fistula;

b) Revascularizes the extremity through creation of a bypass (saphenous vein, PTFE graft) from above the AV fistula to below AV fistula.

University of Arizona champions of the DRIL procedure report that DRIL is a durable and effective procedure that reliably accomplishes the twin goals in the treatment and management of angioaccess-induced ischemia: persistent relief of hand ischemia and continued access patency.

University of Rochester surgeons cite use of a Transonic flowmeter to study and confirm the hemodynamic changes that occur with the DRIL procedure. At the onset of the surgical procedure they confirm the existence of steal: retrograde Qs (Fig. 1) which becomes antegrade (i.e. supplying the forearm) when the fistula is temporarily occluded. This distinguishes between the two potential sources for the patient’s forearm circulatory problems: steal versus distal vessel disease. After the DRIL procedure and ligation of the artery distal to the fistula, flow through the bypass and into the forearm is confirmed through a second measurement.

REFERENCES

Fig. 1: DRIL Technique: The artery is ligated distal to the AV access origin and a bypass is constructed to revascularize the extremity.

Steal Syndrome
1) Creation of an AV access establishes a low-resistance pathway that shunts arterial inflow into the low-pressure venous circulation. The net result is that the access “steals” arterial flow from distal perfusion (i.e. hand).
2) Steal is an almost universal “physiologic” result of the creation of AV fistulas and grafts (occurs in 73%-91% of cases); is usually asymptomatic.
3) Clinically significant ischemic steal syndrome (ISS) develops after 1.6% - 8% of all procedures when inherent compensatory mechanisms such as collateral circulation, vasodilatation, cannot meet metabolic demands.
4) Risk factors for ISS include: female gender, > 60 years of age; diabetes mellitus; multiple-access operations on the ipsilateral limb; fistula creation and use of brachial artery.