

## **Inside-Out Access: A Novel Lead Placement Technique for Patients with Central Venous Occlusions**

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**Background:** Patients requiring lead implantation with complex central venous occlusions that cannot be recanalized using standard techniques represent a major challenge for the implanting physician. We describe our experience with a novel inside-out vascular access technique for lead placement in such patients.

**Methods:** Eight patients with central venous occlusions were referred for device implantation. Inside-out central venous access (IOCVA) was obtained via the percutaneous femoral approach. A catheter-dilator system was advanced across the right atrium, to the most central point of venous occlusion. The occluded vein was punctured with a directional needle and a catheter was advanced along intravascular or extravascular tissue planes to the subclavian region. A solid wire needle was then oriented toward the skin surface and advanced through the soft tissues until exiting from the body. The wire was utilized to pull rigid dilators through the occluded segment. Conventional transvenous leads were implanted through the new channel.

**Results:** All patients had chronic, total venous occlusions that were inaccessible by conventional methods (3 superior vena cava, 5 brachiocephalic and bilateral subclavian). All patients had successful, pre-pectoral device implants (4 right-sided, 4 left-sided; 1 single-chamber, 4 dual-chamber, 3 biventricular). There were no procedure-related complications. Procedural time was 39±43 minutes. At discharge there were normal lead parameters in all patients with no pneum/hemothoraces. There were no revisions or late complications at long term follow-up (29-1027 days).

**Conclusions:** IOCVA is a novel technique that appears to provide a safe and effective access solution for patients with complex central venous occlusions.