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Connecting The Vascular Community

Tips And Techniques For The Use Of Ultrasound In AV Access

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Disclosures:

- X Consulting/Teaching: Becton Dickinson, Medtronic, Laminate medical, Bluegrass Vascular, Xeltis, VentureMed
- X Speaking: BrosMed medical, Cardionovum
- X Advisory Board: Venova medical


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Why do U/S guided interventions?



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Should I routinely use U/S?



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Why do U/S guided interventions?

- Good image quality
- Good stenosis and extravasation/hematoma quantification
- Simultaneous flow (Qa) measurement
- Easy to learn and use
- No radiation (ALARA)
- No lead protection
- No contrast agent
- Cheap, but no reimbursement

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Why do U/S guided interventions?

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Erste Erfahrungen mit der Dilatation von Dialyseshuntis unter farbkodierter duplexsonographischer Kontrolle

First experiences with dilatation of dialysis shunts with colour-coded duplex sonography monitoring
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Summary

Purpose: Aim of the study was to evaluate the technical aspects of colour coded duplex sonography guided interventions of peripheral vessels.

Methods: During 15 months 39 stenoses of shunt veins in 24 patients were dilated guided by colour coded duplex sonography.

Results: 38 stenoses were dilated without complications. The blood flow volume was increased from 361.9 ± 83.5 to 718.9 ± 189.2 ml/min. In one case it was not possible to dilate the stenosis because of a vasospasm.

Conclusion: PTA guided by colour coded duplex sonography is an alternative to DSA guided interventions of superficial vessels without x-ray exposure or contrast agent application.

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Why do U/S guided interventions?

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Duplex-guided balloon angioplasty of failing or nonmaturing arteriovenous fistulae: A new office-based procedure

Enrico Archer, MD, PhD • Arif Hingorani, MD, PhD • Natalie Marks, MD, RVT

[Open Access](#) • Published: July 13, 2009 • DOI: <https://doi.org/10.1016/j.jvs.2009.03.061>

Patterns and Methods
 Twenty-two patients (14 males, 10 females, mean age 65.1 ± 11.1) with chronic renal insufficiency underwent 22 office-based, ultrasound-guided balloon angioplasty of their dysfunctional AV fistulae. Twenty-seven procedures were performed in 10 sites that did not mature while the remaining five were performed in 10 sites. AV fistulae for these procedures were access stenosis (70%) or thrombosis (30%) as revealed by color duplex scan and confirmed by peak systolic velocity (PSV) Doppler US. Preoperative duplex scan-related mean resistive flow (RF) and highest spectral PSV were recorded and compared with postoperative findings. Access site puncture and cannulation with short sheath, wire, and balloon, advancement and dilation were guided by duplex scan only. A comparison of outcomes by hospital-based vs. off-hospital procedures was performed.

Results
 All procedures were successfully completed without fluoroscopy and contrast media. There were no systemic complications. The patient (20%) developed an air embolism due to the use of a saline syringe that contained a 1-ml air embolism for 20 minutes. An additional patient (2%) had a focal intracranial hemorrhage not obscuring the brain. Complication of postoperative mean RF (200 ± 100 vs. 100 ± 50) and postoperative mean PSV (100 ± 100 vs. 100 ± 100) demonstrated a statistically significant increase with $P < .001$. Postoperative mean PSV (100 ± 100) increased compared to preoperative (mean PSV 104 ± 4) of 100 (P < .0001). After reduction of postoperative resistive flow (RF) from the graft site, the net volume from these 22 cases totaled 81.7 mL, making the mean 4.2 mL higher than that of the hospital setting (patient preference for the same value, 81.0 mL).

Conclusion
 This early experience suggests that office-based endovascular repair of AV access under duplex scan guidance is feasible and safe. The optimal location of AV access fistulae requires more evaluation. This proposed approach needs further study on site and patient selection. Finally, it appears to be clinically more suitable than the same hospital-based procedures.

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Why do U/S guided interventions?

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Duplex ultrasound-guided angioplasty of hemodialysis vascular access

Fabrice Abbadie, MD, PhD • George Kosmidaki, MD • Didier Aguiari, MD • Aurélien Prasad, MSc

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Article Highlights

- Type of Research:** Single-center retrospective study
- Key Findings:** In this study, 141 patients with a dysfunctional arteriovenous fistula have been treated on a total of 295 angiographic under duplex ultrasound (DU) guidance, without any concomitant use of radiographic guidance. Clinical success and postintervention patency rates were within the limits of recommended thresholds. Major complications requiring treatment and equipment beyond planned normal therapy were rare (2.7%) and minor complications requiring no unexpected additional treatment were frequent (52.7%), but without any consequences on 24-month postintervention patencies ($P = .07$). All DU parameters were improved during the month after angioplasty.
- Take Home Message:** Duplex-guided hemodialysis vascular access angioplasty is safe and efficient. It presents postintervention patency and complication rates within the recommended threshold and provides DU parameters that could facilitate the definition of new efficiency criteria in the future.

Dr. Robert Steinhausen

Why do U/S guided interventions?

X-ray-guided and ultrasound-guided percutaneous transluminal angioplasty to treat arteriovenous isthmus dysfunction in hemodialysis patients: A retrospective controlled study

Zhen-Guo Liang, Zhong-Si • and Jin-the-Guo

[View all authors and affiliations](#)

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Results:
 After the propensity score matching, 73 matched pairs of cases were created with 34 pairs of autogenous arteriovenous fistula cases and 39 pairs of prosthetic arteriovenous graft cases. There was no significant difference between the X-ray-guided and ultrasound-guided group, respectively, regarding the technical success rate (84.9% vs 87.7%, $p = 0.630$), clinical success rate (98.6% vs 97.3%, $p = 0.999$), and complications (10.9% vs 5.5%, $p = 0.228$). Although the 6- and 12-month secondary patency rates for the dialysis access between the two groups had significant difference ($p < 0.05$), there was no significant difference in primary and secondary patency curves between the two groups ($p > 0.05$).

Conclusion:
 The overall efficacy of ultrasound-guided versus X-ray-guided percutaneous transluminal angioplasty in treating arteriovenous fistula dysfunction might be comparable.

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Why do U/S guided interventions?

- No RCTs but...
- Do we need them here?

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What is needed for U/S guided interventions?

- U/S machine
- U/S experience
- Transducer "holder"
- Willingness to use it

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Who can do U/S guided interventions?

- Vascular (access) surgeon
- Interventional radiologist
- Interventional Nephrologist
- Resident/Fellow, Nurse, Vascular Tech

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Where can we apply U/S guided interventions?

Wherever possible with U/S

From wrist (snuffbox) to cephalic arch/axillary

Both arteries, veins and grafts

When can we apply U/S guided interventions?

ALWAYS!!!!

- Access creation
- Access intervention
- Access revision
- Access surveillance

Access Sites to perform U/S-guided interventions?

- Trans-AVF/AVG
- Trans-sidebranch
- Transradial/ulnar distal (art. and ven.)

Case example: FLEX Vessel Prep+PTA±Stentgraft

FLEX-VP and PTA

PS	89.3 cm/s
ED	42.6 cm/s
MD	42.6 cm/s
TAMAX	57.8 cm/s
PI	0.81
RI	0.52
TAMEAN	34.0 cm/s
VolFlow	451.7 ml/min
1 VF Durchm.	0.53 cm

Stentgraft?

U/S-guided Interventions of Dialysis Access

PROS

- Good image quality
- Good outcomes
- Easy to learn
- No radiation
- No contrast agent
- Cheap

CONS

- **None**
- Need 3 hands (occasionally)
- Learning curve
- Not always easy (anastomosis/curves)
- Peripheral, not central

Dr. Robert Shashoua

IF I CAN DO IT, YOU CAN DO IT!!!!

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Dr. Robert Shashoua

Thank you!

