25 scans for this modality (from the last 3 months)

Single leg arterial (aorta-TPT)
Full single leg arterial (aorta-ankle)
Single leg segment (iliac only/femoral only/calf only)
Graft surveillance
Upper limb arterial
Thoracic outlet duplex
EVAR surveillance
Renal artery duplex
True aneurysm scan
False aneurysm scan
Fistula surveillance

1. Fistula

REPORT E-75446835 VERIFIED Attended-10-Nov-2022 WALCT/WALCT-10-Nov-2022

Clinical History :
Clinical details: Dialysis patient - right b/c interposition graft with multiple interventions - patient booked for plasty but yesterday came in with no bruit/thrill over graft/avf sections\.br\Have d/w Amber the urgency of scan - thanks
Specific question to be answered: Please assess entent of thrombosis as patient due intervention this morning - many thanks

US Doppler for dialysis access VERIFIED Attended-10-Nov-2022 WALCT/WALCT-10-Nov-2022

Dialysis fistula duplex

AV fistula location:	RA	**Right arm**
Type of AV fistula:	G	**Graft**
Estimated flow into AV fistula:	175	**ml/min**
Diameter of Vein	0	**mm**
Outcome:	R	**Red**

Comments:

Arterial inflow:
Triphasic pulsatile flow in the brachial artery, suggestive of outflow obstruction.
Reduced volume flow to 175ml/min.

Venous outflow:
Arterial anastomosis is patent.
The graft is occluded from <2 cm above the arterial anastomosis.
The cephalic vein is occluded extending up to <2cm below the insertion.

Deep veins patent.

Comments:
Occluded graft and cephalic vein.
Informed access nurse of the results.

2. Graft surveillance

REPORT E-75217516 VERIFIED Attended-09-Nov-2022 WALCT/WALCT-09-Nov-2022

Clinical History :
1/12 emergency SFA to ATA origin PTFE graft + ontable SFA angioplasty for origin and proximal stenosis + ATA angioplasty for a calcified plaque 1-2 cm after the anastamosis
(Entered By FISHE (FISHER Emily) on 05-Jul-2022 at 15:55)
3 Month follow-up
on 26-Jul-2022 at 15:38)

US Graft Surveillance Right VERIFIED Attended-09-Nov-2022 WALCT/WALCT-09-Nov-2022

Bypass graft follow-up

	F/U interval:	1M POST ANGIO	Location:	R SFA-ATA	Type: PTFE
Best Resting Ankle Pressure		mmHg			
Brachial systolic Pressure:		mmHg			
ABPI:		mmHg			
ABPI Not Measured	KWN ART CALCIF				

Comments:
Inflow:
CFA patent and calcified with triphasic pulsatile flow.
SFA patent and calcified with biphasic pulsatile flow. 2x 50-75% stenoses proximal and mid thigh.

Proximal Anastomosis:
Patent with no evidence of significant stenosis.

Graft:
Patent with monophasic pulsatile waveforms, PSVs 0.4-0.6 m/s (increased from 0.2-0.3m/s previously).

Distal Anastomosis:
Patent with no evidence of significant stenosis. (NOTE: visualised medially).

Run-Off:
ATA origin is heavily calcified causing poor views. Difficult to rule out any residual occlusion at this level.
50-75% stenosis in proximal ATA.

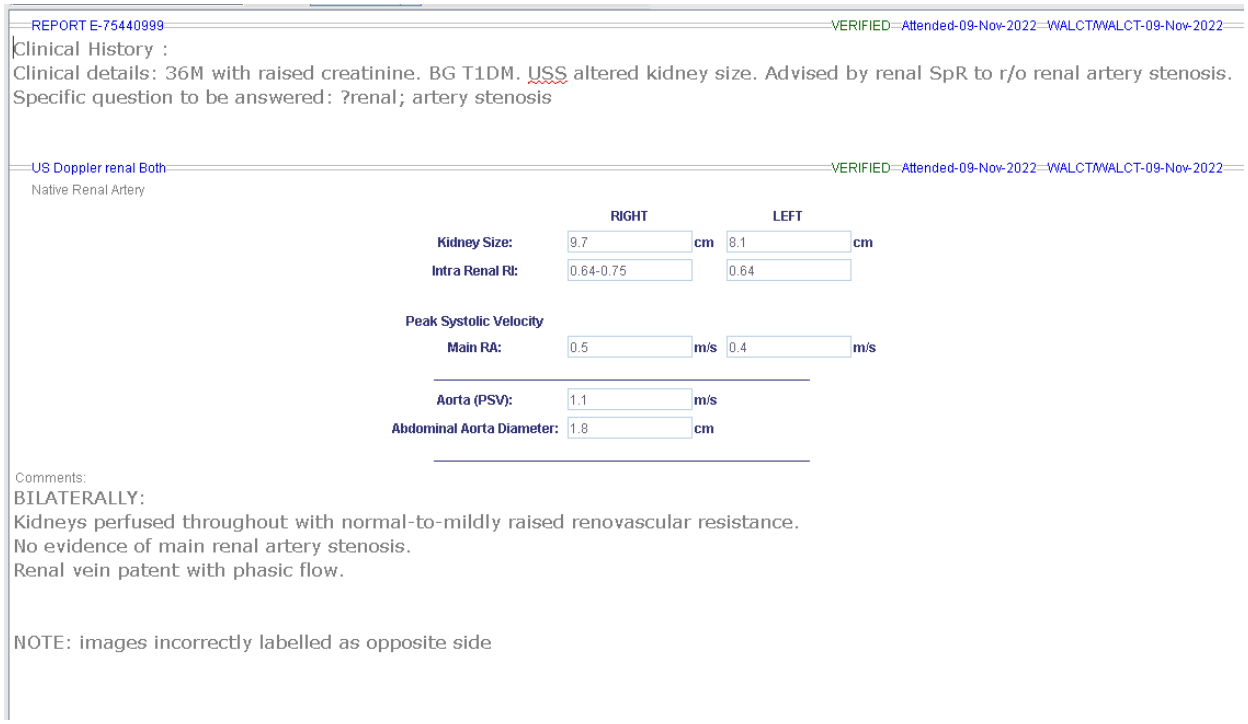
Remainder of ATA appears patent from proximal to distal calf with monophasic pulsatile flow; with limited colour filling but spectral waveforms detected.

Proximal DPA is patent and then divides into medial and lateral branches; both of which are patent with monophasic pulsatile flow, PSVs 0.4m/s and 0.6m/s.

Date of next scan
2 months

Comments:
Improvements to graft and distal flow post-angio.

3. Renal



REPORT E-75440999 VERIFIED Attended-09-Nov-2022 WALCT/WALCT-09-Nov-2022

Clinical History :

Clinical details: 36M with raised creatinine. BG T1DM. USS altered kidney size. Advised by renal SpR to r/o renal artery stenosis.
Specific question to be answered: ?renal; artery stenosis

US Doppler renal Both VERIFIED Attended-09-Nov-2022 WALCT/WALCT-09-Nov-2022

Native Renal Artery

	RIGHT		LEFT	
Kidney Size:	9.7	cm	8.1	cm
Intra Renal RI:	0.64-0.75		0.64	
Peak Systolic Velocity				
Main RA:	0.5	m/s	0.4	m/s
Aorta (PSV):	1.1	m/s		
Abdominal Aorta Diameter:	1.8	cm		

Comments:

BILATERALLY:
Kidneys perfused throughout with normal-to-mildly raised renovascular resistance.
No evidence of main renal artery stenosis.
Renal vein patent with phasic flow.

NOTE: images incorrectly labelled as opposite side

4. Renal

REPORT E-75453705 VERIFIED Attended-17-Nov-2022 WALCT/WALCT-17-Nov-2022

Clinical History :
Clinical details: BG of AVR, CHF, CVD, Angiodysplasia presented with rapidly progressive AKI ?cause
Specific question to be answered: To look for cause of AKI ie perfusion of the kidney, any renal artery stenosis

US Doppler renal Both VERIFIED Attended-17-Nov-2022 WALCT/WALCT-17-Nov-2022

Native Renal Artery

	RIGHT		LEFT	
Kidney Size:	13.3	cm	12.3	cm
Intra Renal RI:	0.78-0.84		0.70-0.76	
Peak Systolic Velocity				
Main RA:	0.8	m/s	-	m/s
Aorta (PSV):	-	m/s		
Abdominal Aorta Diameter:	-	cm		

Comments:
BILATERALLY:
Limited views of the kidneys due to patient body habitus and bowel gas.
Kidneys are perfused where seen with raised renovascular resistance.
No evidence of right main renal artery stenosis. Unable to visualise the left renal artery.
Renal veins patent with phasic flow.

5. Fistula

REPORT E-75326341 VERIFIED Attended-16-Nov-2022 WALCT/WALCT-16-Nov-2022

Clinical History :
Clinical details: Dialysis patient had left r/c avf formed on 15th September - due review in the maturation clinic in 6-8 weeks
Specific question to be answered: Please assess avf maturation at 6-8 weeks post formation - thanks

US Doppler for dialysis access VERIFIED Attended-16-Nov-2022 WALCT/WALCT-16-Nov-2022

Dialysis fistula duplex

AV fistula location:	LA	**Left arm**
Type of AV fistula:	RC	**Radiocephalic**
Estimated flow into AV fistula:	700-750	**ml/min**
Diameter of Vein	5	**mm**
Outcome:	A	**Amber**

Comments:

Arterial inflow:
No evidence of inflow stenosis.

Venous outflow:
Anastomosis widely patent.

Cephalic vein is patent throughout and small in calibre, 4-5mm in forearm and upper arm.
The distal forearm cephalic vein is mildly tortuous and branched: 2.9mm lateral branch followed by a 1.5mm medial branch.

Outflow at ACF level via upper arm cephalic vein and median cubital vein to basilic vein. Basilic vein outflow appears dominant to the upper arm cephalic vein outflow. MCV 3.6mm calibre, 3.1mm depth. Basilic vein measures 5-5.5mm calibre, 9-14mm depth.

Central veins patent.

Comments:
Patient attending clinic tomorrow.

6. Graft surveillance

REPORT E-75265027 VERIFIED Attended-16-Nov-2022 WALCT/WALCT-16-Nov-2022

Clinical History :
Clinical details: right Femoral to popliteal artery bypass ptfe bypass, last scan in july 2021
Specific question to be answered: please rescan to check for any changes

US Graft Surveillance Right VERIFIED Attended-16-Nov-2022 WALCT/WALCT-16-Nov-2022

Bypass graft follow-up

	F/U interval:	>12M	Location:	R SFA-POP	Type: PTFE
Best Resting Ankle Pressure		mmHg			
Brachial systolic Pressure:		mmHg			
ABPI:		mmHg			
ABPI Not Measured	-				

Comments:

Inflow:
Unable to visualise CFA due to patient being scanned in a chair.

Proximal Anastomosis:
Unable to visualise.

Graft:
Patent with no evidence of stenosis, triphasic pulsatile flow, PSVs 0.5-0.9 m/s (previously 0.7-1.3m/s).

Distal Anastomosis:
Sub-optimal views due to patient positioning, however appears patent with no stenosis where seen.

Run-Off:
PopA: Triphasic pulsatile flow, PSV 0.4 m/s.
Distal ATA: Triphasic pulsatile flow, PSV 0.6 m/s.
Distal PeroA: Triphasic pulsatile flow, PSV 0.6 m/s.
Unable to visualise the PTA throughout the calf, ?occluded.

Date of next scan
12m of graft surveillance complete. Please request through EPR if additional duplex scans are required.

7. Graft surveillance

REPORT E-75237883 VERIFIED Attended-15-Nov-2022 WALCT/WALCT-15-Nov-2022

Clinical History :
6m ATA-DPA
on 04-Aug-2022 at 14:21)

US Graft Surveillance Left VERIFIED Attended-15-Nov-2022 WALCT/WALCT-15-Nov-2022

Bypass graft follow-up

	F/U interval:	6M	Location:	L ATA-DPA	Type: VEIN
Best Resting Ankle Pressure		mmHg			
Brachial systolic Pressure:		mmHg			
ABPI:		mmHg			
ABPI Not Measured	ULTRADISTAL GRAF				

Comments:

Inflow:
The CFA, SFA, PopA and prox-mid ATA are patent with diffuse calcification, bi/triphasic pulsatile flow.

Proximal Anastomosis:
Patent with no evidence of stenosis.

Graft:
4x PSV increase in the proximal graft suggestive of >75% stenosis, however visually appears closer to 50% stenosis.
Graft is patent throughout with triphasic hyperaemic flow, PSVs 0.4-1.1 m/s, slightly reduced since previous scan (0.7-1.5m/s).

Distal Anastomosis:
Patent with no evidence of stenosis.

Run-Off:
The DPA is patent with monophasic pulsatile flow to mid foot, PSV 0.4m/s. At midfoot the DPA occludes and collaterals carry flow towards the foot.
Just below the distal anastomosis there is also an immediate lateral DPA branch which is patent with monophasic pulsatile flow, PSV 0.6m/s.

Date of next scan
3 months

Comments:
Proximal graft stenosis.
Patient being reviewed in the foot clinic today.

8. Single leg arterial

REPORT E-75426535 VERIFIED Attended-15-Nov-2022 WALCT/WALCT-15-Nov-2022

Clinical History :
Clinical details: Pt reports claudication/rest pain in both legs (calf muscles) pt can only walk a few years before the pain start and reports it wakes him at night.
Specific question to be answered: Any vascular comprimise present

US Doppler lower limb arteries Lt VERIFIED Attended-15-Nov-2022 WALCT/WALCT-15-Nov-2022

SEE DIAGRAM ON SECTRA.

Aorta of normal calibre 1.6cm, triphasic pulsatile flow.

LEFT:
CIA, EIA and CFA patent with triphasic pulsatile flow.

There is diffuse ?soft plaque in the proximal and mid SFA.
50-75% stenosis proximal SFA; >75% stenosis mid SFA.
~8cm chronic-appearing occlusion in mid-distal thigh.

Very distal SFA, PopA and TPT patent with monophasic pulsatile flow, PSV 0.9m/s.
Calf vessels not scanned due to proximal findings. At the ankle DPA and PTA are patent with monophasic pulsatile flow, PSVs 0.3m/s.
Distal PeroA is patent with severely damped monophasic flow, PSV <0.1m/s. ? occluded above this.

9. Single-leg arterial

REPORT E-75426555 VERIFIED Attended-15-Nov-2022 WALCT/WALCT-15-Nov-2022

Clinical History :
Clinical details: Pt reports claudication/rest pain in both legs (calf muscles) pt can only walk a few years before the pain start and reports it wakes him at night.
Specific question to be answered: Any vascular comprimise present

US Doppler lower limb arteries Rt VERIFIED Attended-15-Nov-2022 WALCT/WALCT-15-Nov-2022

SEE DIAGRAM ON SECTRA.

Aorta of normal calibre 1.6cm, triphasic pulsatile flow.

RIGHT:
CIA and EIA patent with triphasic pulsatile flow.
Heterogenous plaque in the CFA causing 50% stenosis.

There is diffuse ?soft plaque throughout the SFA which is not haemodynamically significant in the prox-mid thigh, however is reducing the lumen calibre.
>75% stenosis in the distal SFA, followed by a ~3cm chronic-appearing occlusion, followed by a further >75% stenosis.

PopA and TPT patent with monophasic pulsatile flow, PSV 0.6m/s.
Calf vessels not scanned due to proximal findings. At the ankle DPA and PeroA are patent with monophasic pulsatile flow, PSVs 0.5m/s and 0.4m/s respectively.
Distal PTA is occluded.

Comments:

10. Single-leg segment

REPORT E-75067782 VERIFIED Attended-15-Nov-2022 WALCT/WALCT-15-Nov-2022

Clinical History :
Clinical details: renal transplant workup. if possible to be booked on Tuesdays or Thursdays
Specific question to be answered: iliac vessels anatomy

US Pre-Renal Transplant Assessment VERIFIED Attended-15-Nov-2022 WALCT/WALCT-15-Nov-2022

BILATERALLY:
Aorta, CIAs and EIAs patent with normal waveforms and velocities.
CIVs and EIVs patent with normal phasic flow.

An old transplant kidney is in-situ in the left iliac fossa.

11. Renal

REPORT E-75446542 VERIFIED Attended-14-Nov-2022 WALCT/WALCT-14-Nov-2022

Clinical History :
Clinical details: BG prostate cancer under Guys. New AKI with anaemia. Nephrotic picture
Specific question to be answered: ?renal artery stenosis

US Doppler renal Both VERIFIED Attended-14-Nov-2022 WALCT/WALCT-14-Nov-2022

Native Renal Artery

	RIGHT		LEFT	
Kidney Size:		cm	10.3	cm
Intra Renal RI:	0.65-0.73		0.62-0.64	
Peak Systolic Velocity				
Main RA:	0.4	m/s	0.3	m/s
Aorta (PSV):	1.0	m/s		
Abdominal Aorta Diameter:	1.7	cm		

Comments:
BILATERALLY:
Kidneys perfused throughout with normal to mildly raised renovascular resistance.
Limited view of the upper pole of the right kidney due to proximity to the ribs, unable to measure kidney size.
No evidence of main renal artery stenosis bilaterally.
Renal veins patent with phasic flow.

12. Renal

REPORT E-75449401 — VERIFIED — Attended-14-Nov-2022 — WALCT/WALCT-14-Nov-2022

Clinical History :
Clinical details: myeloma, aki 3 with Cr>500, USS KUB showed features of medical renal disease, renal SpR advised renal doppler
Specific question to be answered: to r/o thrombosis ?vascular lesion causing AKI

US Doppler renal Both — VERIFIED — Attended-14-Nov-2022 — WALCT/WALCT-14-Nov-2022

Native Renal Artery

	RIGHT		LEFT	
Kidney Size:	10.9	cm	10.4	cm
Intra Renal RI:	0.77-0.79		0.76-0.83	
Peak Systolic Velocity				
Main RA:	0.5	m/s	0.5	m/s
Aorta (PSV):	1.7	m/s		
Abdominal Aorta Diameter:	1.8	cm		

Comments:
BILATERALLY:
Kidneys perfused throughout with raised renovascular resistance.

No evidence of main renal artery stenosis bilaterally.
Renal veins patent with phasic flow.

13. Fistula

REPORT E-75092385 VERIFIED Attended-11-Nov-2022 WALCT/WALCT-11-Nov-2022

Clinical History :
Clinical details: Home dialysis patient - had left r/c av formed on 19th May - due review in the maturation clinic
Specific question to be answered: Please assess avf maturation at 6-8 weeks - thanks

US Doppler for dialysis access VERIFIED Attended-11-Nov-2022 WALCT/WALCT-11-Nov-2022

Dialysis fistula duplex

AV fistula location:	LA	**Left arm**
Type of AV fistula:	RC	**Radiocephalic**
Estimated flow into AV fistula:	1100-1300	**ml/min**
Diameter of Vein	5	**mm**
Outcome:	A	**Amber**

Comments:

Arterial inflow:
High brachial bifurcation, volume flow measured in the Axillary artery.
No evidence of inflow stenosis.

Venous outflow:
Anastomosis appears widely patent but there are raised velocities seen in the cephalic vein just above the anastomosis, PSV >8m/s. Cephalic vein is small in calibre here 3.3mm.
?valve above this in the distal cephalic vein, also contributing to raised velocities.

Cephalic vein is patent throughout the arm with no evidence of stenosis.
Typical calibres 3-5mm in forearm; 9mm ACF; 5-6mm upper arm.
Cephalic vein is <5mm deep throughout the majority of the arm, but increases to 8mm deep in the proximal forearm.

There are two large branches seen diverting flow from the fistula:
- 3.5mm dorsal branch in distal forearm
- 3.9mm medial branch in mid-distal forearm

Central veins patent.

14. Single-leg arterial

REPORT E-75451194 VERIFIED Attended-11-Nov-2022 WALCT/WALCT-11-Nov-2022

Clinical History :
Clinical details: Bilateral claudication
Specific question to be answered: ?PVD

US Doppler lower limb arteries Rt VERIFIED Attended-11-Nov-2022 WALCT/WALCT-11-Nov-2022

Aorta normal in calibre 1.6cm, with pulsatile flow.
RIGHT:
CIA, EIA, CFA, proximal ProfA and proximal SFA patent with biphasic pulsatile flow.
Diffuse 50% stenosis in the mid SFA; <50% stenosis in the distal SFA.
Biphasic pulsatile flow in the PopA.

Diffuse >75% stenosis in the TPT, PTA and PeroA origins.

Proximal PeroA is patent but small in calibre with multiple collaterals seen.
PeroA is occluded from mid calf to ankle level.

ATA origin is patent with biphasic pulsatile flow.
>75% stenosis proximal ATA, occludes shortly after this in proximal calf.
Flow reconstitutes at ankle level, proximal DPA patent with monophasic damped flow, PSV 0.2m/s.

See PTA origin stenosis above.
Remainder of PTA is patent with monophasic pulsatile flow, distal PSV 0.8m/s.

Conclusion:
-Diffuse 50% stenosis mid SFA
-Diffuse >75% stenosis in the TPT, PTA and PeroA origins.
-Single vessel run-off via PTA.

15. Single-leg arterial

REPORT E-75451197 VERIFIED Attended-11-Nov-2022 WALCT/WALCT-11-Nov-2022

Clinical History :
Clinical details: Bilateral claudication
Specific question to be answered: ?PVD

US Doppler lower limb arteries Lt VERIFIED Attended-11-Nov-2022 WALCT/WALCT-11-Nov-2022

Aorta normal in calibre 1.6cm, with pulsatile flow.
LEFT:
CIA, EIA, CFA and proximal ProfA patent with biphasic pulsatile flow.

Borderline 50% stenosis at the SFA origin.
50-75% stenosis proximal SFA.
Diffuse 50-75% stenosis mid SFA.
>75% stenosis distal SFA.

PopA patent with monophasic damped flow.
Calf vessels not extensively scanned due to proximal findings.

At the ankle:
DPA is occluded.
PTA and PeroA are patent with monophasic damped flow, PSVs 0.7m/s and 0.4m/s.

Conclusion:
-Multiple SFA stenoses, damped distal flow.

16. Fistula

REPORT E-75431484 VERIFIED Attended-08-Nov-2022 WALCT/WALCT-08-Nov-2022

Clinical History :
Clinical details: Pre-dialysis patient with r b/c avf formed in July - nearing need to start dialysis but has not had a duplex scan. Clinically avf slow to mature. \.br\Patient has OPA at Kings on 8/11 and 17/11 - would appreciate if he can be accomodated on one of these days. Thanks
Specific question to be answered: Please assess avf post formation - thanks

US Doppler for dialysis access VERIFIED Attended-08-Nov-2022 WALCT/WALCT-08-Nov-2022

Dialysis fistula duplex

AV fistula location:	RA	**Right arm**
Type of AV fistula:	S	**See comments**
Estimated flow into AV fistula:	175	**ml/min**
Diameter of Vein	2	**mm**
Outcome:	R	**Red**

Comments:

Arterial inflow:
High level brachial bifurcation, volume flow is measured near armpit level.
Triphasic pulsatile flow in the brachial artery suggestive of outflow obstruction.

Venous outflow:
Ulnar-cephalic anastomosis is patent.

There is a series of 3 >75% stenoses in the cephalic vein at elbow crease level. The first appears to be a ?valve cusp. Beyond this, the cephalic vein reduces to 2mm calibre and remains so throughout the upper arm.

Central veins patent.

Comments:
Patient attending clinic following the scan.

17. Fistula

REPORT E-75412110 VERIFIED Attended-08-Nov-2022 WALCT/WALCT-08-Nov-2022

Clinical History :
Clinical details: AKKC patient - had left r/c avf formed early June - scanned on 5/8 - good blood flow volume, no stenosis but small diameter- clinically avf working but CV diameter remains small clinically. Need for scan discussed and agreed with Ben to happen on 8/11 at 4:30pm. Patien happy to attend.
Specific question to be answered: Please reassess avf blood flow, ?any stenosis ?any tributary vein(s) preventing full CV maturation - thanks

US Doppler for dialysis access VERIFIED Attended-08-Nov-2022 WALCT/WALCT-08-Nov-2022

Dialysis fistula duplex

AV fistula location:	LA	**Left arm**
Type of AV fistula:	RC	**Radiocephalic**
Estimated flow into AV fistula:	800	**ml/min**
Diameter of Vein	0	**mm**
Outcome:	A	**Amber**

Comments:

Arterial inflow:
There is no evidence of inflow stenosis.

Venous outflow:
Anastomosis is patent with no evidence of stenosis.
Cephalic vein is patent throughout with no significant stenoses.

In the forearm there are two tandem velocity increases which correspond to calibre changes at the level of branches of the cephalic vein (distal 2.6x PSV increase, 5.2mm to 3mm calibre change; mid 2x PSV increase, 4.6mm to 3mm calibre change). 4.6mm calibre cephalic vein in the proximal forearm.

In the upper arm the cephalic vein measures 5.7mm, 8.6mm depth.
Outflow is also via the basilic vein at ACF.

Central veins patent.

18. Single-leg arterial

REPORT E-75397042 VERIFIED Attended-08-Nov-2022 WALCT/WALCT-08-Nov-2022

Clinical History :
Clinical details: had right CFA and proximal SFA endarterectomy . + hallux amputation. wound now is static
Specific question to be answered: please recan right leg + flwo to foot level to check if patient will need further revascularization

US Doppler lower limb arteries Rt VERIFIED Attended-08-Nov-2022 WALCT/WALCT-08-Nov-2022

AN ADDENDUM HAS BEEN ENTERED AT THE END OF THIS REPORT
RIGHT:
See diagram on Sectra.

Proximal SFA occlusion.
Multiple SFA and PopA stenoses.
Crural disease.

PeroA appears patent from prox-mid calf to distal calf, however limited views due to calcification, unable to rule out short occlusion or further stenoses. Small calibre 1.8mm distally.

Unable to scan entire length of DPA or plantar arteries due to extensive foot dressings. Where seen the proximal DPA is patent with monophasic severely damped flow.

ADDENDUM START by WALCOTT-DHAINY Tamara 08-Nov-2022 14:38
2.5cm stump of SFA.

19. Fistula

REPORT E-75308172 VERIFIED Attended-07-Nov-2022 WALCT/WALCT-07-Nov-2022

Clinical History :
Clinical details: Has a Left BC AVF with recurrent central vein stenosis with left arm, neck swelling, Had central fistuloplasty and central brachio-cephalic stent insertion on 1/9/22 and 7/9/22. Due follow up review please
Specific question to be answered: Please assess if central vein stenosis has resolved-Thanks

US Doppler for dialysis access VERIFIED Attended-07-Nov-2022 WALCT/WALCT-07-Nov-2022

Dialysis fistula duplex

AV fistula location:	LA	**Left arm**
Type of AV fistula:	BC	**Brachiocephalic**
Estimated flow into AV fistula:	1450-1650	**ml/min**
Diameter of Vein	33	**mm**
Outcome:	A	**Amber**

Comments:

Arterial inflow:
No evidence of inflow stenosis.

Venous outflow:
Anastomosis is patent.
Cephalic vein is calcified just above the anastomosis with a 2x velocity increase, however visually appears ~30% stenosis. 50-75% stenosis in distal upper arm cephalic vein, just below the level of the lowest aneurysmal segment.

Remainder of the cephalic vein is widely patent and aneurysmal in the distal (33mm) and mid (25mm) segments. The proximal cephalic vein is only 3.6mm deep and 7mm calibre, ?suitable for needling.
?minor partial thrombus adhered to the anterior wall in the cephalic vein at armpit level. This is not haemodynamically significant.

IJV chronically thrombosed (near-occlusive).
Unable to clearly visualise the stented brachiocephalic due to depth and proximity to clavicle bone. Unable to comment on presence of residual thrombus. Raised velocities seen (PSV 1.4m/s) consistent with residual stenosis as per venogram report. Subclavian and axillary veins are patent with antegrade flow. Collateral vein also seen feeding flow into the BCV.

20. Upper limb arterial

Clinical details: CPE +VE in side room -swollen R forearm -ITU stepdown, art line side -Allen's positive -no evidence of infection
Specific question to be answered: ?arterial/venous thrombus

US Doppler artery map upper limb Rt — VERIFIED — Attended-03-Nov-2022 — WALCT/WALCT-03-Nov-2022

Upper limb arteries (RT)

	RIGHT	
		mmHg
Upper Limb Artery Waveforms		
Subclavian artery:	TP	Triphasic pulsatile
Axillary artery:	TP	Triphasic pulsatile
Brachial artery:	TP	Triphasic pulsatile
Ulnar artery:	TP	Triphasic pulsatile
Radial artery:	TP	Triphasic pulsatile
Thoracic Outlet Manoeuvres		
Adson's manoeuvre:	-	----------
Costoclavicular:	-	----------
Hyper-abduction:	-	----------

Comments:

Comments:

RIGHT:

There is occlusive thrombus in the radial artery in the mid forearm ~2cm length. Retrograde flow reconstitutes below this down to wrist level. There is also partial thrombus throughout distal radial artery causing 2x >50% stenoses.

Triphasic pulsatile flow remains in all arteries of the upper arm.

21. EVAR surveillance

REPORT E-74593726 VERIFIED Attended-19-Oct-2022 WALCT/WALCT-19-Oct-2022

Clinical details: EVAR
Specific question to be answered: f-up

US EVAR Surveillance VERIFIED Attended-19-Oct-2022 WALCT/WALCT-19-Oct-2022

The bi-iliac EVAR graft is patent. The aneurysm sac measures 9.9 cm in today's scan (1.5cm increase since previous scan)from left oblique scanning approach.
Previously documented endoleak at the proximal end was not clearly seen in today's scan, nor was any other obvious endoleak identified, however given the large increase in sac size it is likely that there is an unseen leak.

Good triphasic pulsatile flow noted in the EIA bilaterally.

CONCLUSION:
Increased SAC size. Likely endoleak.
Results discussed with vascular reg, confirmed patient can go home and will be re-assessed.

22. Fistula

REPORT E-75267997 VERIFIED Attended-01-Nov-2022 WALCT/WALCT-01-Nov-2022

Clinical History :
Clinical details: HD patient who had l b/c avf formed in June/08 followed by plasty in Jan/22. Another plasty done on 17/8 due to reduction in flow. Please due access review with duplex scan please
Specific question to be answered: Please assess flow and patency

US Doppler for dialysis access VERIFIED Attended-01-Nov-2022 WALCT/WALCT-01-Nov-2022

Dialysis fistula duplex

AV fistula location:	LA	**Left arm**
Type of AV fistula:	BC	**Brachiocephalic**
Estimated flow into AV fistula:	1500-1600	**ml/min**
Diameter of Vein	11	**mm**
Outcome:	A	**Amber**

Comments:

Arterial inflow:
No evidence of inflow stenosis.

Venous outflow:
Anastomosis is patent with no evidence of stenosis.

Cephalic vein is tortuous and patent throughout, typically 8-11mm.
2x velocity increase in the mid humerus due to calibre change (17mm to 7mm).
Residual 50-75% stenosis at cephalic vein insertion (previously >75%).

Central veins are patent.

Comments:
Largely improved flow volume post-plasty.
Patient sent to clinic after scan.

23. Fistula

REPORT E-75247830 VERIFIED Attended-27-Oct-2022 WALCT/WALCT-27-Oct-2022

Clinical History :
Clinical details: Underwent complex fistuloplasty/venoplasty on right bvt fistula - due review in clinic
Specific question to be answered: Please re-assess avf post intervention - thanks

US Doppler for dialysis access VERIFIED Attended-27-Oct-2022 WALCT/WALCT-27-Oct-2022

Dialysis fistula duplex

AV fistula location:	RA	**Right arm**
Type of AV fistula:	BB	**Brachiobasilic**
Estimated flow into AV fistula:	1200-1600	**ml/min**
Diameter of Vein	18	**mm**
Outcome:	A	**Amber**

Comments:

Arterial inflow:
Brachial artery is diffusely calcified and tortuous. No evidence of focal inflow stenosis.
Turbulent flow throughout the brachial artery resulting in a large range of volume flow measurements.

Venous outflow:
Anastomosis is patent with no evidence of significant stenosis.

Basilic vein is diffusely heavily calcified causing limited views along its length. Variable diameter 9-18mm.
Known patent pseudoaneurysm arising from the basilic vein in the distal upper arm (at the site of the lowest aneurysm), measuring 24mm x 16mm in diameter.
Known ?dissection in the basilic vein just above the pseudoaneurysm causing raised velocities, PSV ~5 m/s. Unable to obtain PSV ratio due to proximally raised velocities.
75% stenosis in the prox-mid upper arm basilic vein.

Axillary, subclavian and distal brachiocephalic veins are patent; IJV is chronically occluded.

Comments:
Patient attending renal outpatients following the scan.

24. Single-leg segment

REPORT E-75411997 VERIFIED Attended-26-Oct-2022 WALCT/WALCT-26-Oct-2022

Clinical History :
Clinical details: PFO closure 22/10/22. Access via R femoral vein. Presents to A&E (currently in AMA) with severe R groin pain. Very tender, not overtly a haematoma. Need to rule out aneurysm / pseudoaneurysm
Specific question to be answered: ?aneurysm / pseudoaneurysm

US Dx pseudoaneurysm no compression Rt VERIFIED Attended-26-Oct-2022 WALCT/WALCT-26-Oct-2022

RIGHT:
No evidence of pseudoaneurysm or AVF.
The distal EIA, CFA, proximal ProfA and proximal SFA are patent with normal triphasic pulsatile flow.
The distal EIV, CFV, proximal ProfV and proximal FV are patent with normal phasic flow in colour and Doppler waveforms.
Patient unable to tolerate compression due to pain.

Note: hyperechoic areas seen in the right groin, ?enlarged lymph nodes ?fluid collection. This will require alternative imaging if diagnosis is needed as this is outside of the scope of vascular.

25. Graft surveillance

REPORT E-75325230 VERIFIED Attended-25-Oct-2022 WALCT/WALCT-25-Oct-2022

Clinical History :
Clinical details: aorto bi fem
Specific question to be answered: f-up

US Graft Crossover or Extra-Anatomical VERIFIED Attended-25-Oct-2022 WALCT/WALCT-25-Oct-2022

Bypass graft follow-up

	F/U interval:	>4YRS	Location: AORTO-BIFEM	Type:	PTFE
Best Resting Ankle Pressure		mmHg			
Brachial systolic Pressure:		mmHg			
ABPI:		mmHg			
ABPI Not Measured					

Comments:

Inflow:
The abdominal aorta is patent with no evidence of stenosis.

Proximal Anastomosis:
Patent with no evidence of stenosis.

Graft:
Both limbs of the graft are patent with triphasic flow detected, PSV typically 0.6-0.8 m/s left; 1.0-1.6m/s right.

Distal Anastomoses:
Patent with no evidence of stenosis bilaterally.

Run-Off:
Bilaterally SFA and PopA patent with triphasic pulsatile flow.
50-75% stenosis in proximal right ProfA.

Bilaterally DPAs and distal PTAs patent with triphasic pulsatile flow.
R DPA ABPI 146/154=0.9
R PTA ABPI 120/154=0.8
L DPA ABPI 146/154=0.9
R PTA ABPI 140/154=0.9

Comments:

LOWER LIMB ARTERIAL PROTOCOL

Introduction and scope:

Duplex scanning can identify site, severity and extent of lower limb arterial disease. It is valuable in identifying lesions which can be treated with percutaneous transluminal angioplasty. The scan is also used for planning surgical intervention.

Referral criteria:

Referrals can be accepted from vascular surgeons and the diabetic foot team for patients with clinically appropriate symptoms of lower limb arterial disease. Referrals can also be accepted from other departments if a poor ABPI result indicates arterial disease and it is likely that the patient will need arterial intervention.

Responsibilities:

Test staff: scientific or technical staff trained in vascular duplex scanning.

Equipment:

Duplex scanner with 2, 3.5, 5 and 7 MHz transducer.

Method:

Examination protocol:

The examination can cover the arterial supply to the lower limb from the abdominal aorta to the pedal arteries, or just a specific region of interest.
Perform the examination in a longitudinal plane with colour Doppler, identifying any regions of disease.

If the patient is a new referral the scan should commence at the level of the abdominal aorta (in order to check for aneurysmal disease). If the patient has had previous imaging of the abdominal vessels the examination can begin by taking a waveform in the common femoral artery, if this is triphasic there is no need to scan the iliac arteries.

Take representative waveforms and images in the common femoral, superficial femoral and the profunda femoral arteries. Move distally down the leg to the distal popliteal artery, noting any disease. If a significant lesion has been found proximally, take ankle waveforms in the PTA, peroneal and ATA arteries. If no significant lesion has been found the crural vessels (TPT, PTA, ATA and peroneal artery) may be scanned in full if clinically indicated.

If a haemodynamically significant (≥2x PSV increase) lesion is suspected, examine the area in detail with spectral Doppler. Where possible use an angle ≤60°. Record velocities proximal to and at the site of the stenosis and document the anatomical location of any haemodynamically significant lesion identified.

If an occlusion is identified record the site of the occlusion and level of reconstitution of the vessel. Document presence of collateral vessels where seen.

Pedal arteries:
The pedal arteries can be examined for the presence of disease, also the consultant may request the pedal arteries be examined for planning surgical intervention (distal bypass). In instances where the patient presents with a foot ulcer and normal flow to the crural vessels the pedal arteries should also be assessed. A high frequency linear array transducer should be used. The scan should include the distal ATA, the DPA, distal PTA, and medial and lateral plantar arteries. Take representative images of each vessel and waveform, and also measure the diameter of the vessel where patent.

Popliteal entrapment:
Where popliteal artery entrapment is suspected the popliteal artery should be interrogated as follows: With the patient in a normal standing position examine the popliteal artery and assess waveforms. The vessel should then be examined in active plantar flexion, this is achieved with the patient pushing up onto 'tip-toe' position. Assess the popliteal artery during plantar flexion examining for increased velocities/stenosis or cessation of flow/occlusion of the vessel.
It is important to note that compression of the popliteal artery is also seen in normal subjects, therefore the presence of this is not confirmation of popliteal entrapment however the absence of compression could exclude the condition.

Reporting
Any areas of stenosis should be reported along with their velocity increase and anatomical location. The site of any occlusive disease and level of reconstitution of the vessel. Representative waveforms from all arteries scanned should also be reported.
The site and diameter of any aneurysmal disease should be reported.
Any anatomical variations should also be described.

Where pedal arteries have been assessed the patency, waveform and diameter of the vessels should be reported.

When the patient has been examined for popliteal artery entrapment the appearance of the vessel and waveforms when relaxed and during plantar flexion should be commented on.

All reports are completed on the CRIS system.
Where it aids clarity and understanding, the written report should be augmented with a diagram completed on the lower limb arterial template (VAS-FRM-7); diagrams are scanned into the PACS system, and this noted in the written report.

In the event of acute onset, critical limb ischaemia and/or aneurysmal disease the vascular team should be informed immediately.

Table 1. Criteria for lower limb artery duplex assessment.

PSV ratio	% Stenosis
< 2	< 50
2	50
4	75
Numerous lesions without any alteration in PSV ratio or with PSV ratio < 2	Diffuse disease
Absence of flow	Occluded

Images:

- Abdominal aorta with maximum diameter (if part of scan).
- Representative waveforms (if patent) from
    - CFA with velocity.
    - SFA (proximal, mid and distal) with velocity.
    - PFA origin
    - Popliteal (proximal, mid and distal) with velocity.
    - PTA, ATA and Peroneal arteries, with velocity.
    - Pedal vessels (where required), with waveform and diameter.
- Areas of stenosis and/or occlusion described in report.
- Areas of aneurysm with diameter measurement.

Inspection criteria:
Complete CRIS database patient tested / DNA / rebooked.

References:
SVT guidelines:
https://www.svtgbi.org.uk/media/resources/Arterial_PPG_-_new_format.pdf

NICE Guideline CG147 (December 2020) Lower limb peripheral arterial disease: diagnosis and management

Vascular Ultrasound, How, Why and When; 3rd Edition, A Thrush and T Hartshorne pg 117-140

UPPER LIMB ARTERIAL PROTOCOL

Introduction and Scope:

Duplex scanning of the upper limb can be used to identify stenosis/aneurysms/dissection/occlusions in patients with suspected upper limb ischaemia +/- suspected thoracic outlet syndrome. Duplex scanning of the upper extremity arteries can also be used in conjunction with Raynaud's testing.
Digital artery lesions are commonly associated with more proximal disease; therefore, all arteries should be examined on the upper limb(s) of interest. On the right the innominate artery to the distal radial and ulnar and on the left the subclavian to distal radial and ulnar should be examined.

Responsibilities:

Test Staff: scientific or technical staff trained in vascular ultrasound.

Equipment:

Duplex scanner with a selection of transducers as appropriate.

Method:

The innominate artery, the subclavian artery (if possible at the origin on the left from the aorta, and the origin on the right from the innominate), axillary artery, brachial artery and the radial and ulnar arteries are examined for narrowing/stenosis or aneurysmal disease. Waveforms in each segment should be noted and stenotic PSV ratios recorded from regions of disease. Any dilatation should be measured.

If thoracic outlet syndrome is suspected, investigate the brachial and subclavian artery flow with the same arm in extreme positions, that provoke symptoms. In some positions it may be difficult to observe the subclavian artery in which case the brachial artery should be examined for changes in the arterial waveform.
Commonly used manoeuvres include:

1) Adsons
Whilst observing the brachial or axillary artery waveform the patient takes in a deep breath and holds it, hyperextends his neck and turns his head towards the affected side and then away from the affected side.

2) Costoclavicular
Whilst observing the brachial or axillary artery waveform the patient is asked to perform the military position, taking a deep breath, holding it while pushing the shoulders back and chest out.

3) Hyperabduction

The brachial or axillary artery waveform is observed with the arm in its resting position. The arm is then fully hyperabducted to 180^{o} the patient should be breathing deeply throughout hyper abduction. Observe the artery with the hand in both the externally rotated and not externally rotated.

If the above manoeuvres are used the patent should be sitting with their arms either side of their thorax, however positions the patients describes to bring on symptoms should be tested.

With any arm manoeuvre, the dampening or obliteration of the arterial waveform indicates a positive result.

Images:

If normal, image and waveform in innominate, subclavian, axillary, brachial, radial and ulnar arteries.
If abnormal the site of any disease and appropriate measurement ie PSV at and proximal to stenosis, diameter of aneurysmal disease, dissection, and occluded segment with waveform proximal and distal.
If positive for TOS, waveform (or absence of flow) shown in subclavian or brachial artery.

Reporting:

The results are recorded on the CRIS system. If the patient has been referred from another hospital, the results are posted appropriately.
In the case of acute disease and/or critical ischemia the vascular team should be contacted directly.

Inspection criteria:

Complete CRIS database patient tested / DNA / rebooked.

Reference:

Zweibel WJ: Introduction to Vascular Ultrasonography. 3rd Edition. WB Saunders Philadelphia 1992

Last Reviewed:
25/08/2009 AQ
15/03/2011 AQ
12/5/2014 HD

GRAFT SURVEILLANCE PROTOCOL

Introduction and scope:

Patients with lower limb ischaemia often require arterial bypass surgery to improve blood flow to the affected limb. Bypass grafts can be constructed from native vein or from synthetic materials. Failure of a bypass graft due to the development of stenosis is a serious complication and patients are placed under graft surveillance and scanned at regular intervals for the first 12 months following surgery. Graft surveillance scans assess for graft stenoses and stenoses affecting the inflow and outflow, which can put the graft at risk of occlusion, allowing intervention (angioplasty or revision) to be carried out.

Responsibilities:

Test staff: scientific or technical staff.

Equipment:

Duplex scanner, linear and curvilinear array transducer blood pressure cuff and sphygmomanometer.

Method:

Examination protocol:

Begin the examination by scanning the inflow vessels to the graft. This examination begins at the common femoral artery however if graft is more proximal or proximal disease is suspected from the CFA waveform the iliac segment should also be assessed. The vessels are examined in longitudinal plane with colour Doppler. Identify and record areas of disease with colour and Spectral Doppler. The following information should be recorded:

- Waveforms from inflow vessels.
- Patency of graft anastomoses. Velocity increases at the anastomoses are recorded.
- Graft flow waveform and typical PSV. If the PSV is variable throughout the graft, typical values proximally and distally can be recorded.
- Run-off waveform and waveforms at ankle level. For ultra-distal bypasses waveforms and velocities at the level of plantar arteries should be recorded.

At the post-operative scan it may occasionally be difficult to assess/identify the graft – in these instances it is recommended that the examiner check the operation notes on EPR to ensure the correct site is being investigated.

ABPI should be recorded after the duplex scan unless the arteries are known to be calcified, or there are extensive dressings/wounds. ABPIS are not taken from distal or ultra-distal grafts where the cuff inflation would occlude the graft. Treadmill testing

is not routinely performed.

Post-operative duplex should be carried out within one week of the operation. It is the responsibility of the vascular surgery team to request the first postoperative duplex. However, it is the Vascular Laboratory's responsibility to book formal surveillance after this. Subsequent scans are performed at 1, 3, 6, 9, and 12 months post procedure. If intervention is performed on the graft, its inflow or outflow, surveillance should be restarted with scans performed at the same time intervals post-procedure.

The next graft surveillance scan should be booked before the patient leaves the laboratory, unless a stenosis is found in the graft. If there is any significant deterioration which could indicate a graft at risk (eg. 4x velocity increase in the graft, ABPI decrease of >0.15, or graft flow below 0.4m/s as a new finding) or other abnormality scanned, the scientist conducting the scan should contact the vascular surgery team on the day.

Images:

- Inflow vessel waveform
- Image and waveform of proximal anastomosis.
- Flow waveforms with PSV from the proximal, mid & distal graft.
- Images with PSV of any stenosis.
- Image and waveform of distal anastomosis.
- Waveform from run-off vessels.

Reporting:
Record the findings on the CRIS database.

As noted above, if there is any significant deterioration, or an abnormality scanned, then the results should be reported to the vascular team immediately post scan. The patient should remain in the department for review until the vascular team have been contacted.

If no further follow up is booked this should be stated at the end of the written report with the reason for this.

When a new graft patient is seen the details of this patient should be emailed to the named surveillance co-ordinator so they can be added to the graft surveillance database.

When a patient has completed 12 months of clear graft surveillance an email should be sent to the named surveillance co-ordinator and the consultant, giving the patient details to let them know surveillance is complete.

Inspection Criteria:
Complete CRIS report as appropriate - patient tested/DNA/rebooked.

Excell spreadsheet containing details of all patients currently under graft surveillance

programme should be inspected by named surveillance co-ordinator at least once a month.

References:

1. Surveillance after lower extremity arterial bypass, Perspectives in Vascular Surgery & Endovascular Therapy, 12 2007, vol./is. 19/4(376-83; discussion 384-5), 1531-0035;1521-5768 (2007 Dec) Bandyk DF
2. Criteria for identification of the “at-risk” infrainguinal bypass grafts Eur J Vasc Surg, 8 (1994), pp. 315–319 AH Davies, TR Magee, SGW Tennant, *et al.*
3. “Early detection of saphenous vein arterial bypass graft stenosis by colour-assisted duplex sonography: a prospective study”. Polak, J. Am J Roentgenology (1990); 154 (4): 857-61.

FISTULA SURVEILLANCE PROTOCOL

Introduction and Scope:

The haemodialysis access is assessed for evidence of vascular problems which will compromise successful use of the access site or predict failure. This may be performed if fistula function is inadequate or failing. Patients may be offered ad hoc surveillance as requested by the access team. Patients with a fistula who are not yet on dialysis should also be offered surveillance.

Responsibilities:

Test Staff: scientific or technical staff trained in vascular duplex ultrasound.

Equipment:

Duplex scanner with broadband linear array transducers.

Method:

The entire circuit of the access is investigated as far as possible. Access is usually in the arm by means of a fistula or graft but may be in the thigh by means of a femoral artery to vein graft. Occasionally there are other variations in patients with exhausted vascular access. The arterial supply should be assessed for any severe stenosis (> x 2 increase in peak velocity). Any severe turbulence should be noted. The highest velocity measured at the anastomoses should be recorded. The venous outflow should be examined and any thrombus noted. Venous narrowing should be measured both on B-mode and as a velocity increase measurement. Although criteria for quantifying stenosis are poorly defined a peak velocity in the vein or graft of >4m/s would usually represent a significant stenosis. Volume flow should usually be calculated in the supply artery. Any flow < 600 ml/min in a graft / AVF should be reported as a cause for concern.

If aneurysmal dilatation is seen the largest diameter of the aneurysm should be recorded as well as the typical diameter.

Reporting:

A summary of flow, velocities, and evidence of stenosis or thrombus is reported on the CRIS system, and if relevant make comparisons to previous scans.

If flows fall to <600ml/min, or there is a drop of flow by 20% from the previous scan with an absolute flow estimate of <1000ml/min, the vascular access team should be contacted.

Typical diameter of the outflow vein should always be reported.

The findings are assigned categories; green, amber or red which refer to the condition and function of the fistula. Those which have reduced in flow volume to the degree stated above should be assigned red, those with functional volume flow but with stenosis etc identified but no significant change from previous assessments assigned amber, and those with no issues assigned green.

Surveillance for fistulae / grafts that are not in use:
Fistulas and grafts should be scanned 6 weeks post formation to assess maturation. It is the responsibility of the vascular access team to arrange the first scan and then request subsequent scans stating required interval.

Patients already on dialysis with a new fistula / graft:
Most new fistulae are scanned at 6 weeks post creation, at the request of the referring team. Further assessments, for example where there is deteriorating function of a fistula, are at the request of the vascular access team.

Interventions on fistulae / grafts
For patients undergoing fistuloplasty or other intervention, a 6 week post procedural scan should be requested by the referring team.

Images:

- At least 3 representative flow volumes, labelled with the vessel they were obtained from.
- Anastomotic velocity.
- Velocities in any areas of stenosis.
- Images of relevant other pathology reported on.
- Outflow vein diameter measurement

Inspection Criteria:
Complete report on CRIS system.

References:

Zweibel WJ: Introduction to Vascular Ultrasonography. 3rd Edition. WBSaunders Philadelphia 1992

Benjamin Freedman and Colin Deane, Ultrasound, May 1, 2005; vol. 13, 2. Pp. 86-92

RENAL ARTERY PROTOCOL

Introduction and Scope:

The kidneys are investigated to assess renal blood flow. Measurements and observations are made to assess the quality of perfusion, and to test for evidence of renal artery stenosis, renal vein thrombosis, arteriovenous fistulae (normally post biopsy) or aortic aneurysm affecting the renal arteries. Renal artery stenosis (RAS) can lead to reno-vascular hypertension and renal failure. RAS can be treated by angioplasty, stenting or surgery.

Responsibilities:

Test staff: scientific or technical staff trained in vascular duplex ultrasound.

Equipment:

High performance duplex scanner with low frequency curvilinear or phased array transducer.

Method:

Test Protocol

The test should begin with assessment of the abdominal aorta and renal artery origins, this is examined with the patient supine however in cases where patient body habitus or bowel gas restricts view the full scan can be carried out with the patient lying on their side (lateral decubitus). The abdominal aorta should be examined for the presence of aneurysmal disease and the maximum diameter of the aorta should be recorded as well as PSV in the abdominal aorta. The renal artery origins can also often be identified in this view and should be assessed for stenosis, images should be obtained where possible with recording of PSV.

With the patient lying on their side (lateral decubitus) examine the kidneys. Measure the length of the kidney. Examine the colour flow image to look for flow throughout the kidney. Any abnormalities (no flow in a region, A-V fistula at a location) should be investigated. Resistive index (RI) measurements of flow waveform should be taken in upper, mid and lower pole levels. Normal RI range is from 0.5 to 0.65 in young patients rising to 0.7 with age. RIs > 0.7 show elevated renovascular resistance, > 0.8 markedly raised resistance, and RI = 1 shows very high resistance. Markedly low velocities throughout the kidney should be noted.

The renal arteries should be investigated along their length for evidence of stenosis and PSV recorded. Atherosclerotic stenosis occurs most commonly at the ostium, fibromuscular dysplasia stenoses occur more distally. A peak systolic velocity of > 1.8 m/s is indicative of a stenosis as are increases of velocity of 1.5 times or a renal artery:aorta velocity ratio (RAR) of >3.5. The main renal artery should be imaged

and insonated along its whole length, where possible. If two renal arteries are seen, record this and insonate both.

Low RIs and the appearance of low acceleration in a kidney should be regarded as indicative of possible renal artery stenosis.

The renal vein can also be directly assessed with colour and spectral Doppler, renal vein thrombosis is usually evident as an absence of intra-renal venous signals.

In the presence of renal artery stenosis the waveforms in the distal EIA/proximal CFA should be assessed and any iliac disease investigated to ensure patency in case of angioplasty.

Reporting

The report should contain:
The length of the kidneys (and any obvious B-mode abnormalities). A description of the intrarenal flow including RIs and a brief interpretation of their value (for example "high RIs indicative of increased renovascular resistance"). Peak systolic velocities of the main R and L renal arteries should be noted with a statement saying whether this is indicative of a stenosis and how much of the renal arteries was visible. Any accessory renal arteries seen should be noted.

The patency of the renal veins should also be reported.

The maximum diameter of the abdominal aorta and the peak systolic velocity within the abdominal aorta should be reported, as well as any other vascular abnormality e.g. aortic atherosclerotic disease.

The results are recorded on the CRIS system. If the patient has been referred from another hospital, the results are posted appropriately.

Images

- Length of right and left kidney
- RI measurements at upper, mid and lower poles
- PSV in right and left renal artery
- Aortic diameter
- PSV in aorta

Inspection Criteria:

Complete CRIS database patient tested/DNA/rebooked.

References:

Zweibel WJ: Introduction to Vascular Ultrasonography, 4th Edition WM Suanders, 2000

Deane CR. Duplex ultrasound of the native kidney Proceedings of European Vascular Course, Sibiu, Romania 25-26 May 2002

Vascular Laboratory Prcatice IPEM part VI, First edition, 2004 Rachel Norris, David E Goss, Simon T Elliot, 2004

Last rev:
25/02/2014 TC
12/02/2015 HD

AAA SURVEILANCE PROTOCOL

Introduction and scope:

Rupture of Abdominal aortic aneurysms (AAA) can be fatal (30% - 50% mortality on arrival at hospital). Duplex ultrasound is used to image possible AAA, for surveillance at regular intervals of known AAA, and aid the planning of elective surgical or endo-vascular repair, which reduces mortality significantly. Ultrasound is reliable for detecting;

- Presence or absence of AAA
- Size of AAA
- Involvement of major aortic branches
- Presence of thrombus
- Presence of infra-aortic aneurysms (iliac, femoral, or popliteal arteries)

Responsibilities:

Test staff: Scientific or technical staff trained in vascular duplex ultrasound scanning.

Equipment:

Duplex ultrasound scanner usually with a low frequency (2.5-6MHz) phased array or curvilinear array transducer, or other transducers as appropriate.

Examination protocol:

The patient should be supine. The aorta should be imaged using B-mode in transverse and longitudinal sections from the diaphragm to the bifurcation into the iliac arteries. The diameter should be noted at the most proximal location possible, at the level of the mesenteric artery and just proximal to the bifurcation. Measurements should be made in longitudinal section to avoid oblique measurements that overestimate diameter, they should be taken from outer wall to outer wall of the aorta.

When AAA is detected the largest diameter (outer to outer) should be measured from three approaches, sagittal and left and right oblique planes at peak systole, and the largest diameter reported. Images of the maximum diameter should be stored on the PACs system.
The anatomical relation to the renal arteries should be established if possible, by imaging them directly or inferring their location by the origin of the superior mesenteric artery (SMA).

The involvement of the iliac arteries should be investigated and their diameters measured.
Any visualisation of thrombus within the aneurysm should be noted.

On discovery of a new AAA, the common femoral and popliteal arteries should also be examined for aneurysm. Where distal embolisation is suspected, the popliteal and ankle waveforms should be investigated.

AAA criteria:

The abdominal aorta is aneurysmal if the maximum diameter exceeds 3cm or is more than 1.5 times greater than the minimum diameter.
The iliac arteries are aneurysmal if the maximum diameter exceeds 1.5cm or is a greater than 50% dilatation.

Images:

In the absence of aneurysmal disease the following images should be recorded:

- Outer to outer wall longitudinal measurement of the abdominal aorta at most proximal location, level of SMA and just proximal to the bifurcation.
- Maximum diameter of common iliac arteries.

Where aneurysmal disease is identified:

- Outer to outer wall longitudinal measurement of AAA from sagittal and left and right oblique planes.
- Common iliac, common femoral and popliteal arteries with maximum diameter measured.

Reporting:

The report should include:

- **Maximum diameter of the aorta, measurement given should be outer to outer and if not this must be stated on the report.**
- **If it was not possible to image part of, or the entire abdominal aorta, and the reason(s) why**
- **Which approach the measurement has been taken from.**
- **Previous diameter measurement and date of previous assessment.**
- **Statement about renal artery involvement or if it was not possible to tell.**
- **Maximum diameter of iliac arteries, or reason for not imaging them.**
- **Presence or mural thrombus, with an approximation of lumen reduction (%).**
- **Whether there is any focal significant stenosis or occlusion of the imaged arteries.**

If a new AAA and/or iliac, common femoral or popliteal artery aneurysm is discovered, forward patient details to/inform the vascular team.

Inspection criteria:

Complete CRIS report, tested/DNA/rebooked

References:

Cole S E et al. 2001 Vascular laboratory practice. (part 3) IPEM.

Meire H et al Abdominal and General ultrasound. 2001. Churchill livingstone.

Zwiebel W. 1992 Introduction to Vascular Ultrasound (third edition).

Thrush A and Hartshorne T 2010 Vascular Ultrasound (third edition)

Society for vascular ultrasound, 2014. VASCULAR TECHNOLOGY PROFESSIONAL PERFORMANCE GUIDELINES: Abdominal Aortoiliac Duplex Evaluation