



EUROPEAN SOCIETY OF NEUROSONOLOGY
AND CEREBRAL HEMODYNAMICS



5th Congress of the European Academy of Neurology

Oslo, Norway, June 29 - July 2, 2019

Hands-on Course 13

**EAN/ESNCH: Neurosonology - from basics to clinical
applications (Level 1-2)**

**Sonographic features of dissection and
inflammation**

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HOC13: Neurosonology
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Sonographic features of dissection and inflammation

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 universitetssykehus

Conflict of Interest



In relation to this presentation and manuscript:

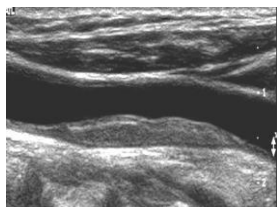
the Author has no conflict of interest in relation to this manuscript.

Content

- Dissection
 - Carotid artery
- Inflammation / Large-vessel vasculitis
 - Takayasu arteritis
 - Giant cell arteritis. Temporal arteritis

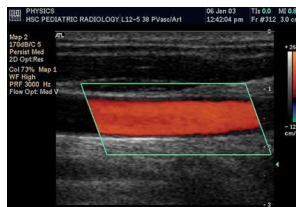
Grey-scale – Colour duplex – Doppler

B-mode/Brightness



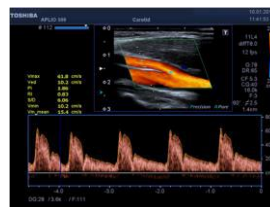
Structures. Vessel wall

Colour-coded duplex
(CCD)



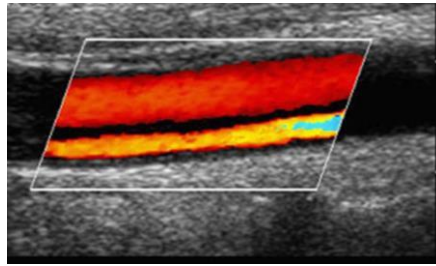
Flow direction

Doppler

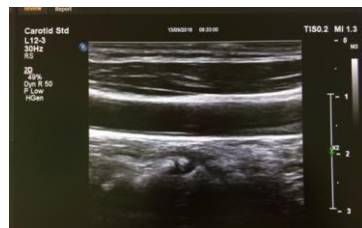
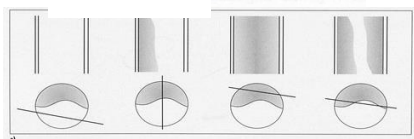
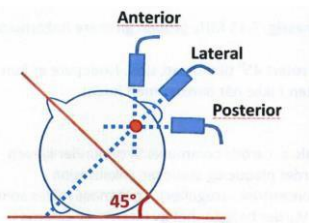


Velocity. Stenosis

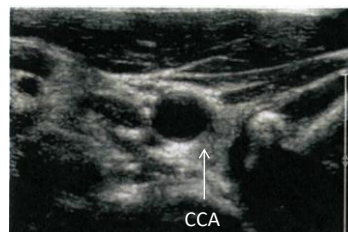
Dissection



Extracranial carotid



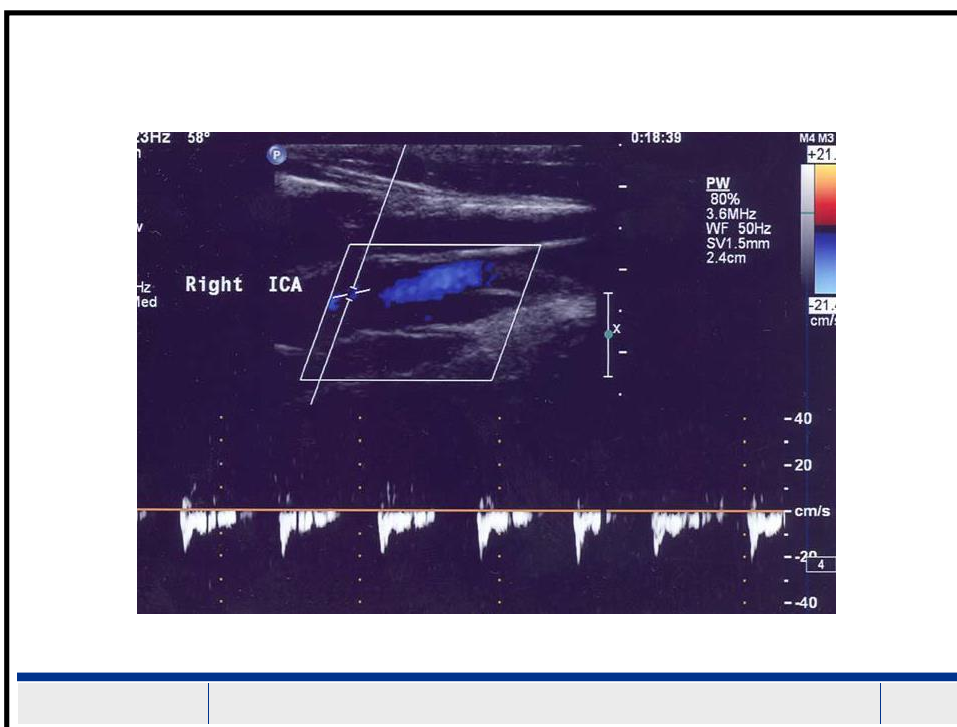
Longitudinal



Transversal

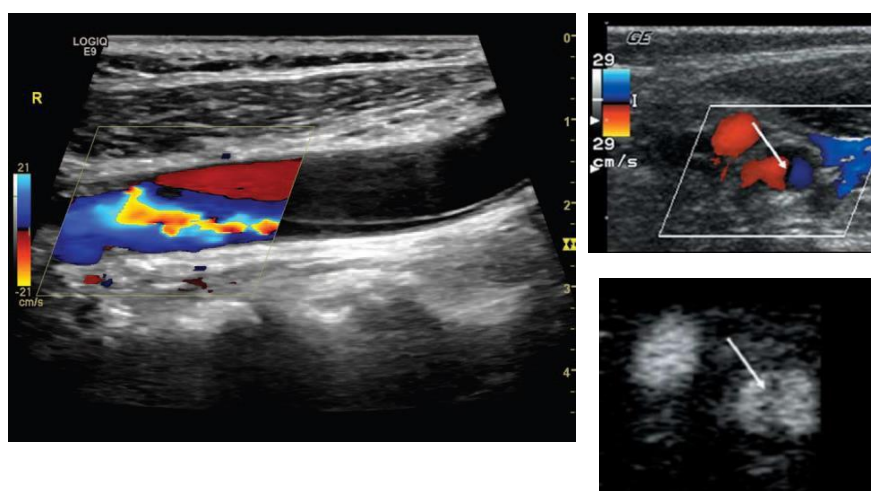
Dissection, ICA





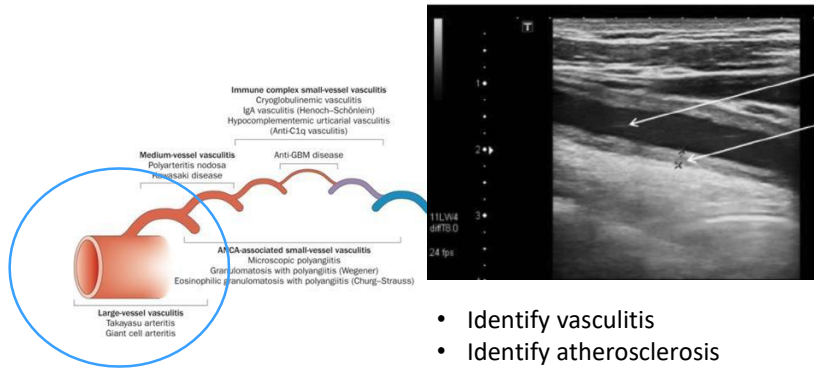
Double-lumen, CCA

CCD: Different direction of blood flow through the true and false lumen



Lijuan et al, Medicine, 2018

Inflammation; Vasculitis



- Identify vasculitis
- Identify atherosclerosis
- Follow-up, disease activity

Jennette et al. Clin Exp Nephrol, Classification vessel involvement, 2013

Vessels to insonate

Takayasu arteritis

- Common carotid (50%)
- Subclavian (90%)
- Vertebral (25%)

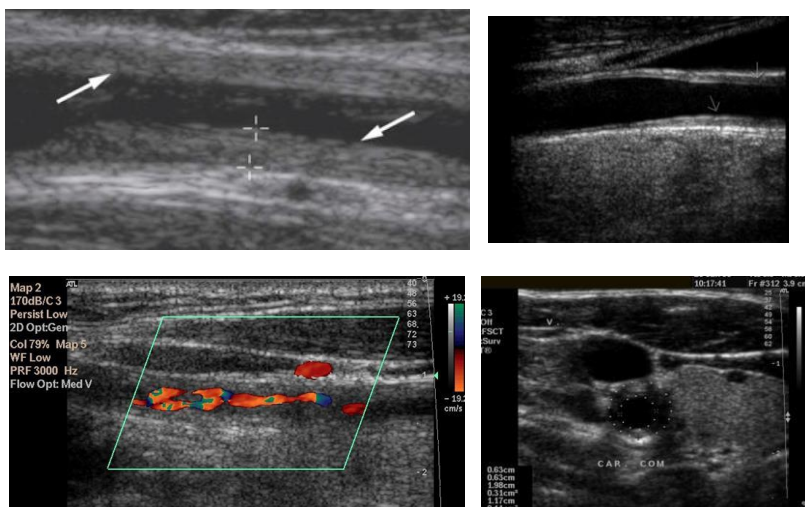
Hypoechoic vessel wall
More echogenic in chronic phase
due to less wall edema

GCA

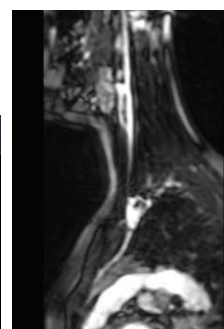
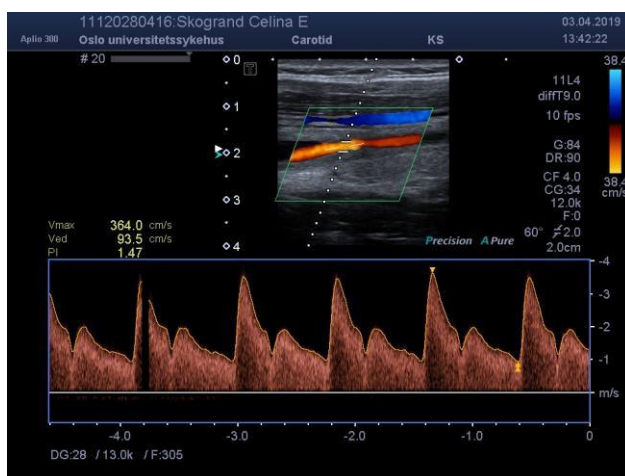
- Temporal
- Subclavian
- Axillar

Hypoechoic vessel wall.
Turbulence. Increased velocities

Takayasu, CCA: Concentric increased wall thickness

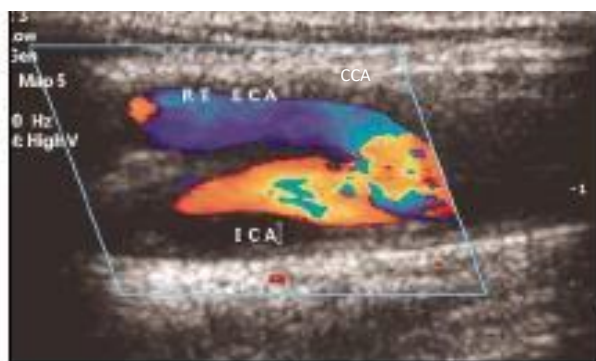


Stenosis/occlusions



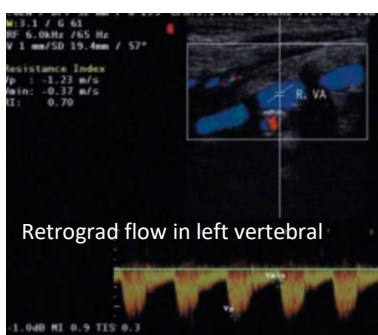
Female,
born 2002,
Takayasu
diagnosed
2019

Flow direction;
External carotid is a collateral for Internal carotid



Reversed flow in externa

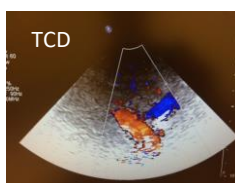
Flow direction. Subclavian steal syndrome



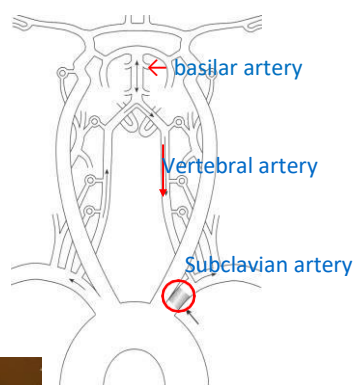
Retrograd flow in left vertebral



Normal antegrade flow



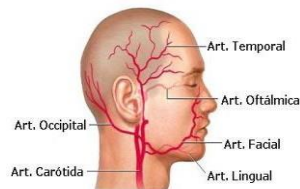
TCD



Ultrasound in Temporal arteritis

Diagnostics; Sensitivity 87%, spesifisity 96 %
Positive histology 80-90%. Ultrasound guided biopsy


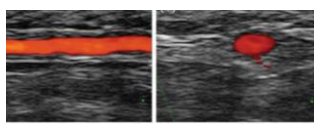
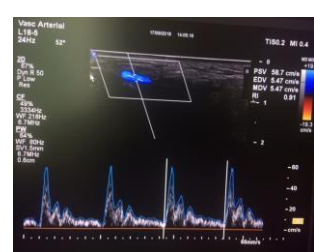
Site	Patients with Temporal Arteritis (N=30)	Patients with Polymyalgia Rheumatica (N=37)	Control Subjects (N=30)
Parietal ramus (15 mm distal to bifurcation)			
Systolic lumen (mm)	0.79±0.29	0.76±0.20	0.89±0.24
Wall (mm)	0.94±0.28*	0.70±0.08	0.72±0.13
Maximal velocity (cm/sec)	52±18	59±14	54±14
Frontal ramus (25 mm distal to bifurcation)			
Systolic lumen (mm)	0.67±0.20	0.66±0.22	0.74±0.24
Wall (mm)	0.95±0.20*	0.66±0.07	0.65±0.13
Maximal velocity (cm/sec)	48±13	53±16	47±15
Frontal ramus (10 mm distal to bifurcation)			
Systolic lumen (mm)	0.74±0.24	0.71±0.17	0.86±0.26
Wall (mm)	0.96±0.22*	0.69±0.09	0.71±0.13
Maximal velocity (cm/sec)	50±14	56±15	48±13
Common superficial temporal artery (8 mm below skin surface)			
Systolic lumen (mm)	1.51±0.44	1.54±0.41	1.70±0.35
Maximal velocity (cm/sec)	62±22	61±16	55±13



Schmidt, New Engl J, 1997

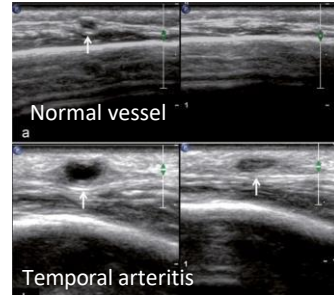
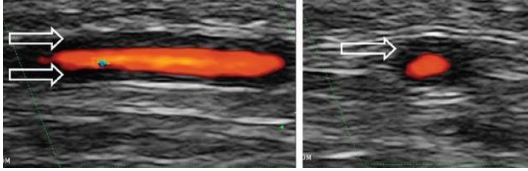
Karassa, Ann Intern Med 2005

Ultrasound normal temporal artery

Longitudinal and transversal plane
Compression test

«Halo sign» & compression test



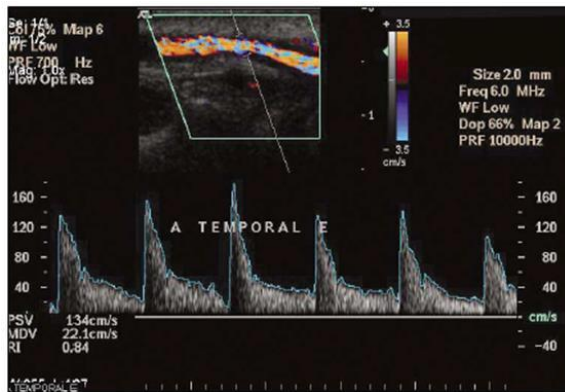
Temporal artery with increased wall thickness

A periluminal hypoechoic halo (arterial wall edema)

Follow response to steroids;

halo will become mild echogenic in about 2 weeks ,
with fibrosis it can become hyperechogenic

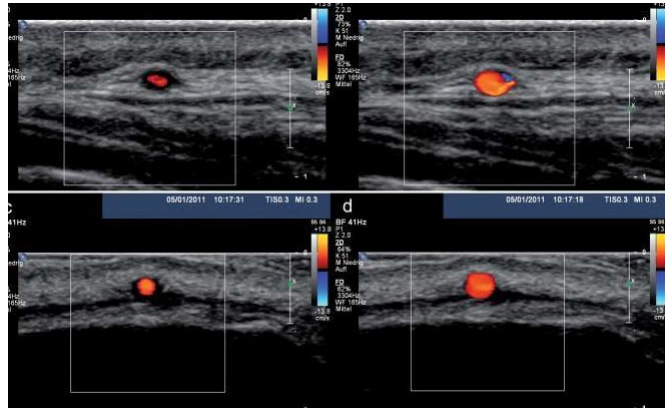
Temporal artery, CCA, Doppler



Segmental arterial stenosis

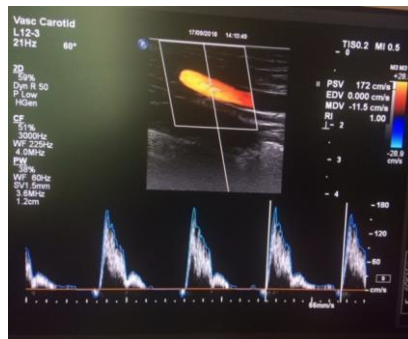
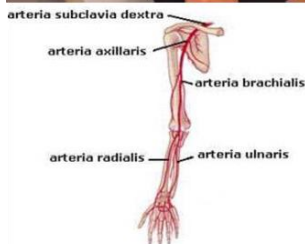
Arterial luminal occlusion in severe cases

Inadequate colour-gain
may impact interpretation when searching for a halo.



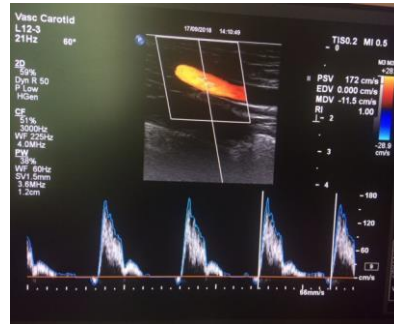
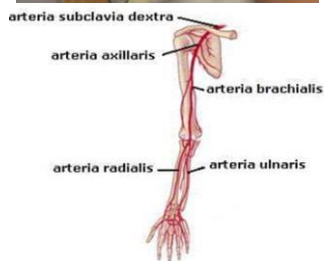
Aschwanden M et al. Temporal Artery Compression... Ultraschall in Med 2013

Ultrasound normal subclavian artery



Longitudinal, transversal plane
B-mode, Colour duplex, doppler

Ultrasound normal axillar artery



- Accessed via the axilla, arm abducted
- Longitudinal plane
- PW Doppler (flow profile, stenosis)

Sonographic protocol Takayasu

Examination of

- Carotid
- Vertebral
- Subclavian
- (Aorta and renal arteries)

- Vessel wall thickness, PSV/EDV, stenosis, occlusions
- Flow directions

Sonographic protocol GCA

Patient in supine position

Examination of:

- Superficial temporal arteries
 - Longitudinal and transversal plane
 - Compression test
- Axillary arteries
 - Accessed via the axilla, arm abducted
 - Longitudinal plane
 - PW Doppler (flow profile, stenosis)
- Carotid and vertebral arteries if neurological/ ocular symptoms

Czihal et al, Vasa 2017

