

Ultrasound in Giant Cell Arteritis

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What is GCA?

Giant Cell Arteritis (GCA), also known as temporal arteritis, is an autoimmune inflammatory disease (form of systematic vasculitis) affecting the main blood vessels in the head and neck region, mainly in adults over the age of 50 [1]. Patients usually present with a headache, severe pain and tenderness around the temple region and jaw. In severe cases, GCA can lead to a stroke or partial or total loss of vision if treatment is delayed [2]. The condition is more prevalent in women of European ancestry and is closely associated with Polymyalgia Rheumatica [3].

GCA Fast Track Approach and the use of Ultrasound

- Recent research has seen new evidence emerge regarding diagnosis and treatment of GCA.
- Fast track pathways are effective in providing rapid access to rheumatology assessment, temporal artery ultrasound or temporal artery biopsy and have led to a decrease in permanent eye loss [4].
- The key to improving outcomes in GCA is prompt diagnosis and treatment.
- Both EULAR (European Alliance of Associations for Rheumatology) and BSR (British Society for Rheumatology) recommend that ultrasound should be used as a first line investigation tool in patients with suspected GCA [1].
- Ultrasound does not use radiation, is non-invasive, repeatable and cost effective when compared to temporal artery biopsy [4].

Ultrasound Equipment and Settings

- Superficial temporal arteries and branches (parietal and frontal): use a linear 15MHz small footprint or hockey stick ultrasound transducer.
- Extra-cranial arteries (i.e. axillary, carotids etc): use a linear transducer (4-13 MHz).
- Use a vascular preset on the ultrasound machine (set for GCA scanning in accordance with BSR/ EULAR guidance) [1,2].

Which vessels should be assessed with ultrasound and how?

- The most commonly involved arteries in GCA include the superficial temporal and axillary arteries. A standard ultrasound protocol should always be performed: 30min scan time is advised [1,5].
- Scan the arteries in both longitudinal and transverse planes, using Doppler and probe compression.
- Extended ultrasound protocol includes assessing the carotid, vertebral, facial and subclavian arteries. Further training may be required to competently scan these vessels [5].
- Patient position- supine or right or left lateral recumbent depending on the side scanning first. Place a pillow underneath the patient's head to ensure appropriate support of the head and neck region.

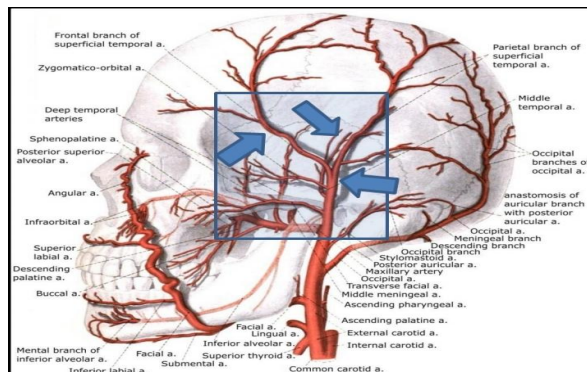


Image 1: Anatomy: The blue arrows indicating the superficial temporal, parietal and frontal artery [1].

Common Symptoms for ultrasound referral

- Visual/ocular disturbance
- Headache
- Tender, thickened, palpable and pulsatile temporal artery
- Scalp tenderness or scalp necrosis
- Jaw or tongue claudication
- Systematic symptoms of weight loss, loss of appetite, sweats, fatigue or malaise.

The criteria for US referral should include direct assessment & referral from a specialist Rheumatology or Ophthalmology clinician in conjunction with the following criteria:

- Elevated CRP (blood sample before starting steroids)
- Age > 50

[1]

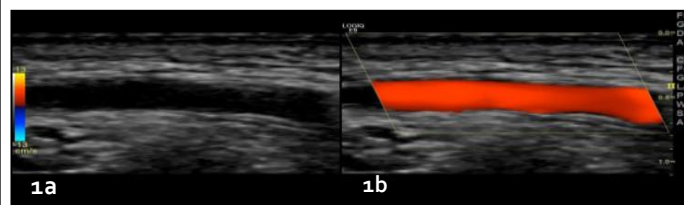


Image 1a: Longitudinal view of normal superficial temporal artery (TA). 1b: Longitudinal view of normal TA with colour Doppler. 1c: Transverse view of normal parietal artery (left). The vessel compresses fully and is non visible (right).

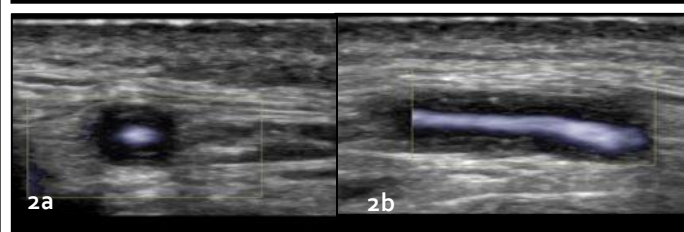
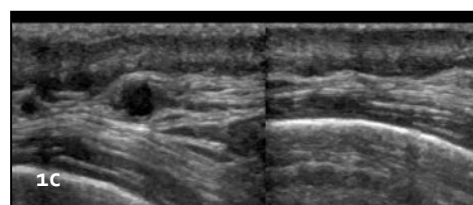
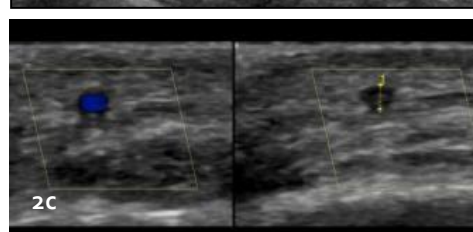


Image 2a: Transverse view of halo in superficial TA. 2b: Longitudinal view of halo in superficial TA [Image 2a and 2b show B-flow Doppler assessment]. 2c: Demonstrates non-compressible halo in superficial TA. TA still visible despite probe compression.



Ultrasound features of GCA

- Halo:** GCA on ultrasound presents as a hypochoic/homogeneous concentric (frequently symmetrical) vessel wall thickening, which can be visible on B-mode, colour and power Doppler ultrasound. Narrowing of the vessel lumen can be observed on Doppler assessment [image 2a,b,c].
- Compression sign:** This is a simple sonographic marker/manoeuvre that can be used to assess the vessel wall. In a normal vessel, the wall should compress and disappear by applying probe pressure [image 1c]. In GCA, the vessel wall remains thickened and resistant to compression (known as positive compression sign) [image 2c]. Refer to BMUS [2021] GCA ultrasound guidance for halo cut off values.
- Axillary arteries:** Normal intima media thickness measures ≤ 1.0 mms [image 3a], abnormal intima media thickness measures ≥ 1.0 mms or above [image 3a].
- Atherosclerosis:** is another pathology seen in vessel walls which can mimic GCA, this also causes wall thickening in vessels. However, this appears asymmetrical, hyperechoic and irregular wall thickening on ultrasound.
- Potential confounders:** Hair at the site of assessment; selecting wrong ultrasound transducer; in males, thicker walls can be observed [1,4,5].

Tips for ultrasound practitioners wanting to learn GCA Ultrasound

- Increase knowledge of GCA: Read around the subject - familiarise yourself with the condition and current guidelines (EULAR, BSR, BMUS etc).
- Seek mentor who has experience in GCA Ultrasound.
- Attend learning events to increase & consolidate knowledge i.e. GCA courses, training days & multidisciplinary team meetings.
- Brush up on the physics of Doppler ultrasound; this will help you to effectively manipulate the machine in order to produce high quality diagnostic images.
- Create a logbook- this will to help you keep a systematic record of the scans you have undertaken and track your progress.
- Obtain feedback from mentor on a regular basis to improve ultrasound technique and develop your reporting skills.
- Practice, Practice and Keep Practicing!

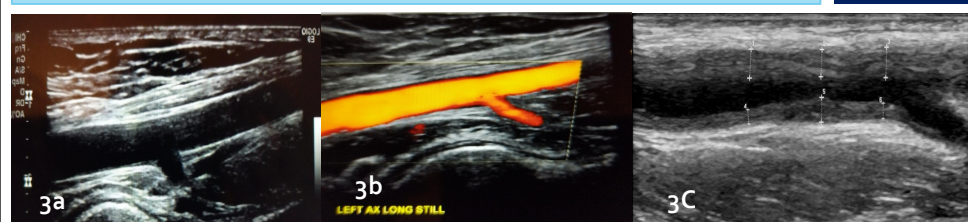


Image 3a: Demonstrating a normal axillary artery (longitudinal view). 3b: Normal axillary artery with Power Doppler assessment. 3c: Abnormally thickened wall (intima media thickness of 1.3mm) with a visible hypochoic halo (calipers demonstrate abnormal wall thickening).

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