



ASUM

Standards of Practice

Promoting ultrasound excellence

Guidelines, Policies and Statements

Statement on Extracranial Cerebrovascular Ultrasound

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1. Introduction

The Australasian Society for Ultrasound in Medicine (ASUM) is a multidisciplinary society whose mission is to advance the clinical practice of diagnostic medical ultrasound for the highest standards of patient care. A primary aim of ASUM is to promote, educate and disseminate standards of ultrasound practice in this continually developing specialty.

2. Instrumentation

Regular equipment maintenance is to be performed on all equipment used for vascular ultrasound.

The duplex Doppler ultrasound machine is used to provide simultaneous or sequential real-time greyscale (B-mode) imaging of the vessel wall and plaque analysis of the angle corrected Doppler frequency spectrum from a selected sample volume within the vessel lumen. As well as the essential characteristics of both B-mode imaging and duplex Doppler spectral analysis for quantification of blood flow velocities (or Doppler frequency shift) the ultrasound machine should have colour Doppler imaging. Colour Doppler provides a qualitative, simultaneous display of flow information superimposed on the real time greyscale image.

2.1. Required characteristics

- Imaging frequencies as specified in anatomic regional sections
- Range-gated Doppler with the ability to adjust the position and size of the range gate/sample volume
- Provision for the measurement and display of the Doppler angle
- Provision of visual and audible output of Doppler signal
- Provision for hard copy or other form or recording

2.2. Specific Characteristics

- Imaging frequencies of 5.0 MHz or greater.
- Doppler frequencies of at least 3.0 MHz.
- Linear array transducer/s.
- Colour Doppler capability

3. Indications and Techniques

3.1. Indications

Cerebrovascular testing shall be done for appropriate indications. These include stroke, transient ischaemic attacks (TIAs), amaurosis fugax, presence of carotid bruit, pre-operative assessment of high-risk patients or post-operative follow-up after carotid endarterectomy or other intervention.

3.2. Techniques

Appropriate techniques shall be used for evaluation of the cerebrovascular circulation.

3.3. Duplex Doppler/Colour Doppler

The course of the CCA, ICA, ECA and vertebral arteries should be evaluated from their origins as far distally as possible. Both sides must be examined. Where possible the origins of the subclavian arteries should also be examined.

Both imaging and Doppler information should be used to identify and evaluate major vessels.

Vessel anatomy and morphology should be documented with high quality imaging.

Using spectral and colour Doppler the haemodynamics of the cervical segments of the carotid and vertebral arteries should be studied and representative waveforms and velocity measurements recorded. Where possible the origins of the subclavian arteries should be studied with Doppler and abnormal haemodynamics recorded. Velocity measurements should be made with a Doppler angle of 60 degrees or less. Areas of suspected stenosis should be examined in the region proximal to the stenosis, at the point of maximum stenosis and distal to the stenosis.

4. Diagnostic Criteria

Accepted diagnostic criteria should be used to assess the presence and severity of pathology in the extracranial cerebrovascular circulation and include assessment of both stenosis and plaque morphology.

The primary purpose of the duplex examination is to determine the presence or absence of disease in the extracranial carotid system, and if disease is present, to document its nature, location, extent and severity.

4.1. Duplex and Colour Doppler

4.1.1. Degree of Stenosis

Vessel haemodynamics are categorized according to the severity of stenosis. Acceptable criteria for classification of stenosis might include application of published reports or the use of internally generated criteria. These criteria are based on multiple parameters such as peak systolic velocity, end-diastolic velocity, and the ratio of peak flow velocity through a stenosis to flow velocity proximal to the stenosis. Whether based on published reports or internally generated data, criteria should ideally be internally validated where possible.

Colour Doppler imaging facilitates the identification of stenotic lesions and the direction of post-stenotic jets and therefore guides the placement of the Doppler range-gate.

4.1.2. Plaque Morphology

B-mode imaging should allow accurate localisation of atherosclerotic plaque and, wherever possible, classify plaque as hypoechoic, homogeneous, heterogeneous or calcific and describe the surface characteristics as smooth or irregular. Colour Doppler imaging and

colour amplitude imaging may assist in the identification of hypoechoic plaque as an intraluminal filling defect.

A detailed description of the diagnostic criteria used for each examination should be able to be provided. This should accompany any charts, graphics or formulae used in the interpretation of the examination results. Specific references, including text or article, author, date, name and volume number of journal, or name of text and publisher should be provided.

Diagnostic criteria that have been developed within the vascular practice or modified from standard published criteria should be internally validated where possible.

5. Summary

Once the clinical indications for the examination have been elicited from the patient and the sonographer has addressed any questions or concerns raised by the patient, the examination can commence after informed consent has been obtained from the patient. A complete and thorough examination should be performed (using the guidelines above) and extended as necessary. Adequate, representative hard copy should be made of all aspects of the examination, including a written worksheet for the reporting physician.