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## KARNATAKA RADIOLOGY EDUCATION PROGRAM

### ULTRASOUND ARTIFACTS

Ultrasound artifacts are commonly encountered and familiarity is necessary to avoid false diagnoses. In some cases, specific artifacts can even offer valuable diagnostic information. For instance, some artifacts may be indicative of certain pathologies. They are not to be confused with ultrasound probe defects, which represent hardware failure.

#### Artifacts

**Acoustic enhancement :** Acoustic enhancement also called posterior enhancement or enhanced through transmission, refers to the increased echoes deep to structures that transmit sound exceptionally well.



**Acoustic shadowing :** Acoustic shadowing (sometimes referred to as posterior acoustic shadowing) is a form of ultrasound artifact. It is characterized by the apparent lack of signal deep to an imaged tissue interface, due to all (or nearly all) of the transmitted sound wave being reflected back to the transducer or absorbed by the tissue. It commonly occurs when an area of interest contains a high Z/solid tissue (e.g. calcified gallstone or bone) or at an interface with high acoustic impedance mismatch (e.g. soft tissue/air).



**Aliasing artifact :** Aliasing is a phenomenon inherent to Doppler modalities which utilize intermittent sampling in which an insufficient sampling rate results in an inability to record direction and velocity accurately

**Anisotropy :** Anisotropy is an artifact encountered in ultrasound, notably in muscles and tendons during a musculoskeletal ultrasound. In musculoskeletal applications, the artifact may prompt an incorrect diagnosis of tendinosis or tendon tear. When the ultrasound beam is incident on a fibrillar structure such as a tendon or a ligament, the organized fibrils may reflect a majority of the insonating sound beam in a direction away from the transducer. When this occurs, the transducer does not receive the returning echo and assumes that the insonated area should be hypoechoic.

**Bayonet artifact :** Bayonet artifact is a type of artifact encountered in ultrasound guided needle techniques, that results in the apparent bending of the needle as it passes into or adjacent to tissue with different sound transmission speeds.

**Beam width artifact :** Ultrasound beam width artifact occurs when a reflective object located beyond the widened ultrasound beam, after the focal zone, creates false detectable echoes that are displayed as overlapping the structure of interest.

**Blooming artifact :** Blooming or color bleed artifact occurs when the color signal indicating blood flow extends beyond its true boundaries, spreading into adjacent regions with no actual flow.

**Color bruit artifact :** The color bruit or tissue vibration artifact is a type of color Doppler ultrasound artifact which results in color signal overflowing to the perivascular tissues most often caused by stenosis, AV fistulas, or shunts. Thus, this artifact is useful by pinpointing areas of potentially pathological blood flow

**Color flash artifact :** The color flash artifact is a commonly encountered artifact on color Doppler ultrasound, representing spurious flow signal arising due to tissue/transducer motion

**Comet tail artifact :** The comet tail artifact is a grey scale ultrasound finding seen when small calcific / crystalline / highly reflective objects are interrogated and is believed to be a special form of reverberation artifact.



**Color comet tail artifact :** The color comet tail artifact is an ultrasonographic sign seen in a number of situations when color Doppler scanning is performed.

**Double aorta artifact :** The double aorta artifact is a relatively common ultrasound artifact, which can appear both on standard B-mode and color Doppler imaging, resulting in an artifactually duplicated abdominal aorta in the transverse plane. Knowledge of this artifact is paramount as potential differential diagnoses include life threatening conditions (e.g. aortic dissection).

**Electrical interference artifact :** Electrical interference artifact is an ultrasound artifact usually caused by the ultrasound machine being too close to the unshielded electrical equipment. The disturbance appears as arc-like moving bands in the ultrasound image

## Hardware-related artifacts

transducer-related artifact

**mirror image artifact :** Mirror image artifact in sonography is seen when there is a highly reflective surface (e.g. diaphragm) in the path of the primary beam.

multipath artifact

**Reverberation artifact** occurs when an ultrasound beam encounters two strong parallel reflectors. When the ultrasound beam reflects back and forth between the reflectors ("reverberates"), the ultrasound transducer interprets the sound waves returning as deeper structures since it took longer for the wave to return to the transducer



**refraction artifact**

**ring down artifact** : Ring down artifact is a special type of resonance artifact. Its appearance is similar to the ladder-like reverberation of comet-tail artifact, but it is produced by a completely different mechanism.

**side lobe artifact**

**speckle artifact** : Speckle artifact may be encountered in ultrasound. It is caused by the scattering of waves from the surface of small structures within a certain tissue. The artifact produces a textured appearance.

**speed displacement artifact**

**twinkling artifact** : Twinkling artifact is seen with color flow Doppler ultrasound 1. It occurs as a focus of alternating colors on Doppler signal behind a reflective object (such as a calculus or air), which gives the appearance of turbulent blood flow 2. It appears with or without an associated color comet tail artifact 3.



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**REF : Christensen's Physics of Diagnostic Radiology, Radiopedia.**