

Ultrasound- Chest Diaphragm

PURPOSE:

To evaluate the movement of the diaphragm for suspicion of diaphragmatic dysfunction.

SCOPE:

Applies to all ultrasound Upper Extremity deep Venous Thrombosis evaluation studies performed at Imaging Services / Radiology

INDICATIONS/CLINICAL PRESENTATIONS:

- Unexplained difficulties in weaning a patient from mechanical ventilation
- Persistent elevated hemidiaphragm on chest radiographs
- Unexplained respiratory distress or dependence on oxygen supplementation
- Signs of respiratory distress
- Asymmetric breathing pattern
- Paradoxical movement of the epigastrium
- Recurrent pneumonia
- Recurrent unilateral lung collapse
- Tachypnea / polypnea

CAUSES OF DIAPHRAGMATIC PARALYSIS:

- Phrenic neuropathy
- Catheter placement
- Birth injury
- Cardiac surgery
- Liver transplantation

CONTRAINDICATIONS:

No absolute contraindications

EQUIPMENT:

A linear array transducer with a frequency range of approximately 9-12 MHz that allows for appropriate penetration of the soft tissue.

PATIENT PREPARATION:

- Patient does not need to be NPO

EXAMINATION:

GENERAL GUIDELINES:

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A complete examination includes evaluation of the bilateral diaphragms in the longitudinal and transverse planes, with B-mode and M-mode.

EXAM INITIATION:

- Introduce yourself to the patient (AIDET)
- Verify patient identify using patient name and DOB
- Explain Test
- Obtain patient history including symptoms. Inquire if the patient has received pain medication.
- Enter and store data page
- Place patient in supine, right lateral decubitus (RLD), and /or left lateral decubitus (LLD).

TECHNIQUE CONSIDERATIONS:

- **Review any prior imaging exams that are available, making note of any abnormalities that require further evaluation.**
- Patient NPO
- Assess for extrinsic factors
 - Mass
 - Pleural effusion
- Correlate with respiration
 - Inspiration occurs after pause
 - Expiration is normally passive, ends with pause, occurs during crying, speaking
- Initial conventional B-mode US:
 - Evaluation of upper quadrants and lower chest in longitudinal and transverse plane
 - Midline transverse subxyphoid plane
 - Symmetry of movement (non-paradoxical)
- M-mode US:
 - Interrogation of each hemidiaphragm in the coronal, anterior or mid-axillary plane, with cranial tilt of transducer
 - M line of sight positioned at maximum excursion
 - Recording of at least 4 respiratory cycles during spontaneous respiration
 - If patient is mechanically ventilated, temporarily disconnect & record in both situations (ventilated and free-breathing)
 - Direction
 - Amplitude of excursion
 - Transition between inspiration and expiration

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B-Mode:

TRANS R DIAPHRAGM X 2 images

LONG R DIAPHRAGM X 2 images

LONG R DIAPHRAGM X 2 CINE (~12 secs)

M-Mode:

LONG R DIAPHRAGM with time difference between inspiration and expiration X 2 (distance measurement)

B-Mode:

TRANS L DIAPHRAGM X 2 images

LONG L DIAPHRAGM X 2 image

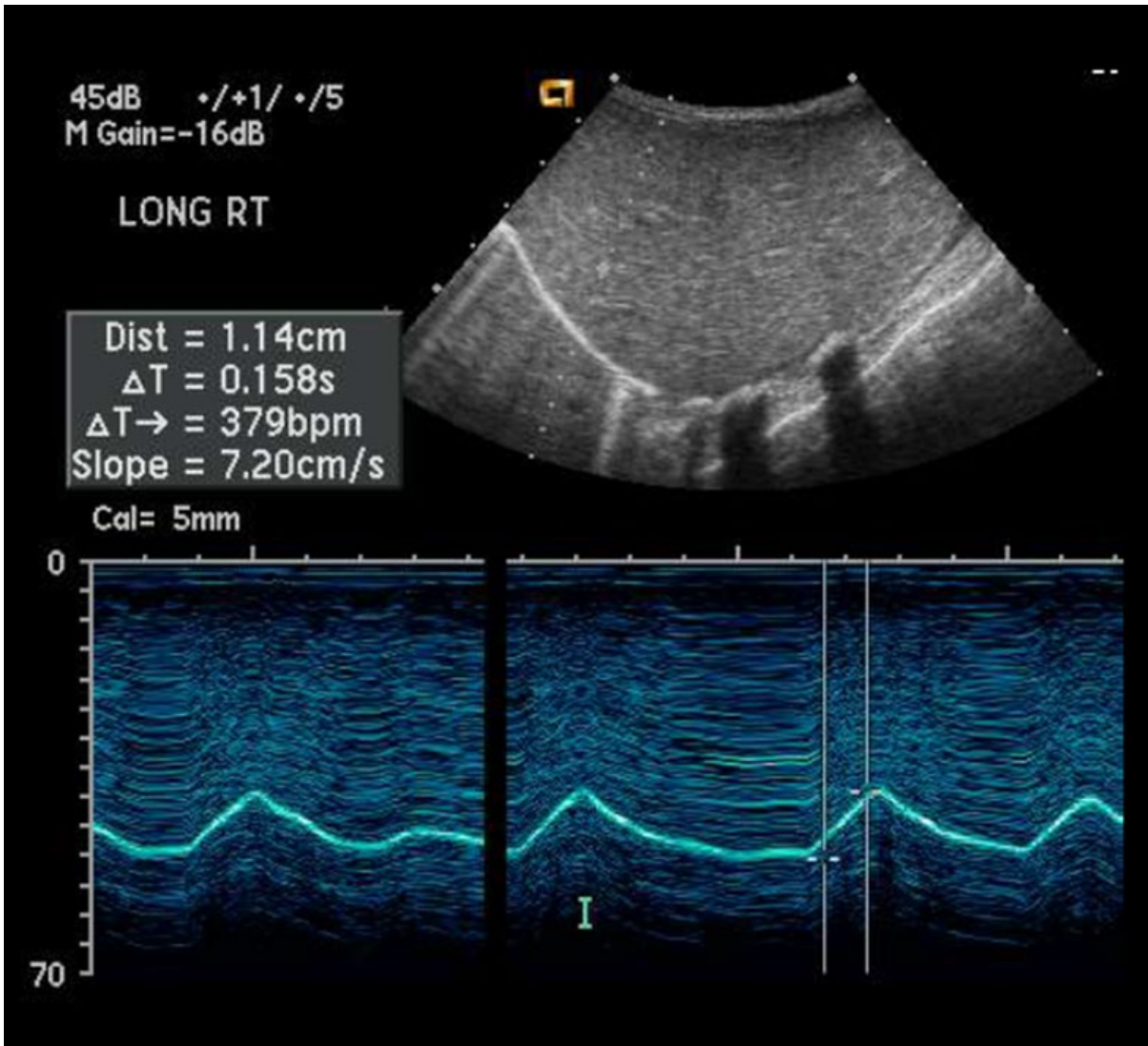
LONG L DIAPHRAGM X 2 CINE (~12 secs)

M-Mode:

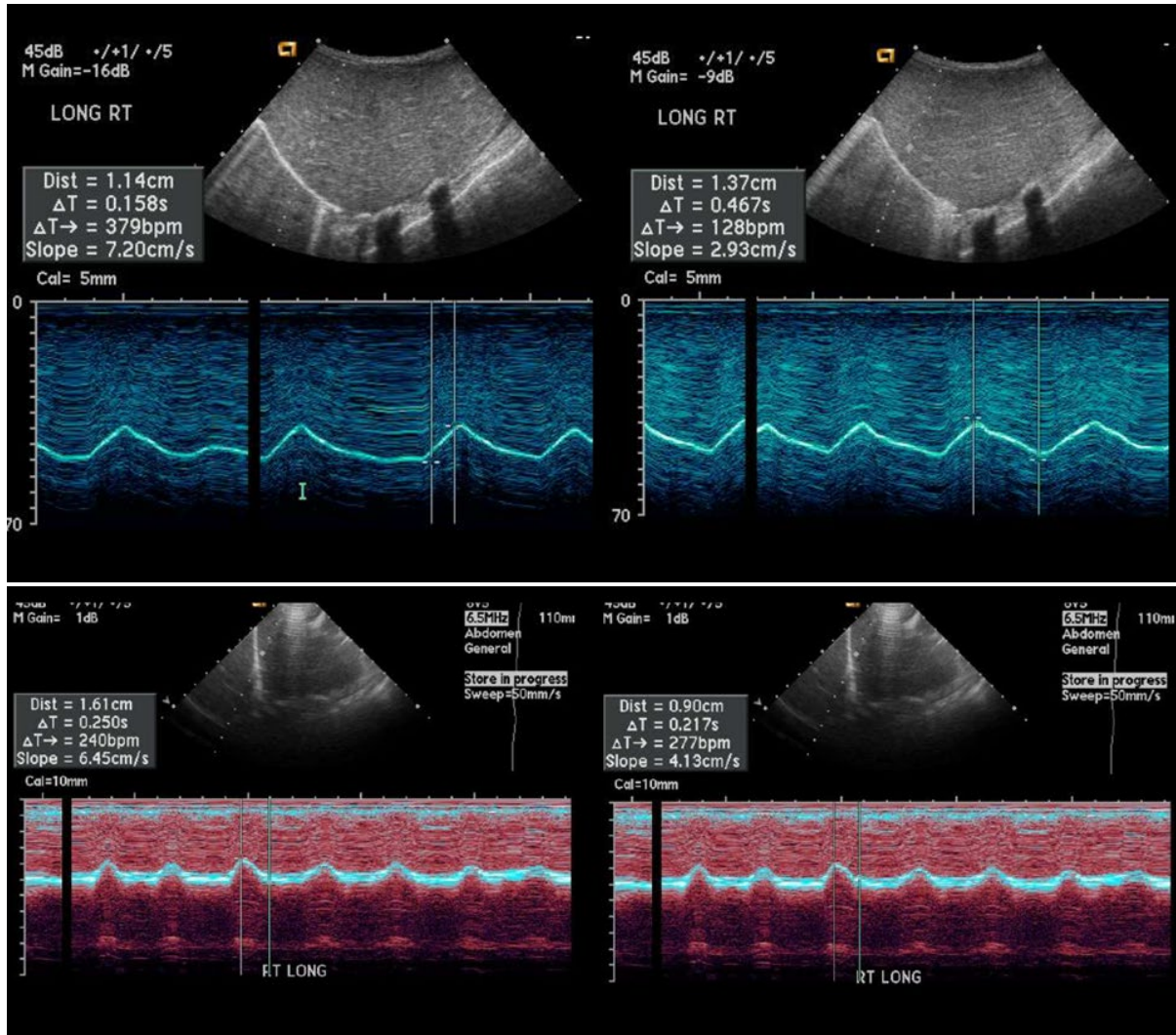
LONG L DIAPHRAGM with time difference between inspiration and expiration X 2 (distance measurement)

TRANS MIDLINE BILATERAL DIAPHRAGMS CINE X 3

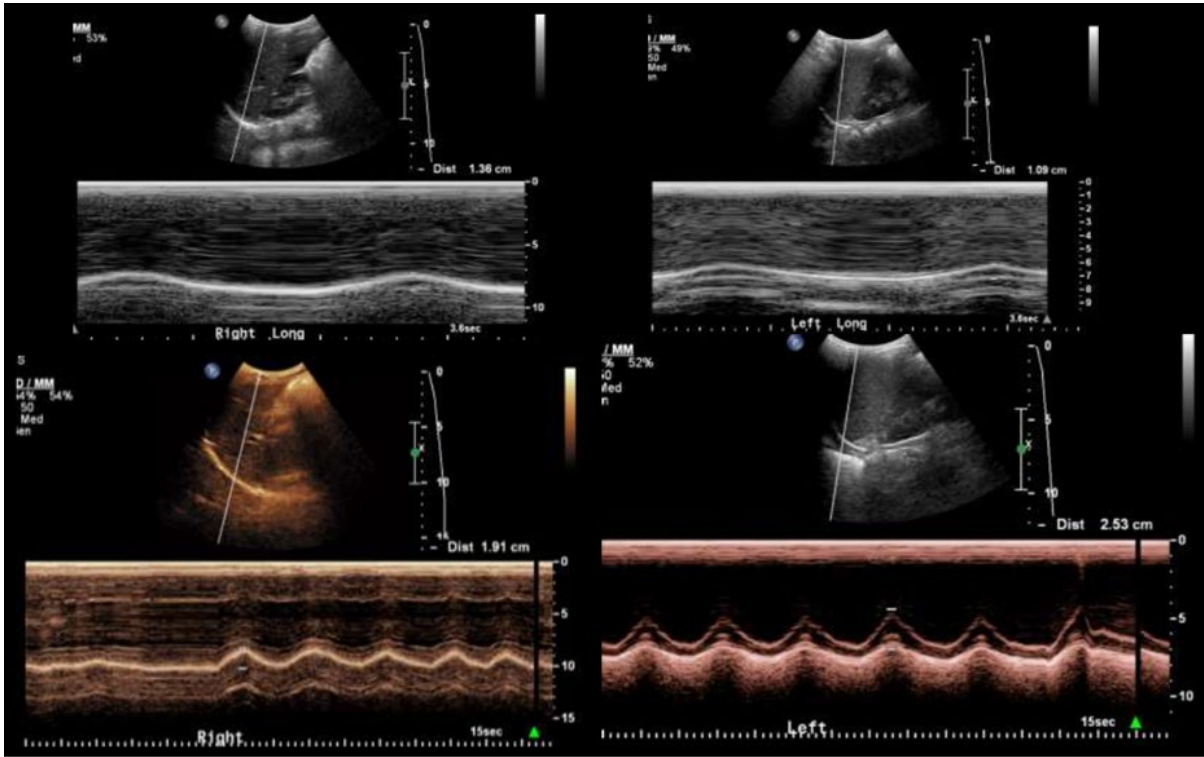
NOTE: Attention to measurement



NOTE: Attention to measurement



NOTE: Attention to tracer speed setting



PROCESSING:

- Review examination images and data
- Export all images to PACS
- Document relevant history and impressions in primordial.
- Present images to Radiologist

REFERENCES:

REVISION HISTORY:

SUBMITTED BY:	Jeannie Kwon, M.D.	Title	Director of Ultrasound
APPROVED BY:	Jeannie Kwon, M.D.	Title	Director of Ultrasound
APPROVAL DATE:	08/28/2019		
REVIEW DATE(S):			
REVISION DATE(S):		Brief Summary	