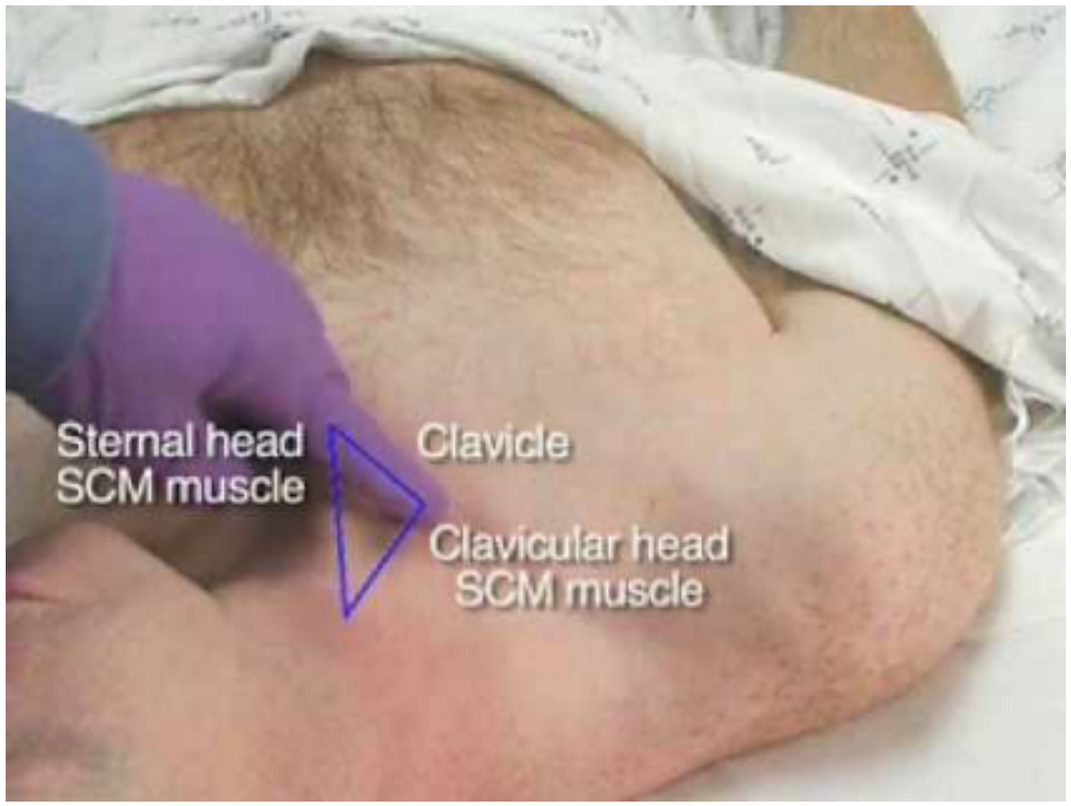
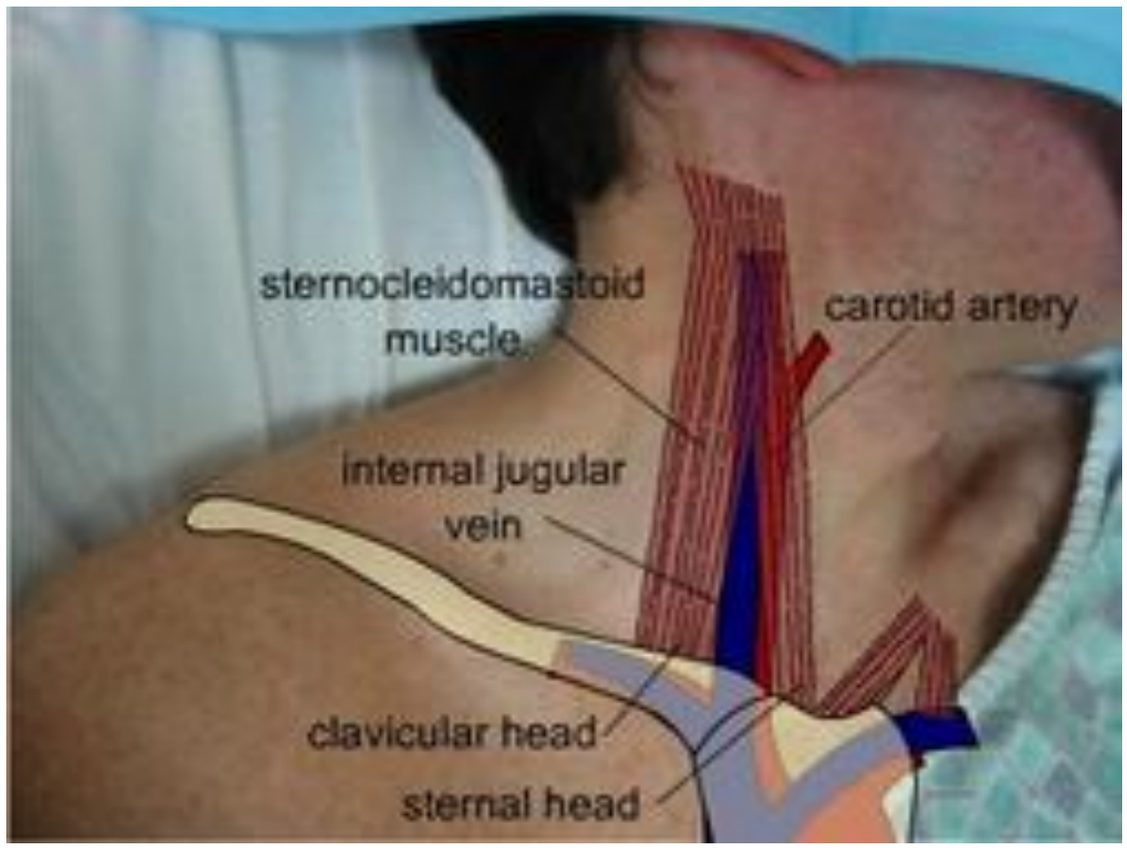
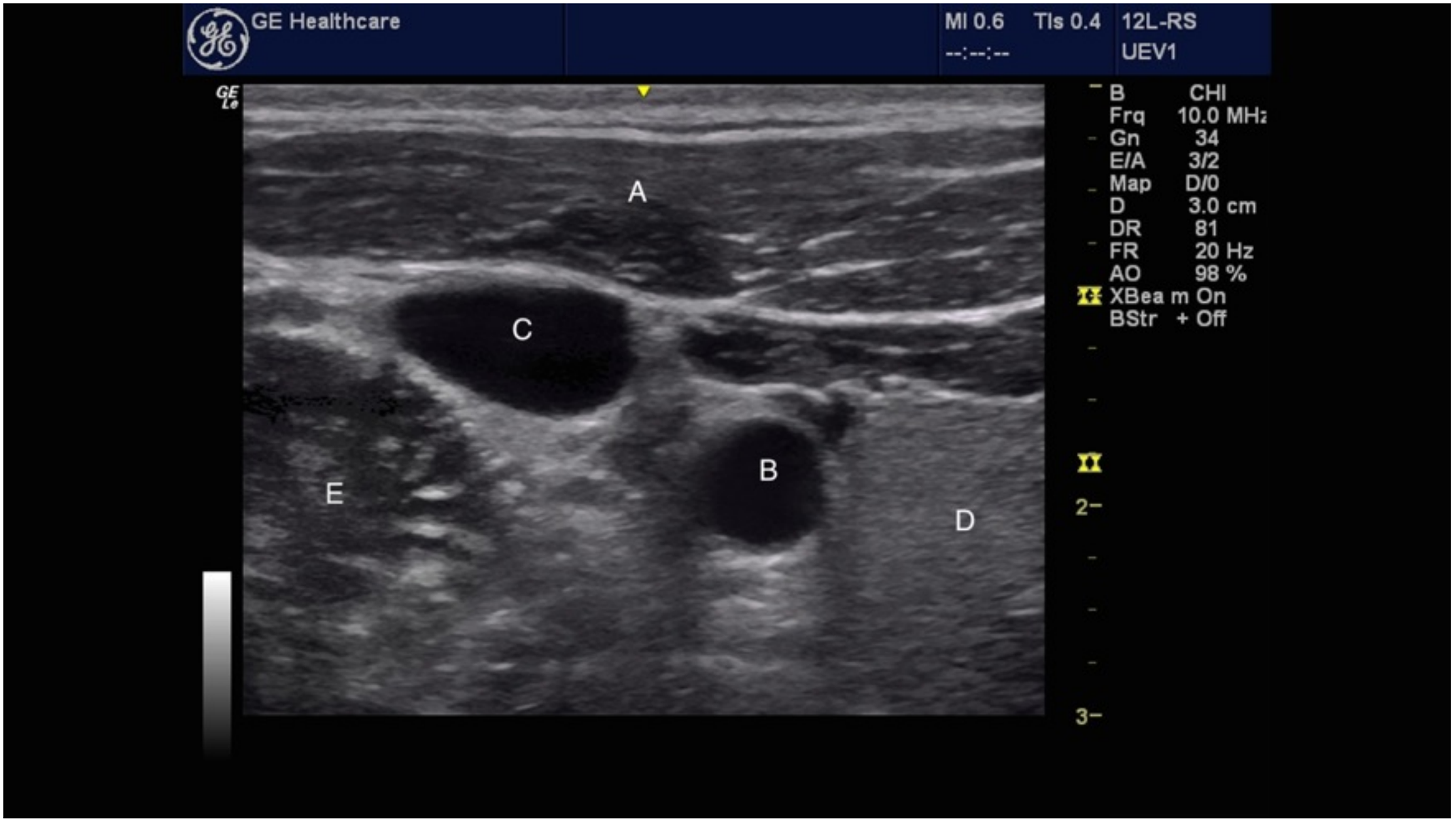
JVP

Transducer Placement

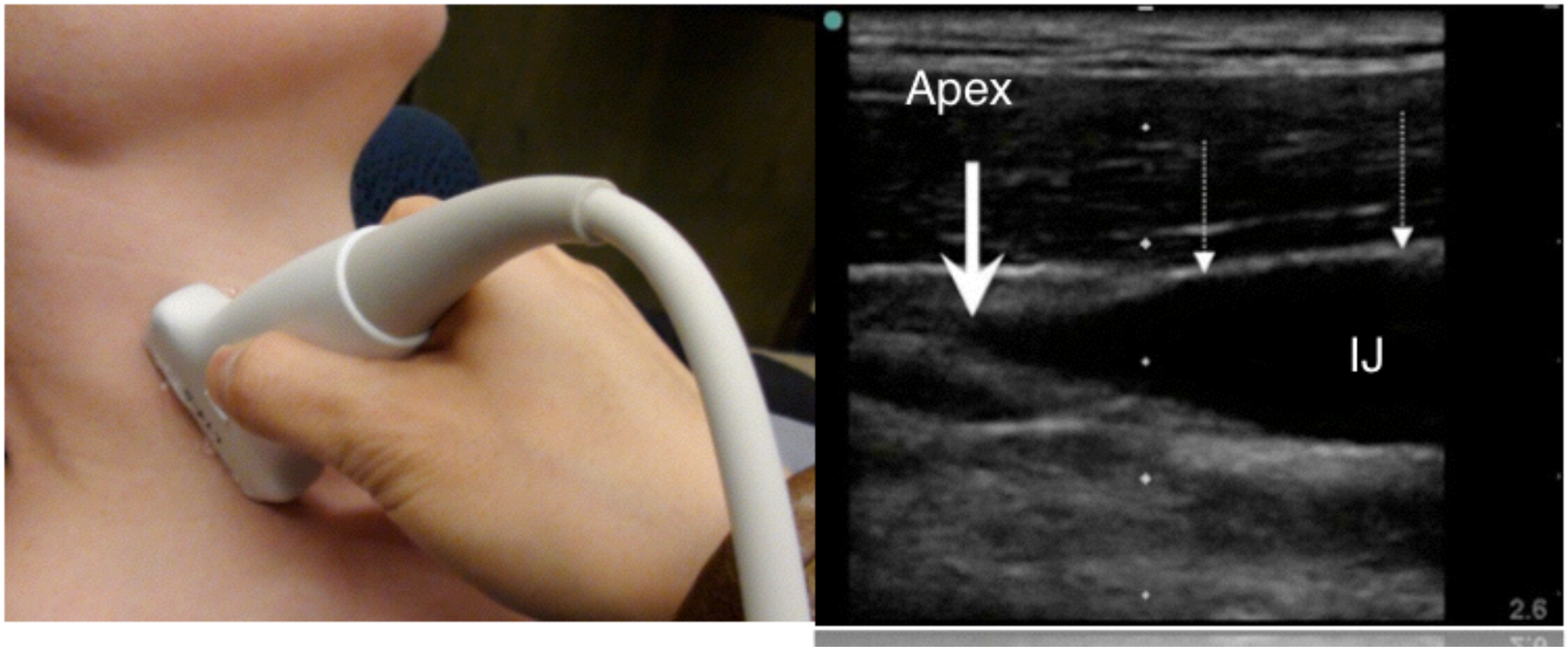




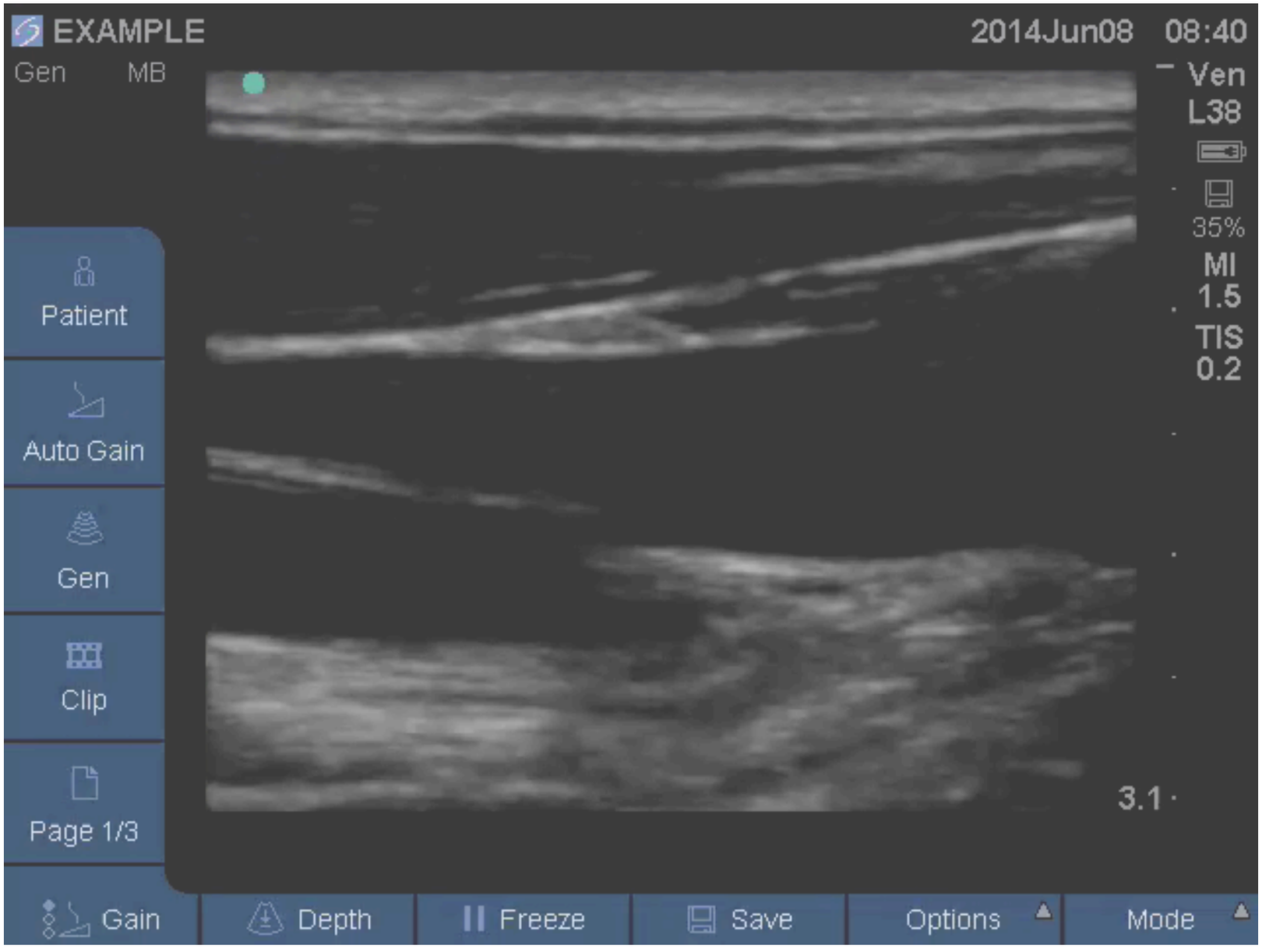
Anatomy


GE Healthcare
MI 0.6
TIs 0.4
12L-RS
--:--:--
UEV1
B
CHI
Frq
10.0 MHz
Gn
34
E/A
3/2
Map
D/0
D
3.0 cm
DR
81
FR
20 Hz
AO
98 %
XBeam On
BStr + Off
A
B
C
D
E
2
3

Point of Maximal Tenting



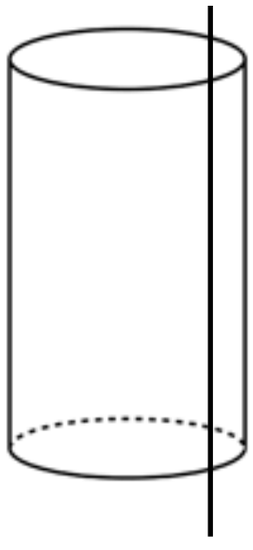
Long Axis


EXAMPLE
2014Jun08
08:40
Gen
MB
Ven
L38
35%
MI
1.5
TIS
0.2
3.1
Patient
Auto Gain
Gen
Clip
Page 1/3
Gain
Depth
Freeze
Save
Options
Mode

Pitfalls

- Too much pressure
- Foreshortening
- Sidewalling
- Wrong vessel
- Too much neck rotation

Foreshortening
- Incorrect axis resulting in foreshortening
- rotating the probe counter-clockwise will restore the correct axis



Sidewalling
- the beam is NOT aligned over the center of the vessel
- sliding the probe to the left will restore the correct alignment

The Evidence

- Several studies evaluating US assessment of JVP have been published
- Studies have looked at:
  - Height of US measured collapse of IJ in patients with presumed normal CVP
  - Correlation between US measured height of collapse of IJ and CVC measured CVP
  - Correlation between US measured height of collapse of IJ and visually estimated height of IJ
  - Correlation between diameter of JVP and CVC measured CVP

IJ Collapse Height in People with Normal CVP

- CJEM 2010;(12)4:320-4
- Single center prospective trial
- Inexperienced sonographers (med students)
- Adults presenting to ED with presumed normal CVP, n = 77
- Patients supine with head of bed at 45 degrees
- Height of IJ collapse measured during expiration at position where tapering of IJ started
    - also identified quadrant of neck (clavicle to jaw)
- IJ in long axis and confirmed in short axis

IJ Collapse Height in People with Normal CVP

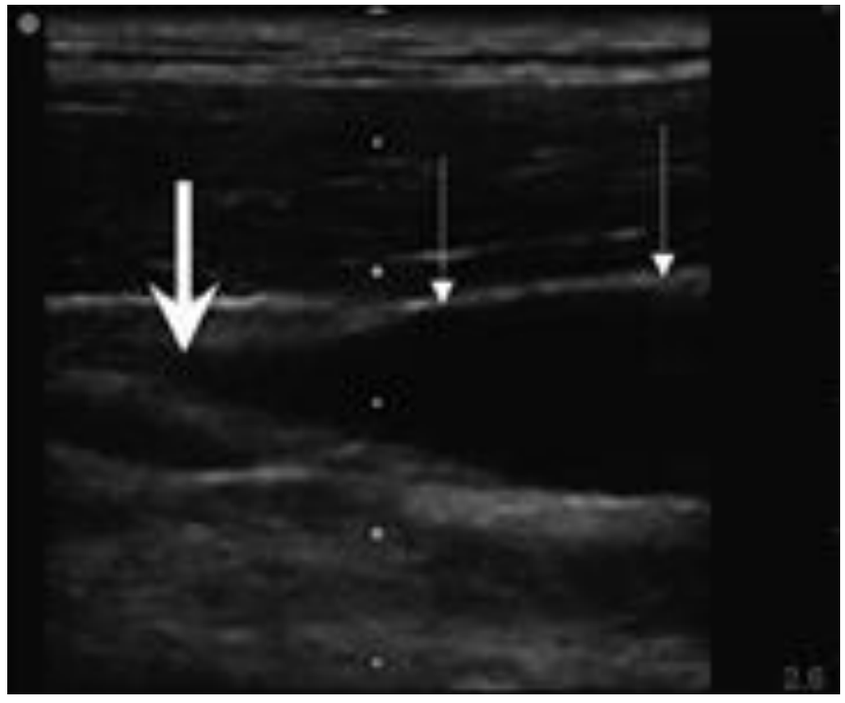
- CJEM 2010;(12)4:320-4
- Vast majority were 0, 1 or 2cm above sternal angle
- mean ht was 6.35cm (5 cm + ht above sternal angle)
- 76/77 showed taper within 1st quadrant
- interrater reliability: k = 0.87 - 1.00

IJ Collapse and CVP

- Chest 2011;139: 95 - 100
- slide probe superiorly along jugular vein
  - short or long or alternating depending on which is more helpful
  - locate collapse point at end expiration
  - apex of zone of collapse at end expiration is noted in long axis

IJ Collapse and CVP

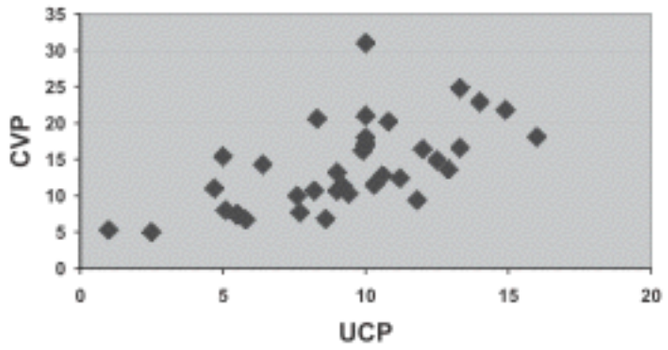
Chest 2011;139:95-100
- int jugular vein in long view
- dotted arrow = ant wall of IJ
- solid arrow = point of vein collapse

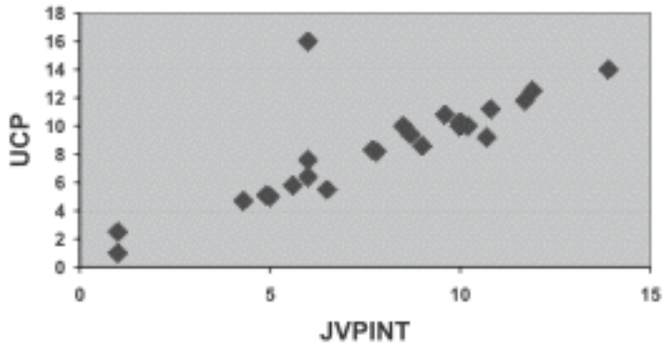


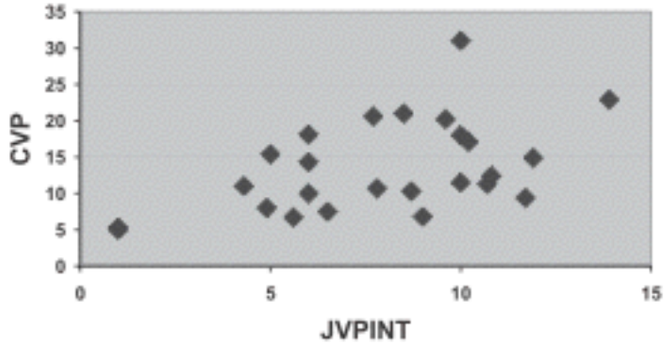
IJ Collapse and CVP

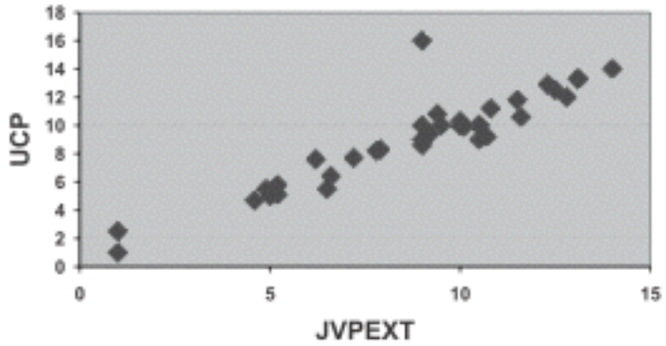
- Chest 2011;139: 95 - 100
- n = 38 vented and non vented (11) pts in ICU, all with CVC (33 in R IJ)
- compared CVP estimations with visual estimate of JVP (int and ext) and US of IJ with CVC CVP measurement
- IJ identified visually confidently in 26/38
- correlation coefficients of CVP assessed by CVC:
  - US = 0.62
  - visually assessed ext jugular = 0.57
  - visually assessed int jugular = 0.5
- correlation b/w US and visually assessed JVPext and JVPint = 0.91 and 0.81
- US good for JVP, but JVP underestimates CVP

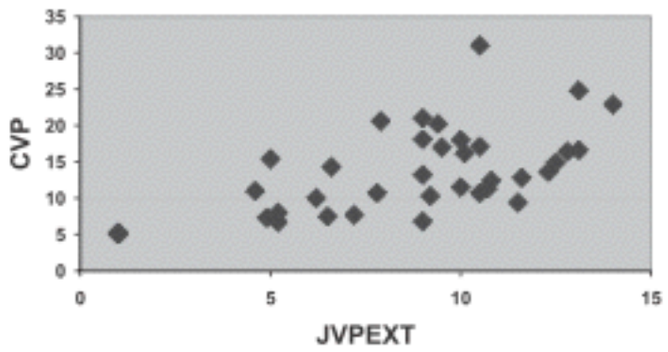
Evidence

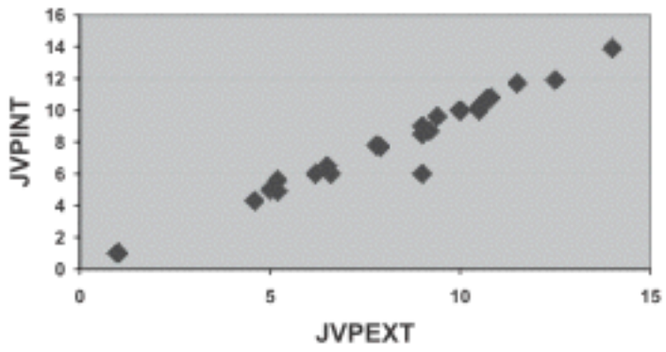












Chest 2011;139: 95 - 100
Correlation between US and visual assessment of JVP with CVC

Evidence

- Am J Emerg Med (2009) 27, 851-855
- n = 34 non-vented, hemodynamically stable
- US of IJ (AP diameter and area) measured at 2cm above clavicle in transverse with head of bed at 0 and 35 degrees
- measurements done at end inhalation and end exhalation
- compared to CVC obtained CVP
- IJ AP diameter w/ head of bed at 0 degrees taken at end exhalation had the best correlation coefficient (0.81)
- for statistical analysis divided into CVP < 10 and CVP >/= 10
    - authors stated w/ CERTAINTY that AP diameter 5.7 - 8.3 indicates a CVP < 10 and diameter 11.2 - 13.8 indicates CVP > 10

Evidence

Am J Emerg Med (2009) 27, 851-855

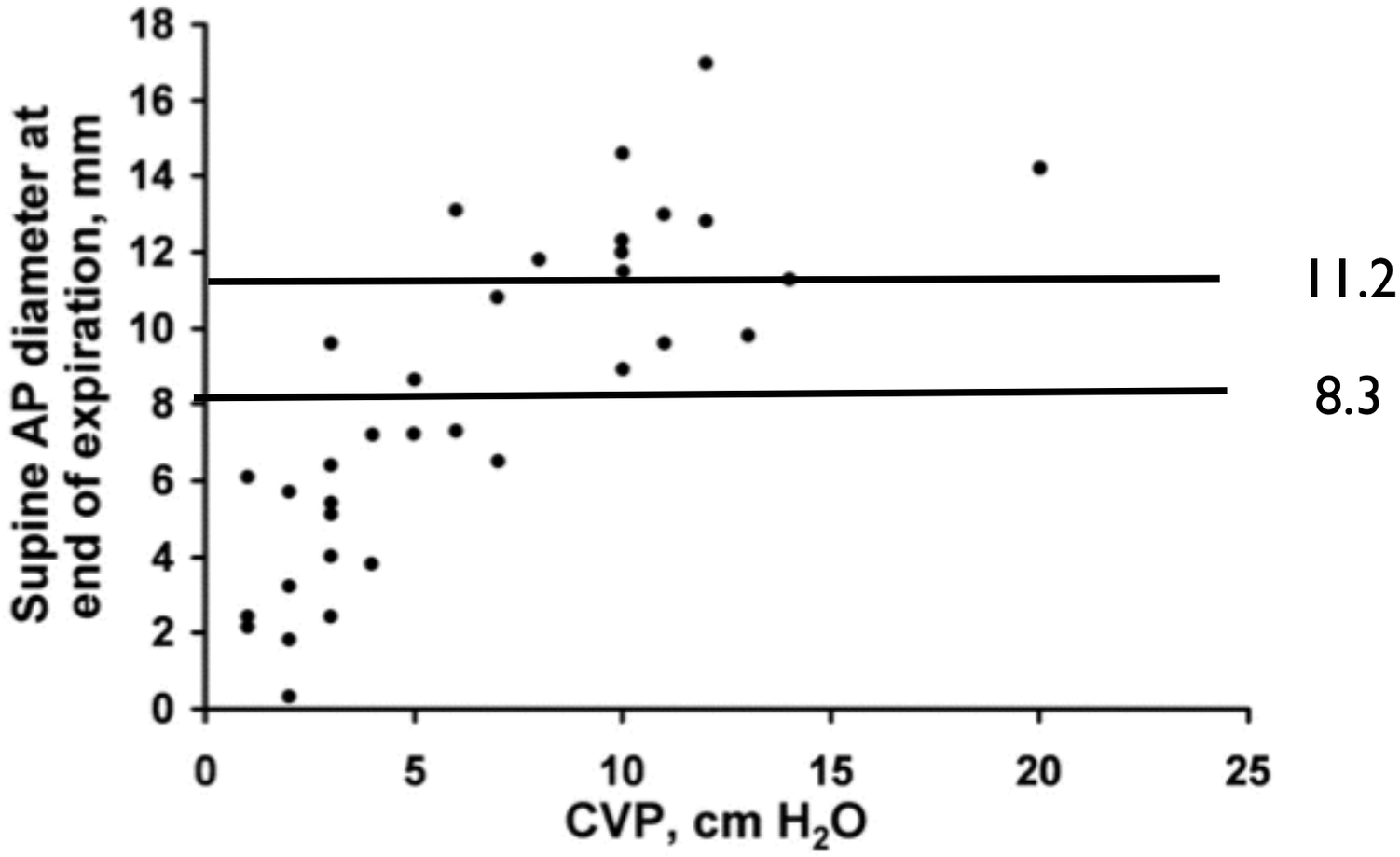


Fig. 2 Comparison of CVP and AP diameter with patient in supine position and at the end of expiration.

Evidence: SOB and Heart Failure

- Am J Emerg Med (2011) 29;1198-1202
- Secondary analysis of previously collected data
- n = 102, w/in 30min presenting to ED w/ 1' or 2' c/o SOB, JVD-US performed in trans or long view
- compared to criterion standard CHF diagnosis based on echo
- Results
  - 68 pts had evidence of CHF on echo
    - all had JVP >/= 8cmH20
    - NO pts w/ JVP </= 8cmH2O had CHF on echo (NO false -ves)
    - JVP >/= 8cmH2O had sens 99%, spec 59% for CHF on echo
    - +ve LR = 2.4, -ve LR = 0.01