

WEBVTT

NOTE duration:"00:15:41.2480000"

NOTE language:en-us

NOTE Confidence: 0.9727888

00:00:02.980 --> 00:00:05.470 In this lecture we will review

NOTE Confidence: 0.9727888

00:00:05.470 --> 00:00:07.960 pediatric point of care lung ultrasound.

NOTE Confidence: 0.98859406

00:00:15.480 --> 00:00:17.474 In general, the approach to your

NOTE Confidence: 0.98859406

00:00:17.474 --> 00:00:19.139 patients will differ depending on

NOTE Confidence: 0.98859406

00:00:19.140 --> 00:00:21.196 the clinical picture and

NOTE Confidence: 0.98859406

00:00:21.196 --> 00:00:22.738 the presenting symptoms.

NOTE Confidence: 0.98859406

00:00:22.740 --> 00:00:24.263 Most common pathology you'll

NOTE Confidence: 0.98859406

00:00:24.263 --> 00:00:26.550 be looking for is the presence

NOTE Confidence: 0.98859406

00:00:26.550 --> 00:00:28.452 or absence of animal thorax.

NOTE Confidence: 0.98859406

00:00:28.452 --> 00:00:30.357 The presence or absence of

NOTE Confidence: 0.97305846

00:00:30.360 --> 00:00:33.030 a pleural effusion in the presence or

NOTE Confidence: 0.97305846

00:00:33.030 --> 00:00:34.930 absence of lung tissue consolidation

NOTE Confidence: 0.97305846

00:00:34.930 --> 00:00:36.840 or fluid filled alveolar spaces.

NOTE Confidence: 0.98690933

00:00:40.630 --> 00:00:42.820 So one common thread in pediatric

NOTE Confidence: 0.98690933

00:00:42.820 --> 00:00:45.403 patients is that they may not be

NOTE Confidence: 0.98690933

00:00:45.403 --> 00:00:47.148 too cooperative with your exam.

NOTE Confidence: 0.98690933

00:00:47.150 --> 00:00:49.376 They may be overly tired, fussy,

NOTE Confidence: 0.98690933

00:00:49.376 --> 00:00:51.456 irritable, arching their backs and

NOTE Confidence: 0.98690933

00:00:51.456 --> 00:00:54.067 bringing the scapula together so as to

NOTE Confidence: 0.98690933

00:00:54.067 --> 00:00:55.825 not expose the posterior lung field,

NOTE Confidence: 0.98690933

00:00:55.830 --> 00:00:58.726 or just simply trying to run a wing.

NOTE Confidence: 0.98690933

00:00:58.730 --> 00:01:01.558 Some potential tricks of the trade include

NOTE Confidence: 0.98690933

00:01:01.558 --> 00:01:04.305 engaging a caregiver so that the child

NOTE Confidence: 0.98690933

00:01:04.305 --> 00:01:06.501 feels more comfortable having an infant

NOTE Confidence: 0.98690933

00:01:06.567 --> 00:01:08.877 or toddler give their parents a hug.

NOTE Confidence: 0.98690933

00:01:08.880 --> 00:01:11.130 This will provide both a sense

NOTE Confidence: 0.98690933

00:01:11.130 --> 00:01:13.515 of comfort and expose their back

NOTE Confidence: 0.98690933

00:01:13.515 --> 00:01:15.525 for a good long examination.

NOTE Confidence: 0.98690933

00:01:15.530 --> 00:01:16.312 And finally,

NOTE Confidence: 0.98690933

00:01:16.312 --> 00:01:17.876 I would encourage distraction
NOTE Confidence: 0.98690933

00:01:17.876 --> 00:01:19.440 in whatever means possible.
NOTE Confidence: 0.98690933

00:01:19.440 --> 00:01:22.079 And yes, screen time is OK during
NOTE Confidence: 0.98690933

00:01:22.079 --> 00:01:23.740 a pediatric lung pocus.
NOTE Confidence: 0.98133993

00:01:29.080 --> 00:01:31.508 So to improve your patient cooperation and
NOTE Confidence: 0.98133993

00:01:31.508 --> 00:01:33.509 optimize your time performing lung focus,
NOTE Confidence: 0.98133993

00:01:33.510 --> 00:01:35.897 you may consider getting some warm gel.
NOTE Confidence: 0.98133993

00:01:35.900 --> 00:01:38.290 This can be done with some relatively
NOTE Confidence: 0.98133993

00:01:38.290 --> 00:01:39.310 inexpensive commercially available
NOTE Confidence: 0.98133993

00:01:39.310 --> 00:01:41.750 products if you're using typical gel tubes.
NOTE Confidence: 0.98133993

00:01:41.750 --> 00:01:44.080 If for some reason you happen to
NOTE Confidence: 0.98133993

00:01:44.080 --> 00:01:45.448 be using gel packets,
NOTE Confidence: 0.98133993

00:01:45.450 --> 00:01:46.470 a hack that
NOTE Confidence: 0.98133993

00:01:46.470 --> 00:01:49.360 I like to use is to put one or two
NOTE Confidence: 0.98133993

00:01:49.453 --> 00:01:52.453 in my pocket at the beginning of a
NOTE Confidence: 0.98133993

00:01:52.453 --> 00:01:55.414 shift and then have them at the ready.

NOTE Confidence: 0.98133993

00:01:55.414 --> 00:01:57.676 When the timing is right now

NOTE Confidence: 0.98133993

00:01:57.676 --> 00:01:59.346 in terms of the transducer,

NOTE Confidence: 0.98133993

00:01:59.346 --> 00:02:01.065 your probe selection is going

NOTE Confidence: 0.98133993

00:02:01.065 --> 00:02:03.410 to depend a lot on the question

NOTE Confidence: 0.98133993

00:02:03.482 --> 00:02:05.396 that you're trying to answer.

NOTE Confidence: 0.98133993

00:02:05.396 --> 00:02:07.766 In general, for younger patients in whom

NOTE Confidence: 0.98133993

00:02:07.766 --> 00:02:09.670 you're concerned mostly about pneumonia,

NOTE Confidence: 0.98133993

00:02:09.670 --> 00:02:11.650 a high frequency linear transducer is

NOTE Confidence: 0.98133993

00:02:11.650 --> 00:02:13.590 going to provide excellent resolution.

NOTE Confidence: 0.98133993

00:02:13.590 --> 00:02:15.746 The linear transducer would be my choice

NOTE Confidence: 0.98133993

00:02:15.746 --> 00:02:18.208 as well for pneumo thorax evaluation.

NOTE Confidence: 0.98133993

00:02:18.210 --> 00:02:20.345 That said, there are many instances

NOTE Confidence: 0.98133993

00:02:20.345 --> 00:02:21.765 where low frequency curvilinear

NOTE Confidence: 0.98133993

00:02:21.770 --> 00:02:23.938 transducer will be an adequate choice,

NOTE Confidence: 0.98133993

00:02:23.938 --> 00:02:26.500 and I certainly would use this probe.

NOTE Confidence: 0.98133993

00:02:26.500 --> 00:02:28.475 In my initial assessment for
NOTE Confidence: 0.98133993

00:02:28.475 --> 00:02:29.265 pleural effusion.
NOTE Confidence: 0.98240566

00:02:32.790 --> 00:02:35.160 So when clinical concern exists for
NOTE Confidence: 0.98240566

00:02:35.160 --> 00:02:36.736 either pneumothorax or pneumonia,
NOTE Confidence: 0.98240566

00:02:36.740 --> 00:02:39.924 your probe of choice will be the high
NOTE Confidence: 0.98240566

00:02:39.924 --> 00:02:41.944 frequency linear transducer and you
NOTE Confidence: 0.98240566

00:02:41.944 --> 00:02:45.090 will start by looking at the apex of
NOTE Confidence: 0.98240566

00:02:45.090 --> 00:02:47.799 the lung over the anterior lung fields.
NOTE Confidence: 0.98240566

00:02:47.800 --> 00:02:50.172 If clinical concerns exist for a
NOTE Confidence: 0.98240566

00:02:50.172 --> 00:02:52.145 pleural effusion, like would be
NOTE Confidence: 0.98240566

00:02:52.145 --> 00:02:54.910 the case in the context of trauma,
NOTE Confidence: 0.98240566

00:02:54.910 --> 00:02:57.141 then using a curvilinear probe to
NOTE Confidence: 0.98240566

00:02:57.141 --> 00:02:58.876 interrogate the lung basis would
NOTE Confidence: 0.98240566

00:02:58.876 --> 00:03:01.228 be my preferred initial approach.
NOTE Confidence: 0.98159397

00:03:04.420 --> 00:03:06.242 In pneumothorax occurs when air
NOTE Confidence: 0.98159397

00:03:06.242 --> 00:03:08.366 accumulates in the pleural space between

NOTE Confidence: 0.98159397

00:03:08.366 --> 00:03:10.498 the visceral and parietal pleura.

NOTE Confidence: 0.98159397

00:03:10.500 --> 00:03:12.780 The air buildup in this space,

NOTE Confidence: 0.98159397

00:03:12.780 --> 00:03:15.440 even when it is in small quantities,

NOTE Confidence: 0.98159397

00:03:15.440 --> 00:03:17.340 create visual changes on your

NOTE Confidence: 0.98159397

00:03:17.340 --> 00:03:18.860 ultrasound screen which will

NOTE Confidence: 0.98159397

00:03:18.860 --> 00:03:20.760 help you make this diagnosis.

NOTE Confidence: 0.9807303

00:03:23.550 --> 00:03:25.330 For the evaluation of pneumothorax,

NOTE Confidence: 0.9807303

00:03:25.330 --> 00:03:27.466 the following steps should be followed.

NOTE Confidence: 0.9807303

00:03:27.470 --> 00:03:29.408 First, it is important to position

NOTE Confidence: 0.9807303

00:03:29.408 --> 00:03:31.740 the patient in the supine position.

NOTE Confidence: 0.9807303

00:03:31.740 --> 00:03:33.876 This will increase your overall sensitivity

NOTE Confidence: 0.9807303

00:03:33.876 --> 00:03:35.300 for small pneumothorax detection,

NOTE Confidence: 0.9807303

00:03:35.300 --> 00:03:37.636 as air will rise to the top and

NOTE Confidence: 0.9807303

00:03:37.636 --> 00:03:39.543 therefore in a supine position

NOTE Confidence: 0.9807303

00:03:39.543 --> 00:03:41.633 that pneumothorax will be present

NOTE Confidence: 0.9807303

00:03:41.633 --> 00:03:44.200 between the probe and the chest wall.
NOTE Confidence: 0.9807303

00:03:44.200 --> 00:03:46.258 Evaluation of the apex with a
NOTE Confidence: 0.9807303

00:03:46.258 --> 00:03:48.074 linear probes over the midclavicular
NOTE Confidence: 0.9807303

00:03:48.074 --> 00:03:50.294 line with the indicator to the
NOTE Confidence: 0.9807303

00:03:50.294 --> 00:03:52.858 head is the ideal starting point.
NOTE Confidence: 0.9807303

00:03:52.860 --> 00:03:54.750 You look for signs of lung sliding.
NOTE Confidence: 0.9807303

00:03:54.750 --> 00:03:56.640 If lungs lighting happens to be absent,
NOTE Confidence: 0.9807303

00:03:56.640 --> 00:03:58.488 then you will want to slide the
NOTE Confidence: 0.9807303

00:03:58.488 --> 00:04:00.611 probe down the chest wall to get a
NOTE Confidence: 0.9807303

00:04:00.611 --> 00:04:02.780 general sense of how big of a pneumo
NOTE Confidence: 0.9807303

00:04:02.780 --> 00:04:04.466 thorax you will be dealing with.
NOTE Confidence: 0.9783894

00:04:07.290 --> 00:04:09.802 So let's start by looking at the appearance
NOTE Confidence: 0.9783894

00:04:09.802 --> 00:04:12.509 of normal lung tissue as seen by ultrasound.
NOTE Confidence: 0.9783894

00:04:12.510 --> 00:04:14.580 As discussed, you will place the
NOTE Confidence: 0.9783894

00:04:14.580 --> 00:04:16.739 linear probe we indicated to the head.
NOTE Confidence: 0.9783894

00:04:16.740 --> 00:04:19.674 If you look at the screenshot on the left,

NOTE Confidence: 0.9783894

00:04:19.680 --> 00:04:21.955 that indicator is represented by the P.

NOTE Confidence: 0.9783894

00:04:21.960 --> 00:04:24.576 The ribs can be seen in cross section

NOTE Confidence: 0.9783894

00:04:24.576 --> 00:04:26.001 with posterior acoustic enhancement

NOTE Confidence: 0.9783894

00:04:26.001 --> 00:04:28.817 and the goal here is for the pleura

NOTE Confidence: 0.9783894

00:04:28.886 --> 00:04:31.086 to be at the center of your screen.

NOTE Confidence: 0.9783894

00:04:31.090 --> 00:04:32.710 Note that the ultrasound machine

NOTE Confidence: 0.9783894

00:04:32.710 --> 00:04:34.736 is set on lung window setting

NOTE Confidence: 0.9783894

00:04:34.736 --> 00:04:36.436 and this makes the pleura.

NOTE Confidence: 0.9783894

00:04:36.440 --> 00:04:38.670 Bright or echogenic right above

NOTE Confidence: 0.9783894

00:04:38.670 --> 00:04:41.370 the pleura and between the ribs.

NOTE Confidence: 0.9783894

00:04:41.370 --> 00:04:43.680 You will find your intercostal muscle

NOTE Confidence: 0.9783894

00:04:43.680 --> 00:04:46.375 and again the first echogenic line

NOTE Confidence: 0.9783894

00:04:46.375 --> 00:04:48.539 represents the pleural interface.

NOTE Confidence: 0.9783894

00:04:48.540 --> 00:04:51.700 Now on the video on the right you can see

NOTE Confidence: 0.9783894

00:04:51.784 --> 00:04:54.562 that there is motion movement shimmering

NOTE Confidence: 0.9783894

00:04:54.562 --> 00:04:57.592 of the pleura which represents normal
NOTE Confidence: 0.9783894

00:04:57.592 --> 00:05:00.880 sliding of the visceral and parietal
NOTE Confidence: 0.9783894

00:05:00.880 --> 00:05:02.876 component during typical respirations.
NOTE Confidence: 0.9783894

00:05:02.876 --> 00:05:05.564 In addition you will see additional
NOTE Confidence: 0.9783894

00:05:05.564 --> 00:05:07.440 horizontal lines also echogenic.
NOTE Confidence: 0.9783894

00:05:07.440 --> 00:05:09.736 Which we refer to as a lines.
NOTE Confidence: 0.9783894

00:05:09.740 --> 00:05:11.594 This is a normal reverberation artifact
NOTE Confidence: 0.9783894

00:05:11.594 --> 00:05:14.019 that is seen in healthy lung tissue.
NOTE Confidence: 0.9783894

00:05:14.020 --> 00:05:16.576 We will come back to these a lines at
NOTE Confidence: 0.9783894

00:05:16.576 --> 00:05:18.629 another point in this presentation.
NOTE Confidence: 0.973092

00:05:21.480 --> 00:05:23.650 So when air collects between
NOTE Confidence: 0.973092

00:05:23.650 --> 00:05:25.386 the visceral parietal pleura,
NOTE Confidence: 0.973092

00:05:25.390 --> 00:05:28.092 the lack of lung sliding that results
NOTE Confidence: 0.973092

00:05:28.092 --> 00:05:29.837 will cause physiologic changes
NOTE Confidence: 0.973092

00:05:29.837 --> 00:05:31.897 easily detectable by ultrasound.
NOTE Confidence: 0.98409706

00:05:35.350 --> 00:05:38.207 Your first assessment is going to be a

NOTE Confidence: 0.98409706

00:05:38.207 --> 00:05:40.349 careful visual assessment of the pleura.

NOTE Confidence: 0.98409706

00:05:40.350 --> 00:05:41.746 These images represent lung

NOTE Confidence: 0.98409706

00:05:41.746 --> 00:05:43.491 ultrasound findings of a patient

NOTE Confidence: 0.98409706

00:05:43.491 --> 00:05:45.350 with a right sided pneumothorax.

NOTE Confidence: 0.98409706

00:05:45.350 --> 00:05:47.849 Note the normal clip on the left.

NOTE Confidence: 0.98409706

00:05:47.850 --> 00:05:49.680 You can see normal lung sliding

NOTE Confidence: 0.98409706

00:05:49.680 --> 00:05:51.627 with the appearance of shimmering or

NOTE Confidence: 0.98409706

00:05:51.627 --> 00:05:53.292 sometimes described as ants marching

NOTE Confidence: 0.98409706

00:05:53.292 --> 00:05:56.062 on a log which represents normal motion

NOTE Confidence: 0.98409706

00:05:56.062 --> 00:05:58.197 between the visceral parietal pleura.

NOTE Confidence: 0.98409706

00:05:58.200 --> 00:06:00.960 In contrast on the abnormal side you can

NOTE Confidence: 0.98409706

00:06:00.960 --> 00:06:04.049 see that that plural looks stuck together.

NOTE Confidence: 0.98409706

00:06:04.050 --> 00:06:05.770 There is no discrete motion

NOTE Confidence: 0.98409706

00:06:05.770 --> 00:06:08.299 that can be seen in this case.

NOTE Confidence: 0.98409706

00:06:08.300 --> 00:06:10.424 The probe was placed in the

NOTE Confidence: 0.98409706

00:06:10.424 --> 00:06:11.840 Midaxillary line around T4,
NOTE Confidence: 0.98409706

00:06:11.840 --> 00:06:14.374 precisely where a chest tube or pigtail
NOTE Confidence: 0.98409706

00:06:14.374 --> 00:06:16.089 catheter would typically be placed.
NOTE Confidence: 0.9750419

00:06:18.890 --> 00:06:22.364 So to quantify the size of new more thorax,
NOTE Confidence: 0.9750419

00:06:22.370 --> 00:06:25.079 you want to identify its transition zone,
NOTE Confidence: 0.9750419

00:06:25.080 --> 00:06:27.402 which many will refer to as
NOTE Confidence: 0.9750419

00:06:27.402 --> 00:06:28.955 long points during expiration.
NOTE Confidence: 0.9750419

00:06:28.955 --> 00:06:30.501 Air tracking into the
NOTE Confidence: 0.9750419

00:06:30.501 --> 00:06:32.049 pleural space will expand,
NOTE Confidence: 0.9750419

00:06:32.050 --> 00:06:33.985 while inspiration leads to air
NOTE Confidence: 0.9750419

00:06:33.985 --> 00:06:35.920 accumulation within the lungs themselves.
NOTE Confidence: 0.9750419

00:06:35.920 --> 00:06:38.629 Depending on the size of the pneumothorax,
NOTE Confidence: 0.9750419

00:06:38.630 --> 00:06:41.142 you will be able to determine at what
NOTE Confidence: 0.9750419

00:06:41.142 --> 00:06:43.922 point in the thorax a pneumothorax meets
NOTE Confidence: 0.9750419

00:06:43.922 --> 00:06:46.625 and opposes aerated lung with preserved
NOTE Confidence: 0.9750419

00:06:46.625 --> 00:06:49.355 visceral and parietal pleural sliding.

NOTE Confidence: 0.9750419

00:06:49.360 --> 00:06:51.616 Lung Point is the most specific

NOTE Confidence: 0.9750419

00:06:51.616 --> 00:06:53.120 ultrasound finding for pneumothorax

NOTE Confidence: 0.9750419

00:06:53.180 --> 00:06:54.896 and can be used to distinguish

NOTE Confidence: 0.9750419

00:06:54.896 --> 00:06:56.494 from other causes of abnormal

NOTE Confidence: 0.9750419

00:06:56.494 --> 00:06:58.459 lung sliding such as pleurodesis.

NOTE Confidence: 0.98268485

00:07:01.500 --> 00:07:03.565 In this video clip you can see

NOTE Confidence: 0.98268485

00:07:03.565 --> 00:07:05.320 lung points being demonstrated.

NOTE Confidence: 0.98268485

00:07:05.320 --> 00:07:07.390 Diaphragm again is the Echogenic line

NOTE Confidence: 0.98268485

00:07:07.390 --> 00:07:09.870 seen here between the ribs on the left

NOTE Confidence: 0.98268485

00:07:09.870 --> 00:07:12.339 side of the screen you can see motion

NOTE Confidence: 0.98268485

00:07:12.339 --> 00:07:14.031 which represents movement between

NOTE Confidence: 0.98268485

00:07:14.031 --> 00:07:16.029 the visceral and parietal pleura.

NOTE Confidence: 0.98268485

00:07:16.029 --> 00:07:18.122 While on the right side of the

NOTE Confidence: 0.98268485

00:07:18.122 --> 00:07:20.377 screen the plural line is still

NOTE Confidence: 0.98268485

00:07:20.377 --> 00:07:21.965 consistent with a pneumothorax.

NOTE Confidence: 0.9789907

00:07:25.520 --> 00:07:28.075 Now finally you can use M mode,
NOTE Confidence: 0.9789907

00:07:28.080 --> 00:07:30.318 which stands for motion mode to
NOTE Confidence: 0.9789907

00:07:30.318 --> 00:07:32.572 confirm your suspicion for the presence
NOTE Confidence: 0.9789907

00:07:32.572 --> 00:07:34.648 or absence of a normal thorax.
NOTE Confidence: 0.9789907

00:07:34.650 --> 00:07:37.602 So here you drop the motion line over
NOTE Confidence: 0.9789907

00:07:37.602 --> 00:07:40.120 the center of the pleura and this
NOTE Confidence: 0.9789907

00:07:40.120 --> 00:07:42.675 will split the screen and the bottom
NOTE Confidence: 0.9789907

00:07:42.675 --> 00:07:44.500 half will detect motion overtime.
NOTE Confidence: 0.9789907

00:07:44.500 --> 00:07:46.486 So the same concept applies when
NOTE Confidence: 0.9789907

00:07:46.486 --> 00:07:48.208 there is opposition and normal
NOTE Confidence: 0.9789907

00:07:48.208 --> 00:07:49.893 sliding between the visceral pleura
NOTE Confidence: 0.9789907

00:07:49.893 --> 00:07:52.227 you will see a distinct transition
NOTE Confidence: 0.9789907

00:07:52.227 --> 00:07:54.079 as your ultrasound devices.
NOTE Confidence: 0.9789907

00:07:54.080 --> 00:07:55.260 Picking up this movement,
NOTE Confidence: 0.9789907

00:07:55.260 --> 00:07:57.969 this is often referred to as a seashore sign,
NOTE Confidence: 0.9789907

00:07:57.970 --> 00:08:00.056 which is a good thing because most

NOTE Confidence: 0.9789907

00:08:00.060 --> 00:08:02.455 of us would rather be at the beach

NOTE Confidence: 0.9789907

00:08:02.455 --> 00:08:03.950 than listening to this lecture.

NOTE Confidence: 0.98180366

00:08:06.650 --> 00:08:08.490 In contrast, when a new

NOTE Confidence: 0.98180366

00:08:08.490 --> 00:08:09.962 more thorax is present,

NOTE Confidence: 0.98180366

00:08:09.970 --> 00:08:11.442 your ultrasound cannot detect

NOTE Confidence: 0.98180366

00:08:11.442 --> 00:08:12.914 motion between the pleura.

NOTE Confidence: 0.98180366

00:08:12.920 --> 00:08:14.392 Therefore, the appearance of

NOTE Confidence: 0.98180366

00:08:14.392 --> 00:08:16.232 a barcode will be present,

NOTE Confidence: 0.98180366

00:08:16.240 --> 00:08:18.718 which is only fitting because the next

NOTE Confidence: 0.98180366

00:08:18.718 --> 00:08:20.984 steps are likely to add additional

NOTE Confidence: 0.98180366

00:08:20.984 --> 00:08:23.258 expenses to the health care system.

NOTE Confidence: 0.98284274

00:08:26.170 --> 00:08:28.520 So here we have a case of a 14 year

NOTE Confidence: 0.98284274

00:08:28.587 --> 00:08:30.632 old with a spontaneous pneumothorax

NOTE Confidence: 0.98284274

00:08:30.632 --> 00:08:33.503 who was woken up suddenly with some

NOTE Confidence: 0.98284274

00:08:33.503 --> 00:08:35.765 shortness of breath and chest pain.

NOTE Confidence: 0.98284274

00:08:35.770 --> 00:08:38.269 Ultrasound images of the apex are significant
NOTE Confidence: 0.98284274

00:08:38.269 --> 00:08:40.918 for absent lung sliding on the video clip.
NOTE Confidence: 0.98284274

00:08:40.920 --> 00:08:43.314 In addition, when M mode was applied,
NOTE Confidence: 0.98284274

00:08:43.320 --> 00:08:45.861 there was a positive barcode sign with
NOTE Confidence: 0.98284274

00:08:45.861 --> 00:08:47.990 a straight horizontal lines above and
NOTE Confidence: 0.98284274

00:08:47.990 --> 00:08:50.272 below the plural as no transition zone
NOTE Confidence: 0.98284274

00:08:50.341 --> 00:08:52.574 or lung point was seen by ultrasound,
NOTE Confidence: 0.98284274

00:08:52.580 --> 00:08:54.370 this patient was triaged into
NOTE Confidence: 0.98284274

00:08:54.370 --> 00:08:55.444 the major treatment.
NOTE Confidence: 0.98284274

00:08:55.450 --> 00:08:58.978 Area where chest X ray is 30 minutes later,
NOTE Confidence: 0.98284274

00:08:58.980 --> 00:09:02.298 confirmed the presence of a large
NOTE Confidence: 0.98284274

00:09:02.298 --> 00:09:04.420 right sided pneumothorax. Let
NOTE Confidence: 0.97984374

00:09:04.420 --> 00:09:07.615 us now shift gears and look at
NOTE Confidence: 0.97984374

00:09:07.615 --> 00:09:09.897 ultrasound for the detection of
NOTE Confidence: 0.97984374

00:09:09.897 --> 00:09:12.638 pleural effusion. Be it simple, fluid,
NOTE Confidence: 0.97984374

00:09:12.640 --> 00:09:14.468 complex, fluid or hemothorax.

NOTE Confidence: 0.97789717
00:09:17.810 --> 00:09:19.856 So for assessment of pleural effusion,
NOTE Confidence: 0.97789717
00:09:19.860 --> 00:09:21.988 you will want a curvilinear probe which
NOTE Confidence: 0.97789717
00:09:21.988 --> 00:09:23.950 allows for greater tissue penetration,
NOTE Confidence: 0.97789717
00:09:23.950 --> 00:09:26.197 and you can do this in the
NOTE Confidence: 0.97789717
00:09:26.197 --> 00:09:27.948 supplying position again with the
NOTE Confidence: 0.97789717
00:09:27.948 --> 00:09:29.748 indicator to the patients head.
NOTE Confidence: 0.97789717
00:09:29.750 --> 00:09:32.297 Now here you want to evaluate at the level
NOTE Confidence: 0.97789717
00:09:32.297 --> 00:09:34.839 of the diaphragm with a starting point
NOTE Confidence: 0.97789717
00:09:34.839 --> 00:09:37.250 roughly around the mid axillary line,
NOTE Confidence: 0.97789717
00:09:37.250 --> 00:09:39.483 you'll have to obtain views in both
NOTE Confidence: 0.97789717
00:09:39.483 --> 00:09:41.928 the right upper quadrant and the left
NOTE Confidence: 0.97789717
00:09:41.928 --> 00:09:44.064 upper quadrant for a complete exam.
NOTE Confidence: 0.97789717
00:09:44.070 --> 00:09:46.901 As an example, let's take a look at.
NOTE Confidence: 0.97789717
00:09:46.901 --> 00:09:49.607 The image is created in the
NOTE Confidence: 0.97789717
00:09:49.607 --> 00:09:50.960 left upper Quadrant.
NOTE Confidence: 0.97789717

00:09:50.960 --> 00:09:53.240 The image produced should contain
NOTE Confidence: 0.97789717

00:09:53.240 --> 00:09:55.066 the following anatomy, ribs,
NOTE Confidence: 0.97789717

00:09:55.066 --> 00:09:58.714 spleen towards the top left of the screen,
NOTE Confidence: 0.97789717

00:09:58.720 --> 00:10:00.540 kidney towards the bottom
NOTE Confidence: 0.97789717

00:10:00.540 --> 00:10:02.360 right of the screen.
NOTE Confidence: 0.97789717

00:10:02.360 --> 00:10:03.250 The diaphragm,
NOTE Confidence: 0.97789717

00:10:03.250 --> 00:10:05.920 which is a thin curved echogenic
NOTE Confidence: 0.97789717

00:10:05.920 --> 00:10:08.270 structure which marks the transition
NOTE Confidence: 0.97789717

00:10:08.270 --> 00:10:10.570 zone between abdomen and lungs.
NOTE Confidence: 0.97789717

00:10:10.570 --> 00:10:14.091 In normal circumstances you will see mirror
NOTE Confidence: 0.97789717

00:10:14.091 --> 00:10:17.307 imaging or reflection of the spleen tissue.
NOTE Confidence: 0.97789717

00:10:17.310 --> 00:10:18.926 Slipped behind the diaphragm.
NOTE Confidence: 0.97789717

00:10:18.926 --> 00:10:19.330 However,
NOTE Confidence: 0.97789717

00:10:19.330 --> 00:10:21.574 when fluid collects at the costophrenic
NOTE Confidence: 0.97789717

00:10:21.574 --> 00:10:23.583 angle instead of spleen tissue
NOTE Confidence: 0.97789717

00:10:23.583 --> 00:10:25.387 reflected behind the diaphragm,

NOTE Confidence: 0.97789717

00:10:25.390 --> 00:10:27.814 you will now be able to

NOTE Confidence: 0.97789717

00:10:27.814 --> 00:10:29.430 detect a fluid collection,

NOTE Confidence: 0.97789717

00:10:29.430 --> 00:10:31.662 which will also make the thoracic

NOTE Confidence: 0.97789717

00:10:31.662 --> 00:10:33.870 spine more easy to identify.

NOTE Confidence: 0.9829086

00:10:37.960 --> 00:10:39.168 In this video clip,

NOTE Confidence: 0.9829086

00:10:39.168 --> 00:10:40.980 we can see normal appearance of

NOTE Confidence: 0.9829086

00:10:41.045 --> 00:10:43.175 anatomy and the left upper quadrant.

NOTE Confidence: 0.9829086

00:10:43.180 --> 00:10:45.562 The spleen is a relatively homogeneous

NOTE Confidence: 0.9829086

00:10:45.562 --> 00:10:47.483 structure which appears in the

NOTE Confidence: 0.9829086

00:10:47.483 --> 00:10:49.366 middle of the screen to the right

NOTE Confidence: 0.9829086

00:10:49.366 --> 00:10:51.460 of the screen and below the spleen

NOTE Confidence: 0.9829086

00:10:51.460 --> 00:10:53.273 you will see the left kidney.

NOTE Confidence: 0.9829086

00:10:53.273 --> 00:10:55.777 The lungs will be above and to the

NOTE Confidence: 0.9829086

00:10:55.777 --> 00:10:58.170 left of the spleen and not visible.

NOTE Confidence: 0.9829086

00:10:58.170 --> 00:10:59.148 On these images,

NOTE Confidence: 0.9829086

00:10:59.148 --> 00:11:00.452 the most important structure
NOTE Confidence: 0.9829086

00:11:00.452 --> 00:11:02.082 to note is the diaphragm,
NOTE Confidence: 0.9829086

00:11:02.082 --> 00:11:03.715 which will demarcate the area
NOTE Confidence: 0.9829086

00:11:03.715 --> 00:11:05.340 of the cost for Fennec.
NOTE Confidence: 0.9829086

00:11:05.340 --> 00:11:06.965 Angle where fluid would build
NOTE Confidence: 0.9829086

00:11:06.965 --> 00:11:08.669 up should it be present,
NOTE Confidence: 0.9829086

00:11:08.670 --> 00:11:10.758 but in this case we see we are
NOTE Confidence: 0.9829086

00:11:10.758 --> 00:11:12.574 imaging and reflection of the
NOTE Confidence: 0.9829086

00:11:12.574 --> 00:11:14.210 spleen behind the diaphragm,
NOTE Confidence: 0.9829086

00:11:14.210 --> 00:11:15.510 which you would expect
NOTE Confidence: 0.9829086

00:11:15.510 --> 00:11:16.485 in normal circumstances.
NOTE Confidence: 0.9854469

00:11:20.140 --> 00:11:21.396 In this video clip,
NOTE Confidence: 0.9854469

00:11:21.396 --> 00:11:23.785 you can see a moderate size Pearl
NOTE Confidence: 0.9854469

00:11:23.785 --> 00:11:25.521 diffusion by ultrasound with
NOTE Confidence: 0.9854469

00:11:25.521 --> 00:11:27.691 its corresponding chest X ray.
NOTE Confidence: 0.9854469

00:11:27.700 --> 00:11:29.430 The fluid is accumulating above

NOTE Confidence: 0.9854469

00:11:29.430 --> 00:11:31.860 the liver and above the diaphragm,

NOTE Confidence: 0.9854469

00:11:31.860 --> 00:11:33.834 and in this instance you can

NOTE Confidence: 0.9854469

00:11:33.834 --> 00:11:35.683 also see disease lung tissue

NOTE Confidence: 0.9854469

00:11:35.683 --> 00:11:37.527 within the pleural effusion,

NOTE Confidence: 0.9854469

00:11:37.530 --> 00:11:39.038 and additional important finding

NOTE Confidence: 0.9854469

00:11:39.038 --> 00:11:40.923 is the thoracic spine sign,

NOTE Confidence: 0.9854469

00:11:40.930 --> 00:11:43.108 which can only be visualized when

NOTE Confidence: 0.9854469

00:11:43.108 --> 00:11:44.560 there's enough fluid presence

NOTE Confidence: 0.9854469

00:11:44.623 --> 00:11:46.123 between the ultrasound probe

NOTE Confidence: 0.9854469

00:11:46.123 --> 00:11:47.998 and the thoracic vertebral body

NOTE Confidence: 0.9854469

00:11:47.998 --> 00:11:49.700 that allows for sufficient.

NOTE Confidence: 0.9854469

00:11:49.700 --> 00:11:51.760 Ultrasound transmission to reach and

NOTE Confidence: 0.9854469

00:11:51.760 --> 00:11:54.270 be reflected by the thoracic spine.

NOTE Confidence: 0.9854469

00:11:54.270 --> 00:11:57.150 This is a key finding to look for

NOTE Confidence: 0.9854469

00:11:57.150 --> 00:11:59.350 when diagnosing pleural effusions or

NOTE Confidence: 0.9854469

00:11:59.350 --> 00:12:02.146 hemothorax in the setting of trauma.
NOTE Confidence: 0.97823024

00:12:05.590 --> 00:12:06.998 In this video clip,
NOTE Confidence: 0.97823024

00:12:06.998 --> 00:12:09.110 we can see a large postoperative
NOTE Confidence: 0.97823024

00:12:09.180 --> 00:12:11.724 pleural effusion and a 3 year old who
NOTE Confidence: 0.97823024

00:12:11.724 --> 00:12:14.258 is status post liver transplantation.
NOTE Confidence: 0.97823024

00:12:14.260 --> 00:12:16.514 You can clearly make out a thoracic
NOTE Confidence: 0.97823024

00:12:16.514 --> 00:12:19.270 spine sign and see lung tissue movement
NOTE Confidence: 0.97823024

00:12:19.270 --> 00:12:21.420 within this large fluid collection.
NOTE Confidence: 0.96706915

00:12:25.220 --> 00:12:28.036 In this case, we can see a massive
NOTE Confidence: 0.96706915

00:12:28.036 --> 00:12:29.732 left sided parapneumonic effusion
NOTE Confidence: 0.96706915

00:12:29.732 --> 00:12:33.364 in an 8 year old who was eventually
NOTE Confidence: 0.96706915

00:12:33.446 --> 00:12:35.534 diagnosed with pneumonia caused
NOTE Confidence: 0.96706915

00:12:35.534 --> 00:12:38.762 by Group A strep which grew out
NOTE Confidence: 0.96706915

00:12:38.762 --> 00:12:40.950 of her thoracic thesis fluid.
NOTE Confidence: 0.9795385

00:12:44.010 --> 00:12:45.895 In contrast, smaller pleural effusions
NOTE Confidence: 0.9795385

00:12:45.895 --> 00:12:48.349 may be more subtle to pick up,

NOTE Confidence: 0.9795385
00:12:48.350 --> 00:12:49.798 especially when a coexisting
NOTE Confidence: 0.9795385
00:12:49.798 --> 00:12:50.884 pneumonia is present.
NOTE Confidence: 0.9795385
00:12:50.890 --> 00:12:52.882 In this example, we have an
NOTE Confidence: 0.9795385
00:12:52.882 --> 00:12:55.450 11 year old with a right lower
NOTE Confidence: 0.9795385
00:12:55.450 --> 00:12:57.766 lobe pneumonia as seen by X-ray.
NOTE Confidence: 0.9795385
00:12:57.770 --> 00:12:59.210 In this particular ultrasound,
NOTE Confidence: 0.9795385
00:12:59.210 --> 00:13:01.389 there's only a small area that
NOTE Confidence: 0.9795385
00:13:01.390 --> 00:13:02.830 appears hypoechoic with a
NOTE Confidence: 0.9795385
00:13:02.830 --> 00:13:04.278 visible spine sign just
NOTE Confidence: 0.9795385
00:13:04.278 --> 00:13:05.726 deep to this collection.
NOTE Confidence: 0.9795385
00:13:05.730 --> 00:13:07.402 Lung Hepatization is present,
NOTE Confidence: 0.9795385
00:13:07.402 --> 00:13:10.305 so this ultrasound would be diagnostic for
NOTE Confidence: 0.9795385
00:13:10.305 --> 00:13:12.615 a pneumonia with a small non drainable.
NOTE Confidence: 0.9795385
00:13:12.620 --> 00:13:14.400 Fusion in this next example,
NOTE Confidence: 0.9795385
00:13:14.400 --> 00:13:16.570 we have a 12 year old with
NOTE Confidence: 0.9795385

00:13:16.570 --> 00:13:18.300 right lower lobe pneumonia.

NOTE Confidence: 0.9795385

00:13:18.300 --> 00:13:20.995 The cost of frenic angle does have

NOTE Confidence: 0.9795385

00:13:20.995 --> 00:13:23.268 a blunted appearance on chest X ray,

NOTE Confidence: 0.9795385

00:13:23.270 --> 00:13:25.400 making a diagnosis of effusion difficult.

NOTE Confidence: 0.9795385

00:13:25.400 --> 00:13:26.504 However, ultrasound evaluation

NOTE Confidence: 0.9795385

00:13:26.504 --> 00:13:28.344 of this area reveals Hepatization

NOTE Confidence: 0.9795385

00:13:28.344 --> 00:13:29.776 and Bronchograms which are

NOTE Confidence: 0.9795385

00:13:29.776 --> 00:13:31.076 consistent with infiltrate alone,

NOTE Confidence: 0.9795385

00:13:31.080 --> 00:13:32.500 and there's no secondary

NOTE Confidence: 0.9795385

00:13:32.500 --> 00:13:34.275 pleural effusion to be seen.

NOTE Confidence: 0.9795385

00:13:34.280 --> 00:13:36.695 Let's take a moment to look at

NOTE Confidence: 0.9795385

00:13:36.695 --> 00:13:38.546 these two ultrasound clips side

NOTE Confidence: 0.9795385

00:13:38.546 --> 00:13:41.150 by side so you can appreciate the

NOTE Confidence: 0.9795385

00:13:41.150 --> 00:13:42.948 difference between no effusion.

NOTE Confidence: 0.9795385

00:13:42.950 --> 00:13:44.118 And a small effusion.

NOTE Confidence: 0.9746984

00:13:47.290 --> 00:13:50.685 Second, here you can see a rather

NOTE Confidence: 0.9746984

00:13:50.685 --> 00:13:53.539 complex pleural effusion with internal

NOTE Confidence: 0.9746984

00:13:53.539 --> 00:13:56.502 septations and honeycomb, like appearance.

NOTE Confidence: 0.9746984

00:13:56.502 --> 00:14:01.206 Note at the bottom of the screen that the

NOTE Confidence: 0.9746984

00:14:01.206 --> 00:14:04.788 thoracic spine can be clearly visualized.

NOTE Confidence: 0.964332

00:14:08.360 --> 00:14:11.048 Now, if you happen to be using a

NOTE Confidence: 0.964332

00:14:11.048 --> 00:14:13.445 linear probe to assess for new motor

NOTE Confidence: 0.964332

00:14:13.445 --> 00:14:15.118 acts or a pediatric pneumonia,

NOTE Confidence: 0.964332

00:14:15.120 --> 00:14:17.402 you should be able to detect pleural

NOTE Confidence: 0.964332

00:14:17.402 --> 00:14:19.478 effusion should it be present and

NOTE Confidence: 0.964332

00:14:19.478 --> 00:14:21.198 the appearance of fluid within

NOTE Confidence: 0.964332

00:14:21.198 --> 00:14:22.940 the visceral and parietal pleura

NOTE Confidence: 0.964332

00:14:22.940 --> 00:14:24.920 will give you a much different

NOTE Confidence: 0.964332

00:14:24.920 --> 00:14:26.948 image than if that potential space

NOTE Confidence: 0.964332

00:14:26.950 --> 00:14:29.990 was occupied by air.

NOTE Confidence: 0.964332

00:14:29.990 --> 00:14:31.901 So let's take a look at this

NOTE Confidence: 0.964332

00:14:31.901 --> 00:14:33.949 clip with a pleural effusion,
NOTE Confidence: 0.964332

00:14:33.950 --> 00:14:35.930 as seen by a linear probe.
NOTE Confidence: 0.964332

00:14:35.930 --> 00:14:38.240 First will make note of the ribs,
NOTE Confidence: 0.964332

00:14:38.240 --> 00:14:39.780 which are superficial Bony structures
NOTE Confidence: 0.964332

00:14:39.780 --> 00:14:41.870 that should be bright or echogenic,
NOTE Confidence: 0.964332

00:14:41.870 --> 00:14:43.520 but also cast a shadow.
NOTE Confidence: 0.964332

00:14:43.520 --> 00:14:45.170 The pleural effusion will displace
NOTE Confidence: 0.964332

00:14:45.170 --> 00:14:46.820 the pleura posteriorly and in
NOTE Confidence: 0.964332

00:14:46.820 --> 00:14:48.680 this case we lose our normal
NOTE Confidence: 0.964332

00:14:48.680 --> 00:14:49.550 sonographic lung architecture
NOTE Confidence: 0.964332

00:14:49.550 --> 00:14:51.440 as there is no reverberation,
NOTE Confidence: 0.964332

00:14:51.440 --> 00:14:53.420 a line artifacts to be seen,
NOTE Confidence: 0.964332

00:14:53.420 --> 00:14:55.365 so the pleural effusion here can
NOTE Confidence: 0.964332

00:14:55.365 --> 00:14:57.377 be detected as an anechoic fluid
NOTE Confidence: 0.964332

00:14:57.377 --> 00:14:59.658 collection that is below the ribs, but.
NOTE Confidence: 0.964332

00:14:59.658 --> 00:15:01.148 In front of the lungs.

NOTE Confidence: 0.97843695

00:15:03.850 --> 00:15:06.474 And in this example we can see a

NOTE Confidence: 0.97843695

00:15:06.474 --> 00:15:08.833 pleural effusion filling in the left

NOTE Confidence: 0.97843695

00:15:08.833 --> 00:15:11.281 costophrenic angle with the linear probe.

NOTE Confidence: 0.97843695

00:15:11.290 --> 00:15:13.150 You can actually see tremendous

NOTE Confidence: 0.97843695

00:15:13.150 --> 00:15:14.634 resolution of the diaphragm,

NOTE Confidence: 0.97843695

00:15:14.634 --> 00:15:17.610 and note that it has a double line

NOTE Confidence: 0.97843695

00:15:17.610 --> 00:15:19.848 appearance as the muscle is found

NOTE Confidence: 0.97843695

00:15:19.850 --> 00:15:21.702 between the parietal pleura and

NOTE Confidence: 0.97843695

00:15:21.702 --> 00:15:23.563 the lining of the peritoneum.

NOTE Confidence: 0.97843695

00:15:23.563 --> 00:15:25.429 Due to the poor penetration

NOTE Confidence: 0.97843695

00:15:25.430 --> 00:15:27.290 available with a linear probe,

NOTE Confidence: 0.97843695

00:15:27.290 --> 00:15:29.215 we cannot reliably assess for

NOTE Confidence: 0.97843695

00:15:29.215 --> 00:15:31.551 mirror imaging artifact nor for the

NOTE Confidence: 0.97843695

00:15:31.551 --> 00:15:33.609 presence of a thoracic spine sign.