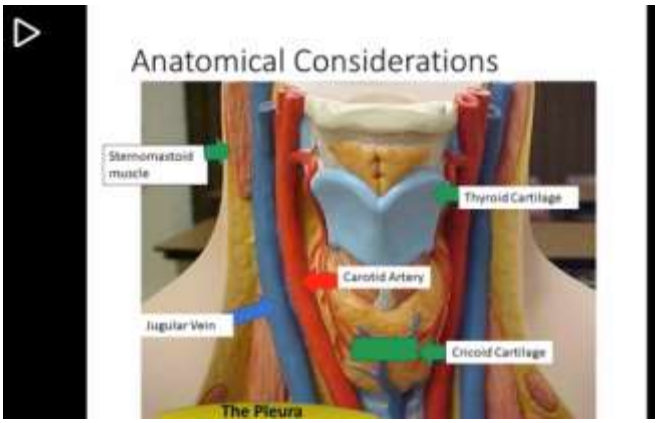
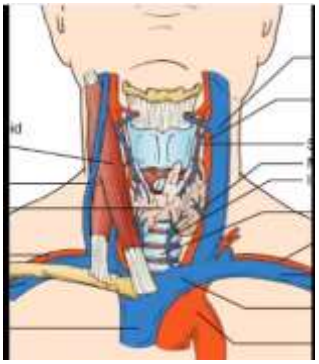
Notes on the placement of CVC lines part one.

Transcript of video.

[00:00:01] Welcome to this presentation, "notes on the placement of right internal jugular central lines". The aim of this making this presentation is to provide you with some information that you'll need before you start to place right internal jugular lines. The idea is that it's easier to take some of this information in before you actually start placing the line, all be it that you'll be doing it under supervision, so that you don't have to concentrate on two things the same time. So the idea is that you go into your first attempt to place line, having already been equipped with some of the information that you'll need to be able to place lines safely. The video should be watched in conjunction with a different video, which is called The "Use of LocSSIPs or local safety standards for invasive procedures, LocSSIPs for central lines". That's a presentation that you'll need to have some basic information about some of the safety standards that we need to follow when we place a central line. So in summary, the aim of this presentation is to equip you with some knowledge that you will be required to have to be able to place central lines. And that it's easier to acquire this knowledge now before you're actually concentrating on the required hand eye coordination to place line.



[00:01:54] So I hope you find the presentation interesting and we'll get going so we can to start off by looking at some anatomical considerations here. We can see a plastic model of a patient's neck. The thyroid and cricoid cartilage is forming parts of the voice box in the centre of the neck. The carotid artery is then just lateral to that and then lateral again is the jugular vein in this model. The relationship between the artery and the vein isn't consistent at all. Although this is normal to have the vein lateral to the artery, which you can palpate in the neck, it's not essential that it's this way around. Also notice on the left side of the neck, the artery and vein are more overlying. In real patients, the vein may be in front of the carotid artery or occasionally to the medial aspect to the carotid artery and very rarely have the artery maybe in front of the vein. But all these anatomical variables you will definitely see in patients. You can also see in the diagram that I placed the pleura towards the bottom of the neck. This is higher than it is in real life for most patients, but it's there to remind you that it exists and you really don't want to stick a needle into it.



[00:03:39] In the model, the sternum mastoid muscle have been cut away. But in reality, it overlies the artery and vein, as you can see here. And also, you can see the external

jugular vein which runs over the sternum mastoid muscle. So back to real life,and here we can see Kevin's neck and he's lifting his head off the bed. To illustrate the sternum, mastoid and muscle, you can ask a patient to do this if you want to define the anatomy of the neck. You'll also note that his head is turned slightly to his left hand side. This is an appropriate position for placing a central venous catheter. You do not want the neck rotated excessively to the left hand side. As this may move the vein more medially in front of the carotid artery. Also, you'll note that the head is definitely not flexed. So oftentimes we will remove the pillow or else we will make sure there's only a very small pillow. If the patient's awake, they'll tell you when you are overextending their neck. If they're unconscious, you will need to use some judgement.

[00:05:11] So to look deeper into the anatomy of the neck, we'll need to use the ultrasound machine and to do this. We'll need to talk a bit about the machine before we talk about the images that it can produce. So here we see a photograph of the machine. So the red arrows pointing towards the on off button, which you just push in. If it doesn't come on, then look at the cable at the back of the machine at the bottom. It's often not properly plugged in. So just push it in, and then the machine should work. There are two dials at the bottom. The green one, which you can see here, is for the gain. Turning this would make the image either lighter or darker adjusted to get the amount of details that

you need. Next to it is the depth dial. Adjusting this will determine how far down the ultrasound image will go into the neck next to the dials as some buttons. The last one to press gives colour to the image which allows us to see blood flow at the top. Near the left hand side is a tiny green dot. And this is important to check the alignment of the ultrasound probe at the bottom of the screen. On the right hand side is the little number, which tells us how deep the ultrasound probe is. And when we adjust the depth dial, this number will change as the ultrasound gets see the shallower or deeper. So, again, to see all this in real life, you can see the on off button to press at the bottom, you can see the two dials, the depth. And as you turn it, the depth indicator will change. There you are. It's changed. And you can see that moving, there you go. And then the other dial is for the gain. And you can't see how this changes because there's no image, then pressing the colour button, we'll put that colour image and you can move it using the mouse pad at the bottom. So that turns it on and off by press and that turns the colour on and off by pressing it.

[00:07:38] Okay, so this is the kind of image that we should be able to get with a nice, clear carotid artery and jugular vein, the artery being for a round vein, slightly more oval in shape, one to the other side of each other. We can clearly see the back walls of the vessels, but we can't see a whole lot deeper. And this is what we kind of image that we want to get. So to get a nice picture like that, we may well need to reduce the depth here from three point eight centimetres to 2.5. As we're doing this, look at the difference in pulsation as the vessels, the artery on the left is just systolic and diastolic, the Vein's venous pulse is more nuanced with several components to it. Next to just the gain. As you can see here, as we turn the gain up and then down again, just choose the level which you most comfortable with. Now we can see a video about head up and head down .So here with some slight head up.

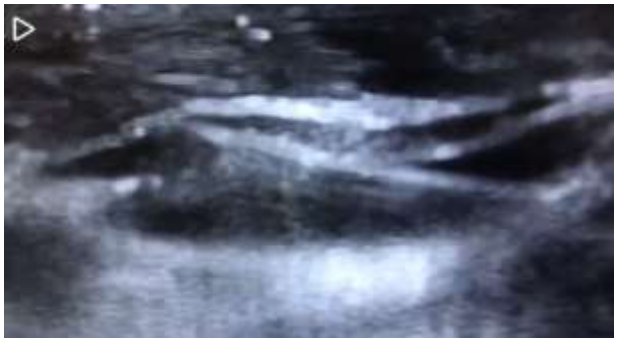
The vein has almost completely disappeared. You'll also notice during the video that with this in this position, the vein is very dependent on the respiratory cycle and it will collapse and expand as the patient breaths in and out as you would expect to see a hypovolemic patient. Head down the vein is now well distended. So this is important in helping position the patient together with the neck extension and rotation as described earlier. So here's the video and you can see the black arrows shows the bed moving up and down as the van gets bigger and smaller. I'm sorry that the camera is moving so much. Head down may be a problem for some patients. And in this circumstance, only put their head down when you really need it for as little as possible and put the patient flat again as soon as you can.

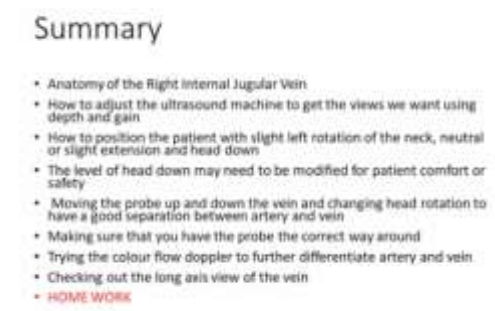
[00:10:00] So in this image, unfortunately, we can see the vein in front of the artery. This is a bad situation, as we'll see later. Sometimes you can sort of type by rotating the neck. So it's a little bit more central. And the other thing you can do is, as we're doing in this video here, we're moving the probe up and down the neck to look to see if the relationship between the artery and the vein changes as we go up and down. It clearly does in this subject. So there's a couple of things to try and sort this problem out.

[00:10:41] Now, I want to talk about the important problem. It's possible to put the probe the wrong way round. So you can see here you can identify, there's a dot on one side to probe but not on the other side. When you put the probe on, you should put the dot facing towards the trachea and then that would be the right way round the artery and the vein. But when we take the probe off and put it back on again here, the wrong way round, you can see that the artery in vain seemed to be transposed. But it's an illusion. So you have to put it on the correct way round. Okay. An important check for this is to tap the end of the probe and look at which side of the image moves when we tap. So that's the correct way round. And then when we tap the other side, the other end of the image moves. The next issue is to check the comprehensibility of the vein by depressing it with the probe.

[00:11:46] This helps differentiate with the artery, which is generally non-compressible. But it's also important to check that the vein hasn't been thrombosed in which case it also will be non-compressible. I now just want to say a little bit about colour. If the ultrasound beam hits moving red blood cells, it's moving towards the probe when they're reflected back. The sound waves will be compressed. If they're moving away from the sound wave from the probe, then they'll be lengthened on reflection. This is a Doppler shift and it can be used to make these colour images that we see here. Now, normally, because the ultrasound probe is parallel to the vessel, there isn't a great deal of colour flow to see, but it still can be useful to put the colour flow on to differentiate between the

artery and the vein. As we can see here, it's not as straightforward as the artery is red and the vein is blue because it depends which way round the blood's flowing, dependent on how you have to probe on. And it's not that useful in internal jugular line placement because the artery and vein are normally easy to tell apart even without the colour flow. But it's worth trying and getting familiar with because it can be useful in difficult femoral line placement. So the last thing that I wanted to talk about in this video was long and short axis . So generally speaking, we use the ultrasound probe at 90 degrees to the vein. And this is because it means there's plenty of room for the needle and syringe. But we can turn the ultrasound probe to 90 degrees so that we can see the vein in its full length. Generally speaking, we don't use this from we place the needle because it means there's not enough room, much heat to fit the needle, particularly in a short necked patient. But it is useful to confirm the position of the guidewire later on, as we can see in this image. So you can now see the vein has a long structure. You can also see it's still clearly compressible and you can see that guidewire in it.





[00:14:27] So that's pretty much the end of the tutorial, but in summary, we've looked at the anatomy at the right internal jugular vein. We've looked at how to adjust the ultrasound machine to get the views that we want using depth and gain. We've looked at how the patient should be positioned with the slight left rotation of the neck, the neck being in neutral or slight extension and head down as much as is possible and

convenient. The level of head them might need to be adjusted for patient comfort or safety, moving the probe up and down the vein and changing head rotations to make a good separation in the artery and vein and choose a good point to place the central line itself.

[00:15:19] Then making sure the probe is held the correct way down and try and the colour flow Doppler to help differentiate between artery in vein and then checking out the long axis view, which will need to confirm the guidewire position.

[00:15:39] There is some homework which would be useful for you to do before you actually start doing these procedures. Firstly, if you need to for your exams, you'll need to revise the anatomy of the neck because we're not really covered in detail. Next, try out the ultrasound machine, check you understand it to use depth and gain and colour. Use the machine on patients and look at other structures like the thyroid and trachea. Try deliberately putting the probes the wrong way round and check you understand how it all works so it's the right way round when you need it to be. Check you can tap the probe and identify left and right and see the difference head down makes. Now look forward to part two of this presentation where we'll talk more about line placement. Thank you for your attention.

[00:16:33] So it just remains for me to thank my co-conspirators in the making of this video. And cheerio. We'll play you out with some music.