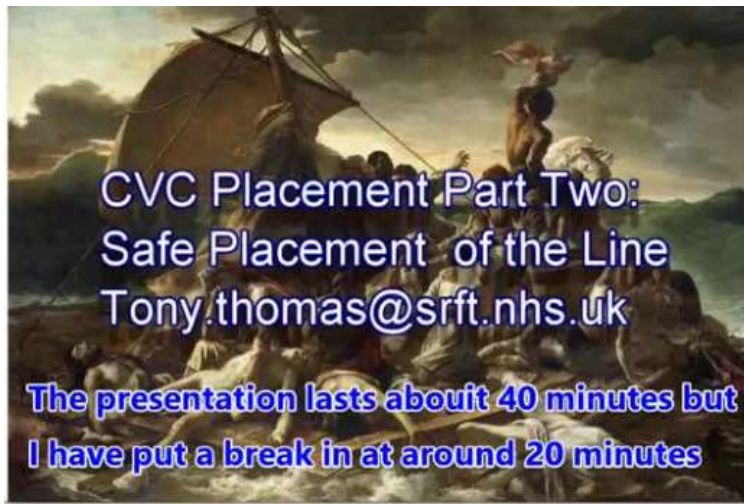


CVC placement part two (Part A).mp4



[00:00:00] Welcome to this second presentation in a series of three presentations on RIJ central line placement, you should already have seen Volume one where we introduced the use of the ultrasound and we dealt with some problems with anatomy of the right internal jugular vein. In this presentation, we again to deal with some more practical aspects of actually placing the line. I've got this picture to start with, the Raft of the Medusa, which you can normally see in the Louvre art gallery. And it shows some sailors who've been cast adrift. Now, this problem wouldn't have happened to them if they had left their ship firmly anchored in the port and anchoring and holding the central line. And ultrasound probe carefully and fixed, anchored against the patient's skin, are core skills, which we will be discussing later in the presentation. So the aspects that we can to cover are: Set up in preparation, Getting the guidewire into the vein, and then began to finish off with a few odds and sods. And then we're going to make a conclusion and we're going to talk about any further work you need to do before actually practising to put these lines into patients. So we'll get started. So here we can see a beautifully prepared tray set up by one of our trainees. And I'm not going to tell you how to open stuff onto a sterile trolley, but. You need to keep everything neat and tidy, otherwise you won't be able to find it when you do need it and there are some key things which I'm going to cover in this.



[00:01:52] Firstly, there is two little clips which you apply after to place the central line just just near the puncture site. And these are easy to lose in all the other stuff and can make you quite flustered when you can't find them. So make sure you know where they are on the trolley. The next thing I want to point out is that dilator, this is used to stretch over the guidewire says it's the central line will actually go in and you need to make a little neck at the skin just at the level that the guidewire enters the skin so that you can then kind of rotate and push in the dilator. The point about mentioning this is when you open the pack for the central line onto the trolley, it's easy to forget the dilator and then it's left in the packaging that's thrown in the bin with the dilator and a whole new set needs to be opened. So make sure you have the dilator out of the packet before the rest of the packet is actually empty before it's thrown out. The next thing I want to mention is the suture. So this is a big hand-held suture on a curved needle. And you are risk of causing yourself a needle stick injury. And I put a reference along the bottom talking about injury to staff. I would not personally not accept anything else apart from this and be very careful not to stab yourself and be carefully dispose of the Sharps correctly at the end. But that's the needle that I would use.

[00:03:34] Sometimes the nurses try and fob you off with some tiny little needle. The thing which is useless and likely you will stab yourself with it. The central line you can see in the middle. Most of the three way taps have been applied except for the brown

Lumen where the guidewire can come out of. But you can see the three way tap ready to apply here when the guidewire has been removed. There's also two Cloraprep sticks. Personally, I think you probably can manage with one because you will have some additional saline that you can clean the skin with after you've completed the procedure. You'll notice at the end that there are two syringes. So you should normally use the lignocaine and you need to know what's in which syringes are lignocaine syringe. So I always leave the 25 gauge needle that you can to use to infiltrate the skin on that, to identify which syringe it is. Then the needle that you can take the syringe again to put it in the end of the needle that's going to puncture the skin to put the guidewire in . I personally would normally use only a 10 ml syringe and I would have a little bit, probably about 4 mls of saline in that syringe. It makes it easier to see the blood when it comes out. And you can also flush the needle a little bit to stop clotting. This makes it less likely that blood clots to block the end of the needle.

NHS Business Services Authority 2016 Blunt drawing up devices



[00:05:17] There are two types of needle that we use to draw up solutions in the critical care unit. One is a blunt needle and the other is a blunt needle that has a filter in it. And they look fairly similar, but they're different. And we should use the filter needle if we want to draw up local anaesthetic, particularly because it's come from a glass ampule. And also, we don't really, really, really don't want any bacteria to get into our new central line. So make sure when your drawing the local anaesthetic you use a filter needle to draw up and you don't use a plain blunt needle.



[00:05:59] Now we're going to see how to put the cover on the ultrasound probe and you can see the how the stuff's opened out onto the trolley. Obviously, this would be with all the other equipment. But then inside, note those two rubber bands and don't lose them. Then you fold it up like Tricia's doing here and then get the jelly ready. And put it on the end. Now, to get a really good ultrasound connection. Kevin's also putting some jelly directly onto the probe. Look at the screen change there when there was jelly on it. And he's holding the jelly up so we can see. And then that's threaded in. This is a two person approach. But you need to keep everything sterile. Pulled the cover down. And they don't get the non sterile wire on the trolley and then put the rubber bands on like this. And you saw how she scrunched up the gel to make sure that it's on the end of the probe. So we are all done. Now, this is an important image because we can see the ultrasound machine positioned on the patient's right hand side.



[00:07:19] And I would suggest that the that the machine is placed right in near the bed so that you can easily see it.

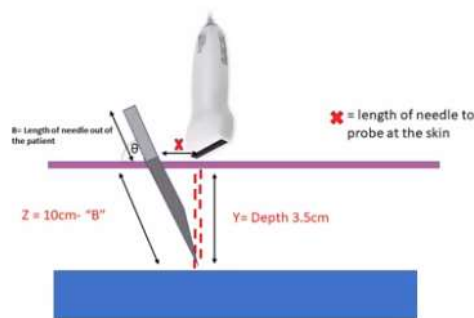
[00:07:29] Before you actually scrub up, you will have examined the neck like this so that you can adjust the gain in the depths of the machine before you actually get scrubbed up. Although if you want to get the nurse to adjust subsequently, I suggest you explain it to them before you get scrubbed up. Now, what we do is called ultrasound guided central line placement. So when you're actually doing the procedure, most of the time you'll be looking at a screen like she is here rather than looking at the needle. Clearly occasionally you need to glance down at it to check everything's going all right and to see whether aspirating blood or not. But a big part of the procedure, you're looking at the screen, which is going to have been ergonomically placed to make your life as easy as possible.



Okay. Now we're going to talk about how to get the needle safely into the vein, but we can digress a little bit by showing you a picture of a thing called a Touhy needle, which we used to cite epidurals. And you notice in this that the length of this metal is eight centimeters enough to the first three centimeters. There are one centimeter markings. Why on earth would this be like this? Well, the Touhy needle is in the skin if you count how many markings are left. That you can see, that's four. Then you know that there are also for is four centimeters into the skin.

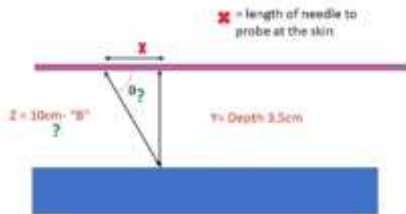


[00:09:10] So the total is eight. However many you can see at minus. That will tell you how far the needle is into the patient's back. So very, very annoyingly, needles don't have those centimeter markings on. But you know that if they're nine centimeters from the end of the one then to the far end and you then kind of just have to look at it and try and work out if that much metal is left outside the skin, then that much is then the remainder is inside. And the big clue you have, which you don't have with epidurals, which is really helpful, is the ultrasound image gives you a really good idea of how deep the vein is. So if you if the veins you see an ultrasound is three centimetres below the skin and you've advanced the needle five centimetres, then, you know, something must be really profoundly wrong and you must have missed the vein. If you then keep advancing the needle, you're likely to cause a pneumothorax. Okay, so this is the mental model that we need to try and create. We know the depth to the vein. Why? Because we could measure it with the ultrasound image.



[00:10:37] We know the total length of the needle and here I've pretended it's 10 centimeters. So we know we can see how much is outside of the patient. So that tells us how much is inside. We also can see the distance between the needle and the probe. So we need to construct this image and use it to direct the needle. Now, you'll notice that the approach to the vein is much steeper than we would use for peripheral cannulas and arterial lines. And I guess the last couple of years you've been learning how to use an increasingly superficial approach to peripheral venous and arterial cannulation because the whole bevel of the needle for a peripheral line or arterial line, the whole bevel needs to be in the vessel for you to be successful. But with the central line, the vein is much bigger than the needle. So that's not so much of a problem. So this is, as I've said, the kind of mental image you need to have in your brain. And

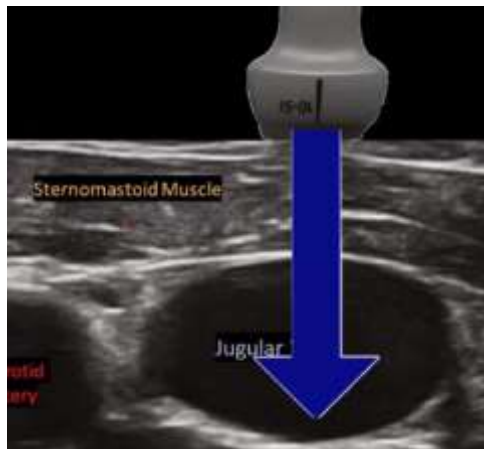
unfortunately, some of the things, the length Z is an estimate. And we don't have a tape measure to measure X.



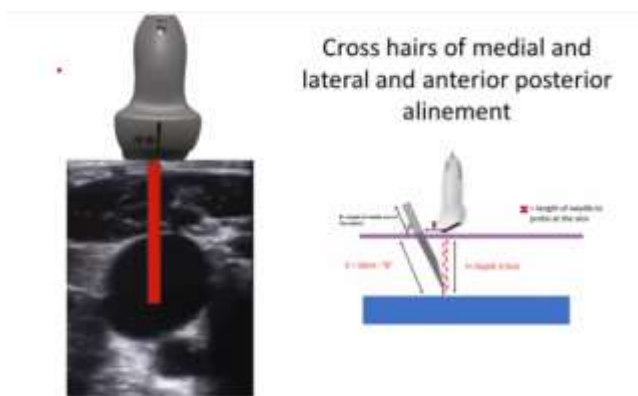
[00:11:57] We just have to build this image up with practice in our brain. Now, the next point is that that's we've talked about anterior and posterior positioning. But we've also got medial and lateral. And there's an important point in the ultrasound probe that there's a nice black line in the middle of the probe. So that tells us that we can see that at the skin.



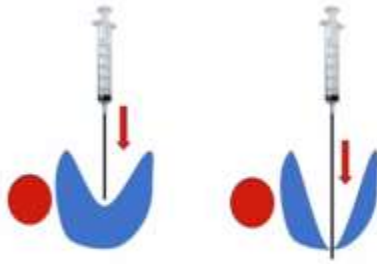
[00:12:23] So we if we adjust the that black line to get the ultrasound image with the vein in the middle of the picture. So you need to adjust the probe so that it's like this with the image, the vein in the middle of the image as near as best you can. And it's actually quite difficult to do this. But if you move the probe around to the vein is in the middle of the image. So if the vein is in the middle of the image and you can see the black line in the middle of the probe. If you put the needle in in line with the black line, then it will also be in line with the vein.



[00:13:08] So the needle now should be in line with the vein, both in the anterior posterior positioning of the vein and also in the medial and lateral positioning. So it is like getting a something in the crosshairs of a rifle.

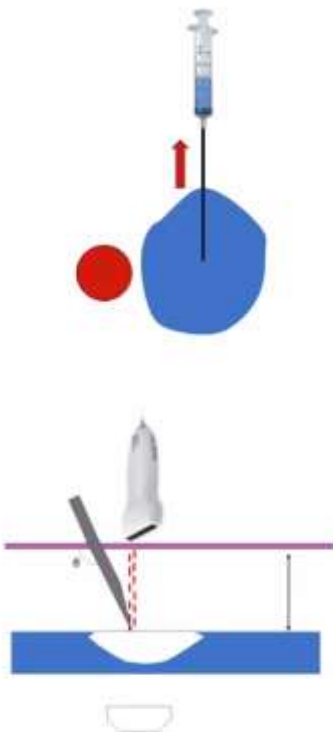


[00:13:34] Now, the vein is actually a dynamic structure and it can move and it can move as we direct the needle towards it, in so far as the anterior wall of the vein can be pushed towards the posterior wall before the vessels actually been punctured. Now, this movement is kind of helpful as we identify how the needle goes towards the vein. But it has the downside that we can puncture the anterior and posterior walls of the vein at the same time and have no flashback of blood. And out she goes through the back wall of the vein.

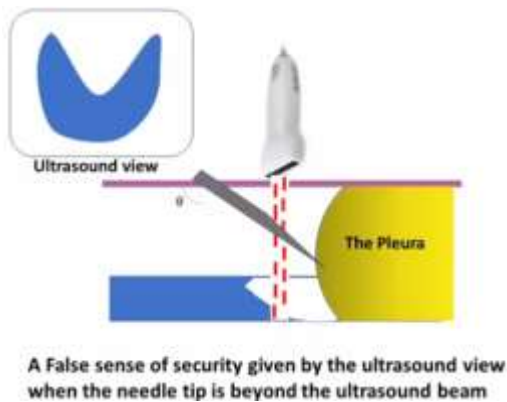


[00:14:12] The other thing to say about this is that we've identified the anterior surface as the wall of the vein to be at, say, two and a half centimeters, then we shouldn't be that surprised if we don't hit the vein at two and a half centimeters. And we may have to go a bit deeper.

[00:14:32] But this problem that we've described here of going out the back of the posterior wall before any flashback of blood can be overcome by carefully withdrawing the needle and then the vein will be stretched in the other ways. So the anterior wall will be pulled away from the posterior wall. So there is then be a big area for us to be able to draw blood back on to confirm placement within the vein.



[00:15:04] So this posterior displacement of the anterior wall of the vein is an important clue that we're about to enter the vein with the needle. But unfortunately, it can also give us a false sense of security because you also get this anterior displacement just from the needle being vaguely around the vein. So here we can see a big problem. The vein looks as if it is being depressed, anterior posteriorly by the needle. But in actual fact, the needle has moved beyond the ultrasound probe. So we think that we're about to enter the vein with the needle. But in fact, the needle has gone continued past the ultrasound image and is heading towards the pleura.



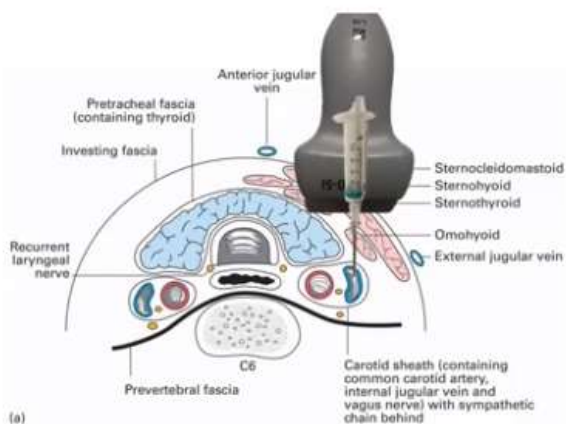
[00:15:58] So this happens partly because people it takes a while to construct that mental model of the angles and the depths and things. And so it's possible to make mistakes and this superficial approach, which we can see here with the angle of the needle. People tend to like to think that they like to use this because this is what they've learned from the peripheral cannula and arterial lines. But a steeper approach would make this much less likely to be a problem. Now, the other thing about this is that when you come to place double Lumen lines, which are much thicker and don't bend as easily for those lines, you'll have to go back to using a constructing a different type of triangle with a more superficial approach so that the length between the probe and the needle will be longer.



[00:16:58] That Distance X and the total length the needle will be in further. And that's because the double lumen won't really bend at the acute angle that you would have with the steep approach, that I'm describing. But it's best to learn a steep approach because it's safer and it's less likely to cause a pneumothorax. And then when you're happy with all of that, then later on in your career you move on to placing large double lumen catheters.

[00:17:34] While we're talking about complications. The other main complication is calculating the carotid artery. And I think this may happen because either you've not got the vein in the centre of the image, as I described and using the central black line to tell you where to put the needle and for it to be in the centre of the image. But even when you've punctured the skin with the needle completely in the centre of the image, it's then possible to move the advance the needle too laterally or immediately not keep it in plain.

[00:18:14] How could we be so cack handed us to go off course like this? Well, one reason is that the neck is actually a curved structure. Generally speaking, when we put the probe on the skin, we tend to slightly distort the anatomy of the neck to make it so that the ultrasound probe is put anteriorly posteriorly. And then the needle, similarly, is directed anteriorly posteriorly into the vein. But sometimes this isn't really possible.

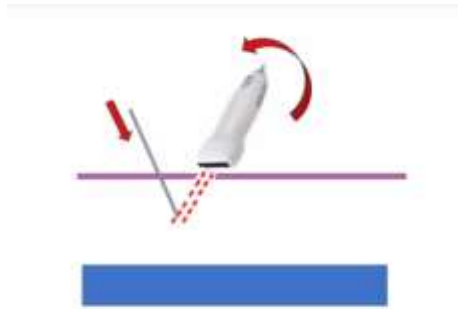


[00:18:45] And then the probe is at a slight angle, as we can see here. And then if the needle there's no accommodation for this and the needle is still directed anteriorly posteriorly then it definitely will go off target. So generally speaking, depending on the patient, the shape of the patient's neck, we tend to put that ultrasound probe directed

fairly anteriorly posteriorly, but not truly in alignment with parallel to the patient's skin and then we direct the needle accordingly.



[00:19:24] Now, really, annoyingly, you can't see the needle with the ultrasound probe. There are some special needles which are visible by ultrasound, but they're not used for placing central lines. But the ultrasound image is distorted by the very tip of the needle. So it's like the three wise men following the star. And you have to find that little star, which you can see. It's a really helpful additional feature. And then this image is entering through the muscle into the vein. So a way of placing a central line is to construct the triangle that we've described earlier and advance the needle towards the vein and then feel reassured as you see the vein displaced. And then you get to flashback of blood and you can advance the advance to Guidewire. But another way of placing a central line is to use the little star, find it when the needles first entered the patient and then advance the needle. Looking at the star into the vein, as we can see here.



[00:20:45] Now, I would I would say that this is a preferable approach. It's safe. And you can see what's going on. The problem with it is it's actually very difficult to do this, in part because I've shown a beautiful picture of that, that little star being so obvious. But oftentimes it's actually more subtle than that. And you can't always see it very well. And sometimes it disappears halfway through you're putting the needle in. So it's something that we should be learning to do and aspiring to do as we advance the as we advance the needle. Now, one of the ways I think that's really good to learn this is using the ultrasound to look at the local anesthetic being infiltrated. And that has a number of advantages. One, for some weird reason, the smaller needles seem to have a nice bright star at the end of them. But also, as you inject the local anesthetic, you can see the tissues being displaced. And that gives you a clue, a good clue as to where the star is. So you can look for it.

[00:22:01] So we've spent so we've spent the last few minutes talking about how to get the needle into the vein and either by constructing a mental model. Fairly steep approach to calculate the vein and then supplementing that by trying to learn the continuous observation of the tip of the needle as it goes into the vein. We're now going to talk a little bit about holding the probe and advance in the guide.



[00:22:35] So before we start talking about how to hold the needle and advance the guidewire it might be, we're about halfway through the presentation. So this might be quite a good point for you to take a little break. But before you go, I would just jot down on a bit of paper what you think you've learned so far, because this will make it easier for you when you get back. But enjoy your coffee break. I've added this picture of a half completed project so that you'll be able to find where you are in the presentation more easily when you return. So enjoy your coffee break and I'll see you in a little while. We'll play you out with a little interlude. Music.