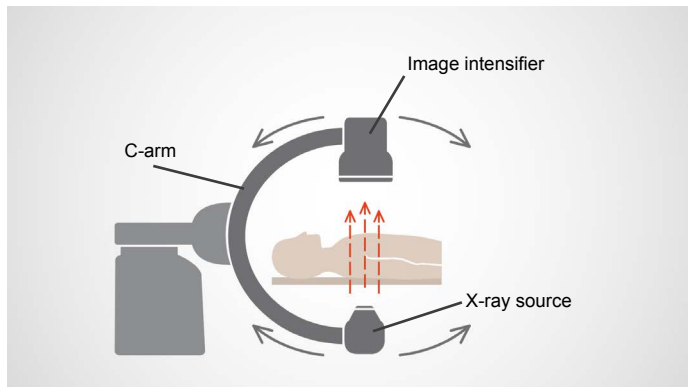


Image intensifier basics and nomenclature

So, let's take a moment to look at how we acquire angiographic images and also discuss some of the terminologies that we use.

Like any procedure that involves ionizing radiation, we need an x-ray source as well as an image intensifier, which facilitates the visual imaging of low-light processes. In the cardiac catheterization laboratory (cath lab), the x-ray source and the image intensifier are connected by a C-arm, which is aptly named because it looks like the letter C.



We position the patient in the x-ray beam centering on the heart. The C-arm is then able to move around the patient in a number of different directions or planes to take different angiographic views. These are described in two anatomical planes:

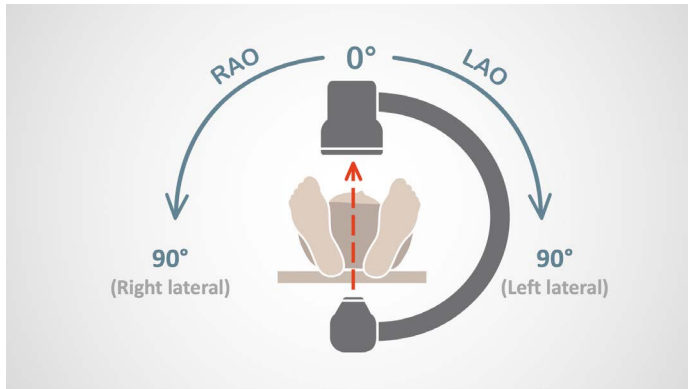
1. From the patient's feet looking toward the head (producing left and right anterior oblique views)
2. From the patient's side (producing cranial and caudad views)

Left anterior oblique and right anterior oblique views

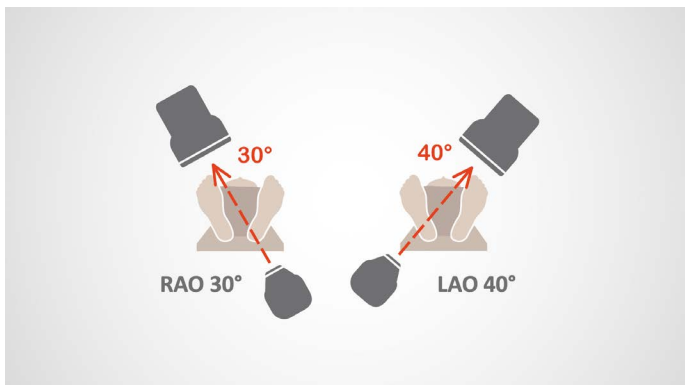
Starting with the first anatomical plane, looking from the feet of the patient towards the head, if the x-ray source is situated directly below the patient with the image intensifier directly above the patient, this is referred to as a standard starting position, or 0°.

If the image intensifier is rotated around the patient towards the right, it is known as the right anterior oblique or RAO view. If the image intensifier is rotated to the left, it is known as the left anterior oblique or LAO view.

The image intensifier can rotate to 90° in either a right or a left direction. If it rotates 90° to the right, it is known as a right lateral view. If it rotates 90° to the left, it is known as a left lateral view.



Let's take a look at two example views. In the first, the image intensifier has rotated 30° to the right, so we name this RAO 30° or RAO 30 for short. In the second image, the image intensifier has rotated 40° to the left of the patient. We note that as LAO 40° or LAO 40 for short.

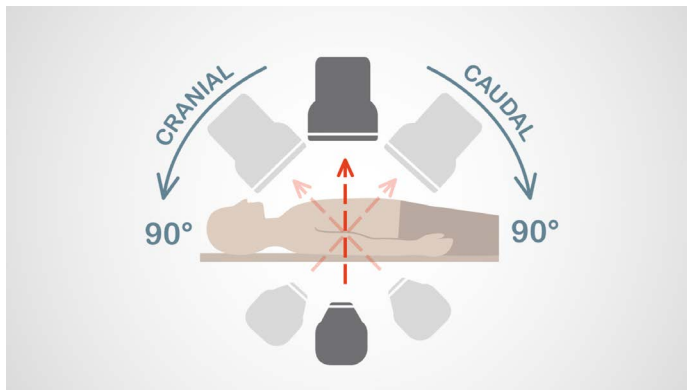


Cranial and caudal views

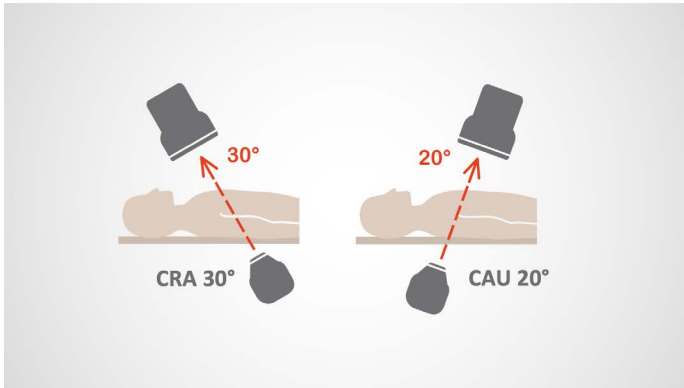
Moving on to the second plane, the image intensifier can move towards the head of the patient, which is known as cranial angulation, or towards the feet of the patient, which is known as caudal angulation.

There is a physical limitation here that isn't apparent in the other plane. All modern image intensifier devices are fitted with proximity monitors. These are essentially devices to ensure that the machine does not collide with a patient to cause injury.

There is a limit to how far the image intensifier can move in a cranial direction before it comes into contact with the patient. Similarly, there is a limitation to how much the image intensifier can move in the caudal position for the same reason.



Next, let's look at two examples again. In the image on the left, the image intensifier has moved 30° toward the head of the patient. This is described as cranial 30° or CRA 30 for short. In the second image, the image intensifier has been angled 20° towards the feet of the patient. This is referred to as caudal 20° or CAU 20 for short.

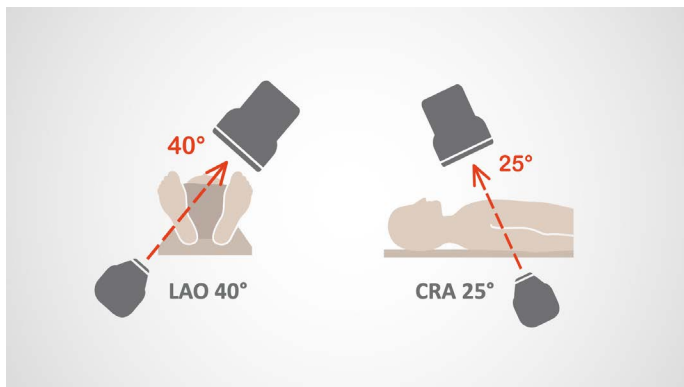


Left anterior oblique cranial view

Let's look at a common angiographic view: the LAO cranial view. You now know that this means the image intensifier must have moved toward the left of the patient and also toward the head of the patient.

What you don't know is the specifics of how much it has moved in either of these planes. It's very important to know the exact angulations used to acquire each image so that they can be reproduced.

For example, if the image intensifier is 40° to the left-hand side of the patient and 25° towards the head of the patient, we call this LAO 40°, cranial 25°.



LAO 40°, cranial 25°