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INTRODUCTION TO

Vascular Scanning

A GUIDE FOR THE COMPLETE BEGINNER

3rd EDITION

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DONALD P. RIDGWAY, RVT

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3rd Edition

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➤ Acknowledgments

I've always wanted to write a book and have acknowledgments at the beginning. This is my big chance.

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Pat Powers, my wife, who tried to proofread some of this for readability even though "atheromatous" and "Nyquist limit" aren't part of her everyday vocabulary, and who didn't mind my being a bluegrass musician for ten years and making almost no money. Now she's pretty patient about my teaching and working and not seeing much of her during the week.

Rick Kirby, Director of the Grossmont College Cardiovascular Technology Program, with whom I played (and play) music, and who first suggested I go through the program and become a tech.

Dr. Willard Dellegar, who founded the Grossmont College CVT program, and Ed Roto, who taught in it for some eighteen years. Also clinical instructors Bruce and Deanne Travers, Shirley McClain, Ray McGuire and Stan Rutter, Steve Adams, and all the vascular techs in the San Diego area, from whom I learned and continue to learn. Also Patrick Coyle, instructor of Anatomy and Physiology at Grossmont College, who is a wonderful teacher.

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Patrick Hagberg, Sherry Guthrie, and Paul Shandley for technical advice on portions of the guide. Also Chris Walker, from whom I got several nifty tips while he was trying to get Kathleen and me to make up our minds at last about ordering a scanner.

All the authors, researchers, technologists, speakers at conferences, and others, from whom I have tried to consolidate useful information in this guide. Many but by no means all of these resources are included in the recommended reading (see Chapter 16).

Mike Davies of Davies Publishing, whose input was largely responsible for changing my little slap-happy scanning-guide pamphlet into a book. ("Trust your publisher and he can't fail to treat you generously." —Alfred A. Knopf)

And, of course, all of my students, who have taught me many times what I could hope to have taught them. Well, okay, probably not as much as I taught them; let's get real. But teaching a subject to bright students keeps you alert and honest, and I am most grateful to them for keeping me on my toes. Good luck, you guys. Write and tell me what you're up to.

Preface to the Third Edition

When we published the first edition of this scanning guide, I was apprehensive about the sort of reception it would get from people in the profession. Instead of a dignified, heavily footnoted theoretical tome, it was a relaxed, conversational, practical text—not dignified.

Fortunately, that's what a number of new and not-so-new technologists wanted; the book got very kind reviews in the relevant journals, and I got positive (even profoundly enthusiastic) feedback from people who had used it. It has been very gratifying to meet people at conferences all over the country who have learned from the book, and even keep the thing handy in their labs. It's what any educator hopes will happen, and I'm just tickled to pieces about it all.

While I was pleased with the first two editions of this book, I welcome the opportunity to make it better. This third edition features Uncle Don's Bonus Images, a new section of scan pictures to supplement the text. Many of the images are normal scans that demonstrate concepts described in the text. Many others are clinical images of vascular pathology, which I hope will illuminate some of the concepts in chapter 5, The Common Studies. While the thrust of the book remains the acquisition of scanning skills rather than vascular pathology, these new images of plaque, thrombus, and other pathology add some real-world clinical context to the basic instruction in scanning skills.

In some ways, little has changed in how we do vascular scanning since the first edition was published, and the basics of scanning technique are still the basics. Nevertheless, some new issues have made life interesting for vascular technologists in the last several years. ICAVL (the Intersocietal Commission for the Accreditation of Vascular Laboratories) has become a fact of life for most labs and a steadying influence for excellence in the field. Medicare carriers in some states require that vascular technologists be credentialed to assure reimbursement for studies. New concern is being expressed about the accuracy of carotid duplex now that the NASCET and ACAS trials have validated carotid endarterectomy as the best way to deal with significant carotid stenosis. All of these issues and more call for smart, skillful techs. While the main purpose of this guide is to promote the "skill" component, I hope some of the changes will also help with the "smarts."

I'd like to confirm and reinforce the acknowledgments from the first and second editions, and again to thank Mike Davies, who is easy to work with and buys me dinner now and then, for his help and guidance. Thanks a ton also to Ray Schwend, RVT, of Scripps Clinic and Research in La Jolla, who contributed most of the exercises in chapter 13's *Those Darn Doppler Angles.*

I've been working in this field now more than twice as long as I had when this guide was first published. With all the tumult and changes in our HMO-ridden medical field since then, it's still a wonderful profession to work in. So my last acknowledgment is to thank all the technologists and physicians who pursue and promote excellence in this field. I hope that this book helps new practitioners to do the same.

Don Ridgway
El Cajon, California

➤ Contents

CHAPTER 7

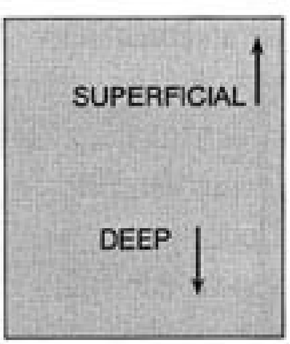
Carotid Scanning

Asked what learning was the most necessary, [Antisthenes] said, "Not to unlearn what you have learned."
—Diogenenes Laertius

Now you may put the probe down and begin scanning at last. There are two basic orientations that you will use when imaging vessels: transverse and longitudinal (or sagittal), which is to say cross sectional and lengthwise. We will start with the first.

TRANSVERSE SCANNING

7-1 Orienting the screen for superficial and deep.

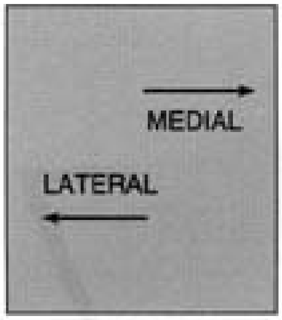


Put a fair amount of gel on the right side of your patient's neck along the expected course of the carotid arteries, spread it about with the probe face, and then take a transverse picture low in the neck, bumping the clavicle, with the probe perpendicular to the skin. Remember, you have taken a moment to visualize how the beam emits from the probe before you start, so now it is easy to send that beam into the neck to intersect the common carotid artery cross sectionally.

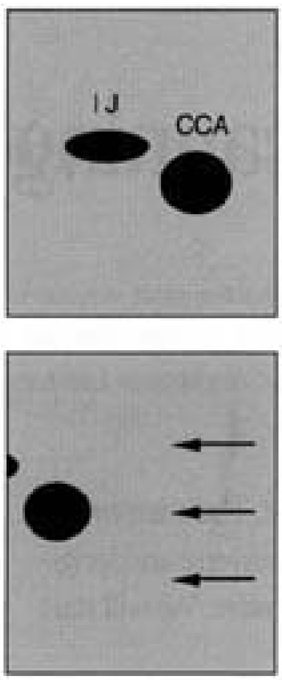
Orienting Yourself on the Screen

Before you do anything at all, you need to get oriented on the screen. There are two dimensions to the 2-D image: One is superficial/deep (fig. 7-1), and this is

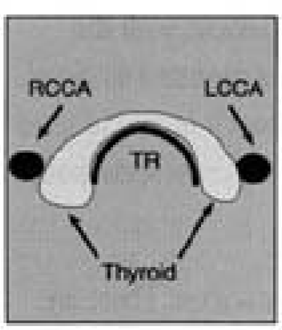
7-2 Orienting the screen for medial and lateral in the transverse plane.



7-3 Movement of medial tissue into the screen with the rocking maneuver.



7-4 Transverse image of the trachea (TR) with the thyroid lobes lateral to it and the common carotid arteries lateral to the lobes.



pretty easy. On nearly all scanners, the skin is at the top of the display, and so up is superficial and down is deep. (On older Biosound scanners, the skin will be to the left. If the illustrations give you trouble, turn the page sideways.)

The other dimension in a transverse scan is lateral/medial (fig. 7-2). So which direction is lateral to the artery, and which is medial? No matter what kind of scanner you are working with, it is easy to find out by aiming the beam medially. That means that you will *rock* the beam medially, leaning the probe laterally (this could include a slight sliding or scooting movement as well).

From which direction does tissue come *into* the screen? If it comes into the field from the right (fig. 7-3), then medial must be to the right, since medial is where you aimed the beam. If it comes in from the left, then medial is to the left. (To see how it looks for the left side, hold the book up to the light and look at the figures from the other side of the page.)

Now aim the beam laterally and identify the lateral orientation as being to the right or to the left by noting where tissue comes into the field.

If you are on the right side of the neck, orient medial to the right; if medial tissue appears to come into the field from the left, turn your probe 180° and fix it. If you are on the left side of the neck, orient medial to the left. Let's repeat that. Say it with me:

> **MEDIAL TO THE RIGHT ON THE RIGHT**
> **MEDIAL TO THE LEFT ON THE LEFT**

This is true on the neck, in the legs, and in the arms; in the abdomen it works out that way too. All it really means is that the scan plane is oriented the same way wherever you are on the body, so that it corresponds with the anatomic position used in medical illustrations. From here on I will discuss all transverse orientations (except for a few specialized areas) as though we are scanning the right side; for the left, the orientations will be just the opposite.

You can get a better feel for how this rule of orientation works if you spread some gel around the center and left side of your patient's throat and then slide around to the front of the neck, right over the trachea. If you could make contact all the way around the throat with your probe, you would see something like figure 7-4. The trachea casts a lot of acoustic shadows, being a fairly dense structure. The thyroid wraps around the trachea, the right and left lobes lying between the trachea and the carotid arteries. This is more or less the same thing you would see on an anatomic position chart, isn't it? (Except that we have turned from a frontal plane to a transverse plane.) The patient's right is to the *left* of the chart (or the screen), and the patient's left is to the *right* of the chart (or the screen).

Now slide your probe farther around to the left side, centering the left common carotid artery on the screen. Is medial to the left? It is, unless you've changed your probe orientation. The position of the beam hasn't really changed relative to the body, has it? You've just moved it back and forth around the neck.

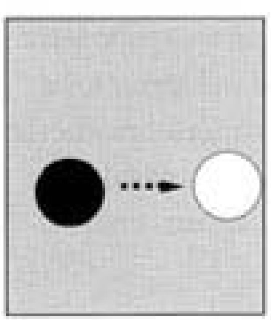
Nearly all probes have some sort of bump or ridge to indicate one end of the long axis of the beam. Find which way that marker points when you are oriented properly, then keep it that way (for example, the ridge *always* to the patient's right in transverse). If your probe has no marker, glue a small half-bead on the appropriate spot. I did. It helps you to keep the probe where you want it when it is slippery with gel and the lab is dark. I don't believe a small bead and a dab of super glue will void your service contract.

By now you have probably located the common carotid artery, as well as the jugular vein (if you're not mashing down too hard), and if you look you can see the grainy, homogeneous tissue of the thyroid gland. The thyroid is medial to the common carotid artery, and so it provides another indication of your transverse orientation: If you want medial to the right (on the right side of the neck), just be sure the thyroid is to the right.

One last trick for checking your transverse orientation: Poke your finger—gently—on your patient's neck at the medial edge of the probe, and watch the screen. You will see the medial tissue move in response. If the probe is on the right side of the patient's neck, you should see the movement at the right of the screen; if it is on the left side of the neck, you should see movement on the left. This maneuver will work elsewhere on the body as well.

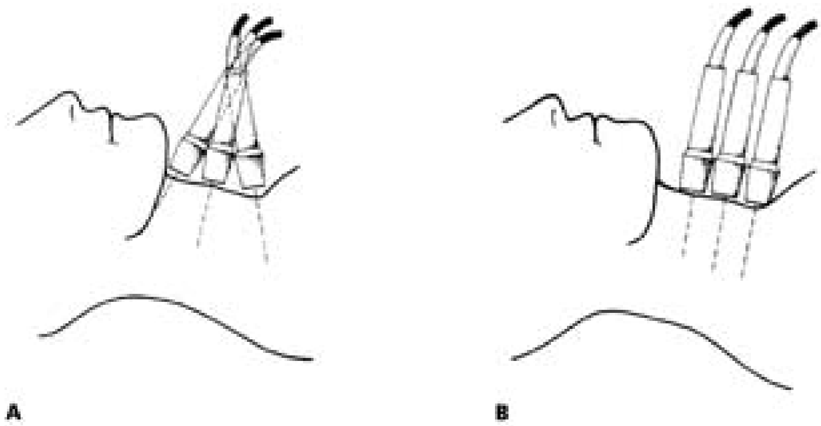
The common carotid artery should be in the center of the screen, and you will adjust for that just as you did to orient the screen, by rocking the probe medially and laterally until the vessel is centered (fig. 7-5). To practice this adjustment, start with the common carotid artery centered, and then bring it all the way to the right of the field by rocking medially. This may work with a sort of nudging or scooting motion on the skin. Now bring the artery all the way to the left of the field by rocking laterally, and then center it again. Do not proceed until you can do this fairly confidently.

7-5 Moving the transverse common carotid artery on the screen by rocking the probe.



Examining the Carotid System

Now it is time to examine the whole carotid system in transverse by sliding the probe up the neck. Again, you begin low in the common carotid, bumping the clavicle, with the probe perpendicular to the skin. As you begin to move distally in the common carotid (fig. 7-6), keep the transducer perpendicular to the neck—do not slide the probe face up the neck while keeping your hand in one place. You can see that this would give you oblique sections through the artery rather than truly transverse (cross-sectional) ones. In addition, your image quality will deteriorate if your beam does not intersect the structures of interest at close to a 90° angle; experiment with the probe angle and see the difference in the clarity of your image.

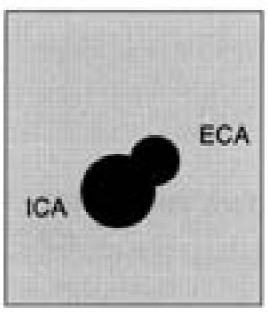


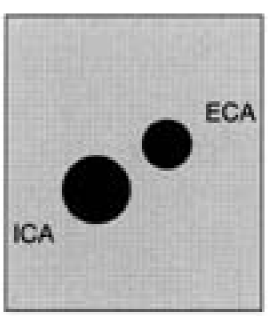
7-6 Keeping the probe perpendicular when sliding it distally on the neck. This perpendicular incidence of the ultrasound beam on the vessel walls gives you the clearest transverse image at all levels. **A.** Wrong. **B.** Right.

So be sure that your hand and the transducer move up and down the neck as a unit. If you want to angle your beam under the clavicle for a more proximal look down the common carotid artery, or under the mandible for a more distal look up the internal carotid, do it consciously, returning to an upright position before moving the probe face.

It is usually best to start with a somewhat anterolateral approach (toward the front of the neck—see *Approaches*, below) to scan the common carotid artery, allowing you to start as proximally as possible. Then slide to a more lateral or posterior approach as necessary to clear up the image or to avoid the mandible and scan farther distally in the internal carotid. As you move distally in the common carotid, keep the vessel in the center of the field with small, smooth adjustments, not big, jerky ones.

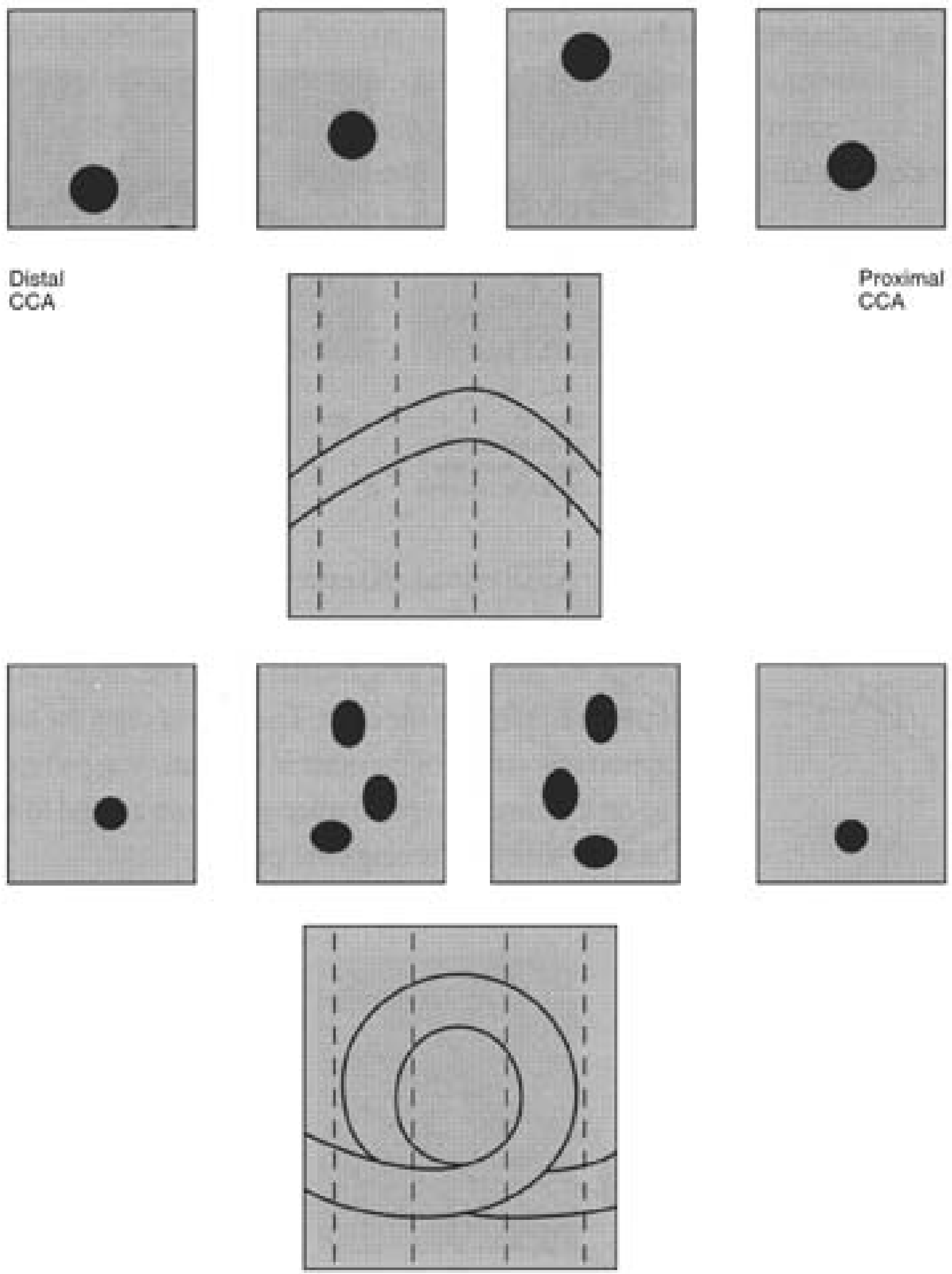
7-7 The carotid bifurcation in transverse. **A.** At the bifurcation. **B.** Just distal to the bifurcation.



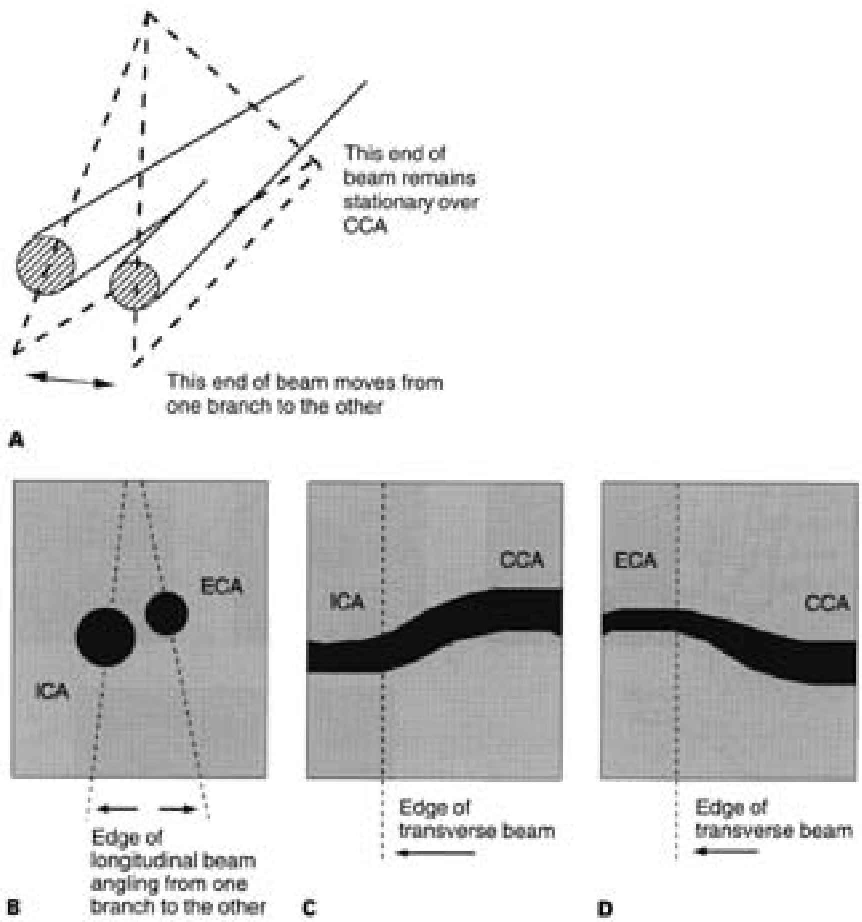


As you encounter the bifurcation, identify the branches (fig. 7-7). The internal carotid artery is almost always the bigger of the two and almost always the lateral of the two, although sometimes the proximal internal carotid will appear to be the medial branch, especially with certain approaches. The way these branches lie varies considerably from patient to patient. Now keep the internal carotid in the center of the screen and follow it distally until it absolutely disappears from the field of view. Then move smoothly back to the bifurcation and back down the common carotid.

The transverse scan in general will tell you a lot about what to expect when you shift to the longitudinal view. For example, if the vessel moves around a lot in the field, it may be tortuous (fig. 7-8), in which case you will have to make a number of adjustments to get any kind of longitudinal picture as you move up and down. Therefore, go back to the bifurcation and think about the transverse-to-longitudinal relationship of the branches.

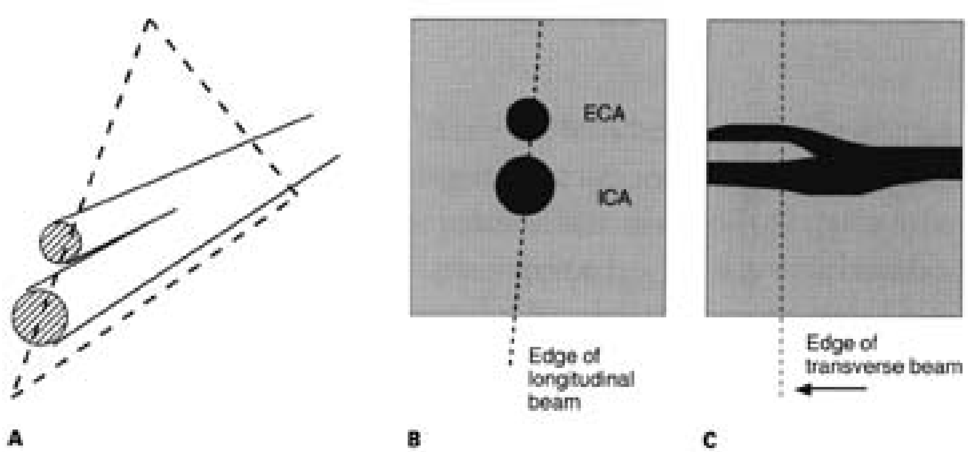


7-8 What the transverse views tell you about the longitudinal picture. In these examples the transverse view tells you that there is a tortuous vessel. Dotted lines indicate the edge of the transverse beam.



7-9 When the internal and external carotid arteries are side by side in the transverse plane, you must angle the beam back and forth in longitudinal for one and then the other (**A**). **B**, Screen presentation in transverse. The longitudinal plane shows the common and internal carotids (**C**) and the common and external carotids (**D**) in continuity.

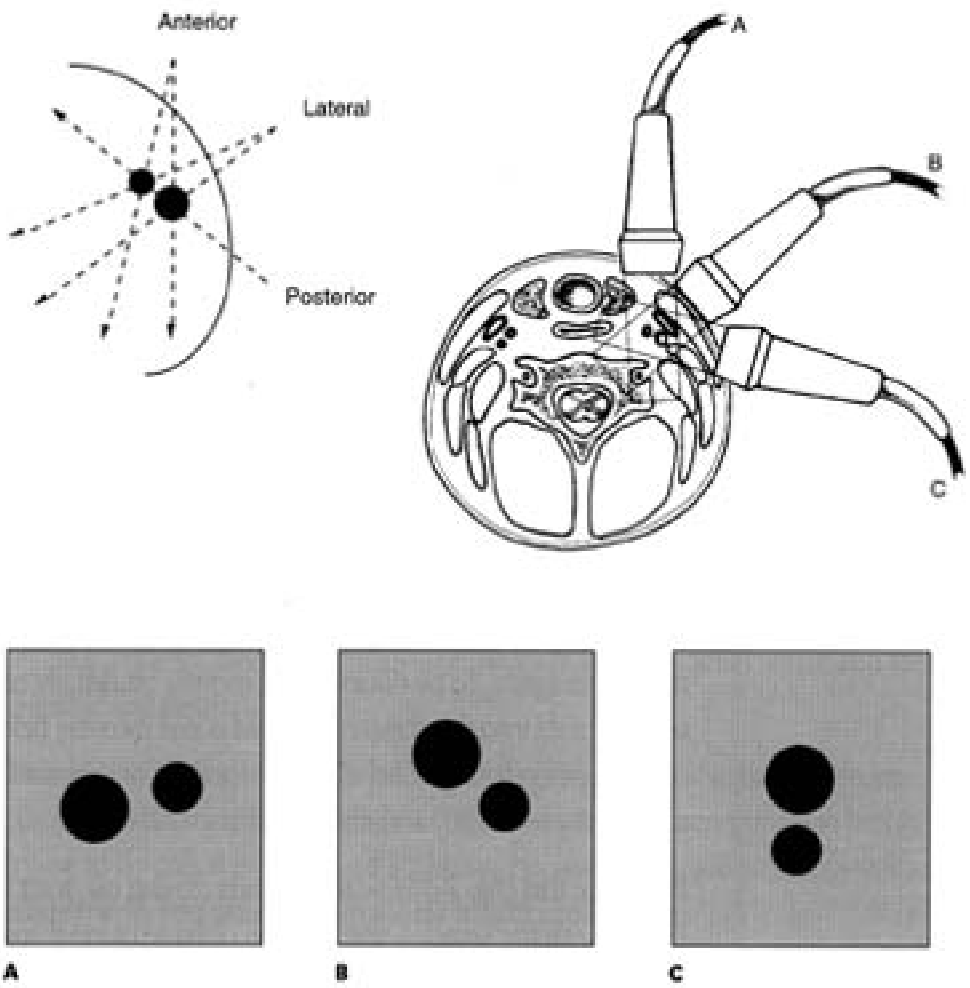
If the internal carotid and external carotid appear side by side in the picture (fig. 7-9), they will not both be in the scan plane at the same time when you turn the probe around to longitudinal—you will angle medially and laterally to move from one branch to the other. This is most often the case. But if the branches appear one on top of the other in the transverse picture (fig. 7-10), they will both be on the same scan plane when you move around to longitudinal, and you will have the textbook "tuning fork" profile.



7-10 When the internal and external carotid arteries are at the top and bottom in the transverse plane (**A, B**), you can get both in the longitudinal plane at the same time (**C**).

What if the branches look like this (fig. 7-11)? In longitudinal, with the anterior or lateral approach, the beam will not pass through both branches at the same time, and you will angle from one to the other to visualize them. (Lateral is at the side of the neck, anterior toward the front, and posterior toward the back, as shown. See *Approaches*, below.) But with the posterior approach, you might be able to pass the beam through both branches at the same time, obtaining the tuning fork profile.

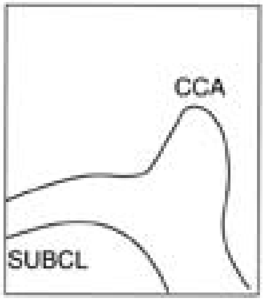
Think about that relationship some more. If the branches lie in the neck as shown in figure 7-11, the internal and external carotid arteries will not lie on the same longitudinal plane when you use the anterior and lateral approaches; you will need to angle from one to the other (see *The Important and Somewhat Tricky Bifurcation Maneuver*, a few pages along). But with the posterior approach, both the internal and external carotid arteries lie along the same plane and will appear at the same time in the longitudinal plane.



7-11 Imagine that you are imaging the internal and external carotid arteries in transverse with a lateral approach. If you move toward the front of the neck (anterior approach) or toward the back (posterior approach), how would the longitudinal beam intersect the two branches? (Remember, medial is to the right.) With the anterior (**A**) and lateral (**B**) approaches on the neck, one is unable to profile the two branches of the carotid system on one scan plane. With the posterior approach (**C**), the scan plane intersects both vessels at once.

COMMON CAROTID ARTERY ORIGIN AND SUBCLAVIAN ARTERY

7-12 The innominate bifurcation, with the subclavian artery heading laterally and the short-axis origin of the common carotid above.



On the left side the origin of the common carotid is quite deep, since it comes off the aortic arch. Without a bullet-shaped, lower-frequency probe, you are unlikely to image this far down the left common carotid artery. Nevertheless, you can pretty readily image the origin of the right common carotid artery in most patients. Image in transverse with an anterior approach and move proximally until you bump the clavicle. Now angle under the clavicle a bit, and you will usually see a segment of longitudinal subclavian artery at the left of (lateral to) the cross-sectional common carotid artery. Angle down a bit farther and you can see the two arteries merge where they bifurcate from the innominate (fig. 7-12).

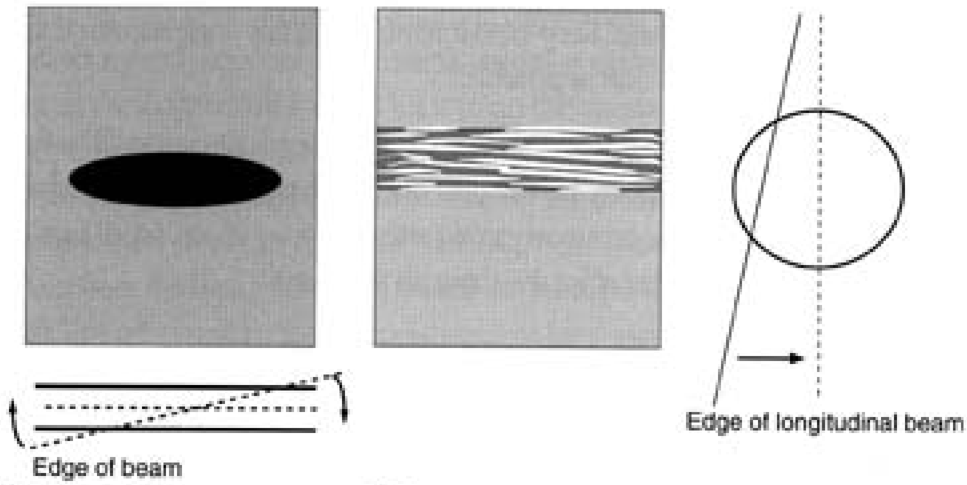
So on the right side, at least, you can assess the origins of both the common carotid and subclavian arteries fairly readily. It is worth taking a moment to do this during all carotid scans. It is also worth a minute's effort to pick up a representative flow signal from the left subclavian artery to check for significant proximal obstruction; see chapter 10 for more on subclavian scanning.

Incidentally, occasionally a patient who has a pulsatile area just above the clavicle will come to you because the physician wants to rule out an aneurysm. Almost always you will find that the common carotid is tortuous and comes up fairly superficially in this area, accounting for the prominent pulsatility.

MOVING TO LONGITUDINAL

Now get a good transverse picture of the common carotid. *Keeping it in the middle of the screen,* slowly rotate your probe 90° until you have a longitudinal view of the common carotid stretching all the way across the screen. Which way should you turn the probe? Whenever you image in the longitudinal (sagittal) plane, you should put the feet to the right, head to the left. When moving from transverse to longitudinal, remember always to turn the probe *to the right,* which is to say clockwise. This puts the feet to the right. To be sure, use the poking maneuver again. To be doubly sure, move a bit distally, and see where distal tissue comes into the screen. It should come into the field from the left if you move superiorly (up). Did all of this work? Congratulations. Carry on. If not, rotate the probe 180° and check again.

If you see this (fig. 7-13), with the ends closing off, your beam is not lined up exactly with the vessel—you have an oblique plane through the vessel, rather than a truly longitudinal plane. How do you fix it? By moving the probe around all over the place and hoping something turns up? No! *Rotate* the probe a little bit so that the edge of the beam lines up with the vessel. If the walls fuzz out, and you have a bunch of unwanted echoes inside the lumen of the vessel (fig. 7-14), your beam is beginning to slip off the vessel sideways. You must *angle* the beam back so that it intersects the biggest diameter of the artery.



7-13 7-14A 7-14B

7-13 When the ends of the vessel close off, rotate so that the beam lines up with the vessel.

7-14 When the walls fuzz out (**A**), *angle* so that the beam passes through the center of the artery (**B**).

As you rotate from the transverse to the sagittal plane, remember two things:

1. Keep the artery exactly in the middle of the field of view the entire time. If you do this, the artery will be there for you when you try to line up lengthwise with it. If the artery strays off center, go back to transverse and start again.

2. Keep the artery centered. How do you do that? With little rocking motions, from medial to lateral, like the ones you exaggerated at the beginning of the *Transverse Scanning* section above. These rocking motions can actually be more like little scooting or nudging movements. It helps to make these scooting motions on purpose the whole time you are rotating. As you get closer to the longitudinal plane, you will see the ends of the artery moving back and forth. When you are truly lined up with the artery, the ends will stop moving, and you will just see the walls getting a little clearer and then a little less distinct.

Now keep scooting while you rotate *counterclockwise* back to the transverse plane. (See Exercise #3.) This is a very good exercise to spend time on before trying to do much longitudinal scanning, because it gets you working on the adjustments you need to keep a clear longitudinal image.

With a clear image of the common carotid artery in the longitudinal plane, begin to work your way distally toward the bifurcation, making small adjustments to keep things clear. What kind of adjustments?

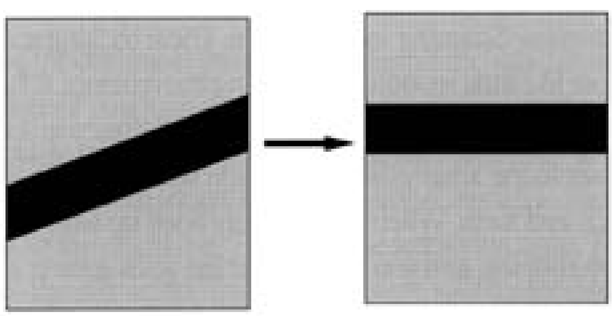
Angling is an adjustment you make constantly as you move up or down during the scan. Very tiny adjustments of the angle will give you the best possible detail of the walls of the arteries. The far (deep) wall usually looks fairly clear, but the near (superficial) wall often looks fuzzier because of ultrasound scattering. When you can see good detail of the near wall, you probably have the optimal vessel image. Keep experimenting with tiny angle adjustments to be sure the image is as clear as possible.

Most of your longitudinal probe adjustments will be these two maneuvers, angling and rotating, often both together. While you have a longitudinal view of the common carotid artery on your screen, try all four probe movements to see what effect they have on the image.

Keep the ultrasound beam perpendicular to structures of interest for good image quality.

At this point, most beginning scanners will start using the Inadvertent Vessel-Banking Maneuver. As the student pulls the probe superiorly or pushes it inferiorly in an unintentional rocking maneuver, the longitudinal image of the common carotid artery heads uphill or downhill on the screen. In transverse imaging the rocking adjustment is made to move medial and lateral, but in longitudinal imaging rocking is not a common movement. Remember that the ultrasound beam should be perpendicular to the structures of interest for good image quality. You should keep the probe perpendicular except for some specific maneuvers to improve Doppler angle, which we will discuss later. For now, do not rock the probe; if the artery appears to head appreciably uphill or downhill (fig. 7-15), stand the probe back up so that the probe face is flat and the probe is perpendicular to the skin.

7-15 The uphill-vessel maneuver created by inadvertent *rocking*. Useful later, not now.

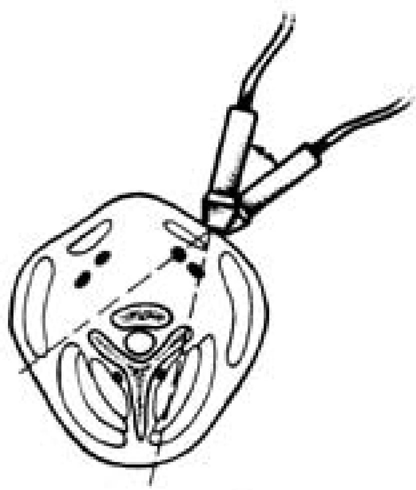


To get control over this adjustment, practice the beam-rocking maneuver: Get a clear view of the mid common carotid artery, making it level across the screen. Now keep the walls clear all the way across the screen while you *rock* the beam, making it go downhill to the left (as in fig. 7-15). Which way will you move the back end of the probe itself—superiorly or inferiorly? Now bring it back to the level position, then rock the other way and make the artery travel downhill to the right.

The clarity of the image of the walls will tend to deteriorate as you do this. In order to keep the walls clear, make little nudging movements across the axis of the beam (tiny angle adjustments) as you do the rocking, always stopping to clear things up if the artery goes away.

Go all the way down to the low common carotid artery, bumping the clavicle, and get a good picture of the proximal common carotid. There are two ways to obtain the longitudinal image: One is to get the transverse picture, then rotate the probe 90°, as described above. The other is to start with the probe longitudinal, aiming posteriorly (toward the back of the neck), standing the probe upright. Now slowly lay the probe back (fig. 7-16). This maneuver sweeps the beam from the back of the neck toward the front, posterolateral to anteromedial. The artery will be there somewhere. Just keep sweeping.

7-16 Sweeping the longitudinal beam from posterior to anterior to locate the carotid artery.



Once you have clearly imaged the artery, by angling and rotating, begin to move slowly superiorly. As soon as the image starts to deteriorate, STOP and fix it by—yes—angling and/or rotating the beam. STOP AND THINK about what maneuver is called for by the problem on the screen before you flail the beam around in panic. The vessel is still there; you just need to make that beam intercept it. Once you have cleared up the image, you may proceed superiorly again, always stopping to fix the image if it starts to go away.

As you proceed distally, keep looking at the walls of the artery, especially the near (superficial, upper) wall. Be sure that the walls are as clear as possible by making tiny angle adjustments continuously: a bit too far medial, a bit too far lateral, then back to the clearest image. Keep checking for image clarity; don't settle for fuzzy unless you absolutely have to. This skill alone will take some time and practice, so give yourself plenty of both before you get frustrated. Then by all means get frustrated; go have some frozen yogurt or something with your patient for 15 minutes, then resume.

The important and somewhat tricky bifurcation maneuver is the single most important skill you can learn for carotid scanning.

At some point the vessel will change shape and/or direction. This is probably the bifurcation. The change in shape or direction is quite obvious with some patients, but very subtle with others; watch carefully. (With some patients, of course, you will get lucky and find the tuning fork picture, with both the external and internal carotid arteries on the same scan plane.) Your transverse scan will have given you a general feel for how far up the neck the bifurcation lies. Once you reach it, it is time to work on the next skill. It is *very* important, and pretty formidable for most people at first; it will probably take some time to master. It is:

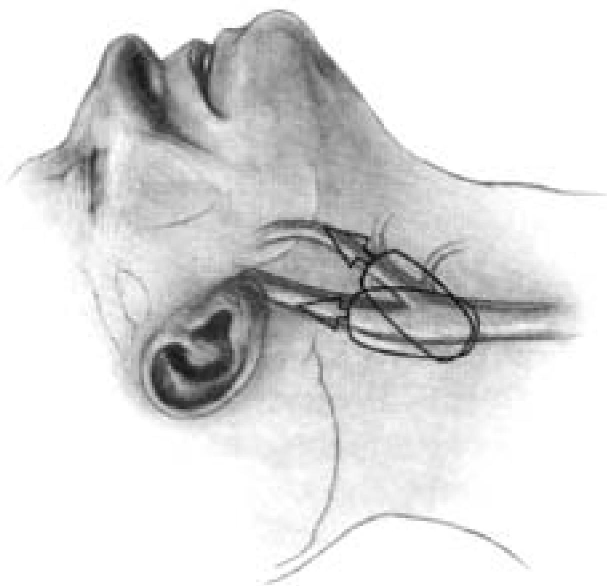
The Important and Somewhat Tricky BIFURCATION MANEUVER

With the bifurcation in the center of your field,
and the common carotid artery
clearly visible at all times at the right of your field,
angle laterally and medially to demonstrate
the internal carotid and external carotid arteries
in continuity with the common carotid artery.

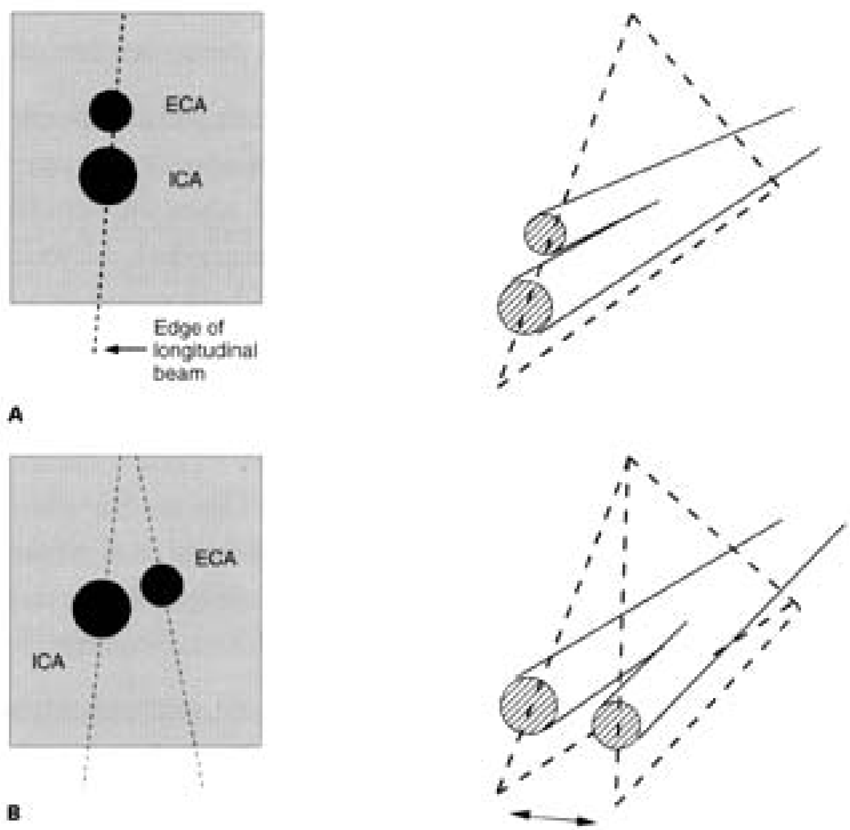
THINK!

This means that the proximal end of your beam remains still over the distal common carotid and pivots, while the distal end of your beam swings medially for the external carotid, laterally for the internal carotid (fig. 7-17). If the internal carotid and external carotid run one above the other (remember the discussion in *Transverse Scanning*, above?), the branches are profiled and this maneuver is unnecessary (fig. 7-18). The beam intersects both branches at the same time. More often, however, the branches lie more or less side by side, so you need to rotate and/or angle to see one branch, then the other. This skill is most important, especially for obtaining Doppler signals.

As you try this maneuver, look at your patient's neck and think of the external carotid heading slightly in front of the ear, while the internal carotid runs slightly behind the ear, and line up the beam accordingly.



7-17 The bifurcation maneuver. The back end of the probe is more or less stationary over the distal common carotid artery, while the front end pivots to line up with the internal or external branch. From Salles-Cunha SX, Andros G: *Atlas of Duplex Ultrasonography.* Pasadena, CA, Davies Publishing, Inc., 1988.



7-18 Again, the relationship of the transverse image of the branches to the longitudinal image. **A.** Top and bottom gives you a profile of both branches in longitudinal. **B.** Otherwise, you must angle back and forth for the branches.

Everyone's anatomy is going to be a bit different, of course. With some bifurcations, a tiny twist of the probe will give you the two branches in sequence, while with others you will have to rotate and angle a lot to move from one branch to the other. Again, your transverse scan provides a clue: How quickly did the branches separate from one another? If they remained together when you moved distally, then only a small probe movement is necessary in longitudinal; if they dove apart quickly, then you know that the angle of the branches will be wide and that more probe movement is necessary to image one and then the other.

Asking your patient to swallow will move the anatomy around and may give you a peek at the carotid branch you are looking for.

Suppose you creep up the common carotid until you can see a branch heading off at an angle. So you know you have to angle one way or the other to see the other branch. How do you know which branch you are looking at? Once you can make a reasonable guess, you know which way to angle. This is no light decision, because it means leaving the security of a vessel image you have finally managed to produce. If the branch seems to be nearly the same diameter as the common carotid, it is probably the internal carotid. Can you see any branches coming off it? If so, it is the external carotid, since the internal carotid has no branches proximal to the skull. If you have paid attention to the transverse scan, you might have noticed that one or the other branch dives quickly, or moves superficially, or curves around; if so, you can see this in longitudinal as well.

In any case, make a guess, take a breath, and angle/rotate whichever direction seems appropriate. If a fairly small movement does not give you at least a glimpse of the other branch, go back where you were, take another breath, and try the other direction. If you still have no luck, ask your patient to swallow. This will move things about in there, which often provides a fortuitous peek that solves everything. Another solution might be to go back to transverse, then performing the transverse-to-longitudinal maneuver with the desired branch. And try different approaches. If you become completely lost, go back down the common carotid a bit and start over.

Another way to identify a branch, of course, is to put the Doppler sample in it and check the character of the flow: sharp with little diastolic flow in the external branch, softer with lots of diastolic flow in the internal branch.

Once you have the branches sorted out, practice going back and forth—again, with the common carotid clearly visible at all times to the right.

This important and somewhat tricky bifurcation maneuver is about as important a single skill as you can learn for carotid scanning. It sums up the kinds of beam adjustments necessary to produce good images, and, once accomplished, it allows you to image whichever branch you want without a lot of searching. In the first few months of your scanning practice, mastery of this maneuver should be your most important goal.

INTRODUCTION TO

Vascular Scanning

A GUIDE FOR THE COMPLETE BEGINNER

DONALD P. RIDGWAY, RVT

This new and improved Third Edition of Don Ridgway's unabashedly practical and famously unique how-to guide to vascular scanning will astound and delight both beginners and veterans who are cross-training in vascular ultrasound. Like previous editions, this one contains all of the features that have made this book so popular and useful—how to scan all of the vascular systems, Other Vascular Modalities, Those Darn Doppler Angles, The Important and Somewhat Tricky Bifurcation Maneuver, Seven Tips toward Good Probesmanship, and Getting Stuck: A Word about the Flop Sweats. In addition to the same great technical illustrations, there are more than fifty duplex scans, color flow images, and Doppler waveforms in a special new insert at the front of the book. As praise for the first two editions suggests (selections at right), you won't find anything like this guide for the relative novice. Very reader friendly, very well illustrated, and better than ever. *SDMS-approved for 16 hours of CME credit.*

Photo: Pat Powers

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As a practicing vascular technologist and an instructor in the vascular technology program at Grossmont College in California, Don Ridgway was responsible for seeing that program become the first vascular technology curriculum to receive American Medical Association accreditation. Don brings teaching skills from several different disciplines and areas of experience: He has taught both writing and fencing (swords, not chain-link) at San Diego State University, and for ten years he played and taught bluegrass banjo, mandolin, guitar, and Dobro. He still gets to pick occasionally when he is not on call, lecturing, or grading quizzes.

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