

ROB MCBANE: Hello, everyone. I'm Rob McBane. I'm the director of the Vascular Medicine Program at Mayo Clinic in Rochester, Minnesota. Today we will be discussing a really important topic of acute and chronic type B thoracic aortic dissection for Medscape Cardiology. I'm joined today by my colleagues Dr. Tom Bower, the chair of vascular surgery at Mayo Clinic Rochester, Dr. Alberto Pochettino, who is from cardiovascular surgery here as well, and Dr. Randy De Martino, from the section of vascular surgery at Mayo Clinic Rochester.

Today we're going to be talking about a really important topic. Tom, why should our audience care about thoracic aortic dissection? What's the big deal with this topic?

TOM BOWER: Well, while it's rare, Rob, with an incidence of maybe three per 100,000 patients, for us as surgeons or interventionists, it's exceedingly challenging, and it's one of the most vexing acute aortic syndromes that we deal with. And I think it's important, as you alluded to, first to define what's the difference in classification of aortic dissection. The DeBakey and Stanford classifications, which are pushing 4 years in age, are probably outdated. But it's very clear that individuals who have dissections involving the ascending aorta and arch become much more of an emergency than many of the type B dissections we have, and in fact type B dissection occurs less frequently than type A dissection. Mortality risk is much higher in the emergency setting in type A dissections.

There's been a real change in the management of type B dissections, which means the intimal flap begins somewhere at or distal to the left subclavian artery, and I think a lot of that has been pushed by the advent of endovascular therapy. So one of the greatest advances in vascular and cardiovascular surgery in recent years has been the use of stent grafts to treat infrarenal abdominal aortic aneurysms and thoracic aortic aneurysms where there's data to show that that superior to open repair at many centers, and now it's being introduced, and it has been used often to treat complicated type B dissections.

So I think if we want to set the stage for this discussion, I think the first thing we need to do is define the difference between acute, subacute, and chronic. Acute is less than two weeks in duration, subacute between two weeks and three months, and chronic dissection is beyond three months.

And then we have to decide are patients complicated or uncomplicated. Complicated by definition would mean rupture of the aorta or a malperfusion syndrome to one of the major organ beds either by static or dynamic branch-vessel occlusion. So patients that present with ischemia to the brain, the spinal cord, the extremity, the gut, or the kidneys, all those patients would be considered complicated.

The uncomplicated patient, although there are some people, including Chris Nienaber and others that argue that every dissection is complicated. But the uncomplicated dissection would be someone who comes in with pain and elevation of their blood pressure. The blood pressure becomes easily manageable. The pain goes away with medical management. A scan is done. There is no aneurysmal dilatation. There is no malperfusion syndrome. And so on. And right now currently that's really where the controversy exists.

So if we walk through this, as I see the challenges now, the first I think is to begin to come up with a better scheme for classification of these which will help the clinician manage them. And then it really goes into who should be treated, how should they be treated, and when they should be treated?

ROB MCBANE: Very good. Thanks, Tom. Alberto, so now we have some classification schemes. We've got acute. We've got chronic. We've got complicated. We've got uncomplicated. Help us to discern which of these patients in the acute setting, let's start with the acute, which of these patients should be intervened upon.

ALBERTO
POCHETTINO: So I mean, some of that goes back to the history of how we got involved in managing dissection and focusing on type B dissection that's beyond the subclavian. The history goes back to having to intervene when a patient is dying, I mean very clearly, and of course a dying event is what we now call complicated, rupture, or malperfusion that is significant enough that the patient has an organ in jeopardy that compromises their survival.

And early on the only option was surgery, open surgery. And open surgery typically, and we're talking about '60s and '70s, involved resecting some of the thoracic aorta to reestablish true lumen flow. Very early on, it became clear that that operation, done on all-comers, with complicated type B dissection was very morbid. It had a high mortality as well. Of course, when you had nothing else to offer to somebody who's in trouble, that was the treatment.

The advance of endovascular treatment has allowed us to provide something that succeeds in increasing true lumen flow, which is for most malperfusion the goal, or stop the leakage if it's ruptured without having to open the chest and replace the thoracic aorta. And the treatment of endovascular therapy for complicated type B dissection, over the last decade or so, has become so good that the treatment using open technique has pretty much gone away. The morbidity and mortality profile of endovascular treatment of complicated dissection is far superior with endovascular treatment compared to anything else historic. So that's the first issue, somebody who's dying, either from rupture or from organ malperfusion should be treated. End of story. Endovascular treatment is the preferred route.

The next issue then is those that have a non-life-threatening problem but clearly have a problem. And so the noncomplicated, which traditionally were treated medically, and the issue to some degree is why treat somebody who's going to do fine short term? If you look at IRAD data, uncomplicated type B dissections have an acute mortality of less than 10%, in the 5% to 10% range, within the first few months is the mortality of an uncomplicated type B dissection.

However, if you look at the same data and look five years out, almost half of those patients will die typically of complications of their dissection. So that's what the driving force of doing something without hurting the patient, because you have to start from that 10% or less mortality upfront, and yet get this patient to survive much longer than five years or 10 years. And that's where the benefit of endovascular treatment in treating patients who are not dying but you know they're not going to do well long term if left alone.

ROB MCBANE: Very good. Thank you. So the patient comes into the ER. The diagnosis is made. They're treated in the hospital. They're dismissed from the hospital. And now they're in the post two week into the subacute, maybe into the chronic setting. So now the patient comes to the vascular clinic or the cardiac clinic. If we're going to intervene, when would we want to intervene on this patient, Randy? What's the timing? How long should we wait? Should we extend the time for quite some time or should we offer them a rather prompt repair of their dissection?

**RANDY DE
MARTINO:**

That's an excellent question, and as we've discussed in the acute setting in those complications, you have to intervene right away. And then once we realize the patient is noncomplicated or uncomplicated dissection, the question is then when is the optimal time to intervene? Historically, we've waited for something bad to happen, such as an aneurysm to form or worse, aortic rupture or other aortic complications to occur. The question is, is can we prevent those from happening, because upwards of 30% to 50% of patients will have something happen to their aorta long term when left untreated.

So there's a large number of people that we would like to be able to intervene sooner upon. The question is, is when is the right time to do that? And there is a balance. If you intervene very early in the acute setting, intervention with endografts has a higher rate of retrograde dissection. The intimal flap is very thin. It would be very easy to propagate that in a retrograde fashion, leading to a second aortic emergency. By delaying the operation by some time, you can decrease that risk. But if you delay it too long, the dissection membrane starts to stiffen over time, your ability to expand the true lumen will start to go away, or it won't be as beneficial.

So the question is now we don't really know the exact timing. We know probably sometime after the acute setting, but before several months' time is the optimal time to do something, if you wish to do it. And encouraging data from randomized trials shows that that may actually alter long-term survival or long-term aortic-related events. And it's an area ongoing study right now to try to define when is that optimal time. It's certainly not going to be right away, but by waiting too long you, may miss your window.

ROB MCBANE:

Very good. Thank you. So the survival relating to optimal medical management or an intervention TEVAR endograft is nuanced. Can you talk to that a little bit, Alberto? We have the acute survival. We have the long-term survival. You know, what's the difference? How does TEVAR help our survival for these patients with the type B?

ALBERTO

POCHETTINO:

So if we go back to the definition of complicated and uncomplicated, the complicated scenario untreated patients don't do well. Most of them die. Treated with traditional open surgery, the mortality can be in the 30% to 50%. Treated with endograft, the mortality has been in most serious in the less than 10% range. So clearly that's the way to go.

Now uncomplicated. The early mortality is low, and you want to keep it low when you intervene. And the issue that was raised in terms of timing, is we want to keep that mortality well below 10%. We want to, however, improve the survival long-term. And these patients, long-term, develop aneurysms.

And you know, aneurysm repair of the type that this patient developed, you know anywhere between six months to five years out, those are very complex operations. And some patients may be elderly and not really able to withstand that kind of surgery. And you want to get-- to prevent that altogether. So we don't have a number, but we certainly know that untreated, these patients, 10 years, most of them, over half of them will now be there to have the option of an open repair or something else. So that's where it's important to intervene earlier.

ROB MCBANE:

Very good. Thank you. You've talked about open repair. Tom, we've talked about the benefits of an endograft. Is there a role for open surgery in these patients, and where would you see open surgery, open repair, being played out here?

TOM BOWER: Well there's really two-- I mean, open surgery in the acute setting, as Alberto's alluded to, is to be avoided, if at all possible, because the mortality and morbidity is just so exceedingly high. So I think there's very clear data now around the world suggesting that stent graft repair, when possible, is the better alternative.

Once you get beyond the two week to three month mark and a patient's developing an enlarging aneurysm for example, or some other complication, then there is a role for open surgery. So in our view here, we would treat patients with connective-tissue disorders, younger patients that have extent II and III thoracoabdominal aneurysms associated with chronic dissection, and then selectively, higher risk patients. Because complex fenestrated endovascular repair in patients with chronic dissection is not a freebie, either.

So that's where I see the biggest role for open surgeries, young patients, especially those with connective-tissue disorders That have dissecting aneurysms or aneurysms that are degenerated as part of that. **ROB MCBANE:** Very good. Very good. Thank you so much. Randy, The patient presents to you and he's dissected his entire aorta, from subclavian all the way to his femoral arteries. How much do you fix? Is that important issue and the entire aortus disease now, how much should you fix?

RANDY DE MARTINO: It is an important question and the thing to consider when you're treating. If you made the decision to treat the patient, the primary goal is to cover the primary entry tear, usually located just distal to the left subclavian. Beyond that, I think most people advocate covering a majority of the thoracic aorta down towards the celiac artery.

Although that hasn't always been done in the past, I think that's the feeling of most people doing the procedure to treat. And the idea is to cover that section of thoracic aorta and try to help promote false lumen thrombosis. When that occurs, the aorta can then remodel around the stent graft.

The risk is the more coverage you perform, the higher the risk of paraplegia. And so by covering a limited segment of the aorta, just in the chest, you can try to minimize that, but these patients still have a risk of paraplegia even with that amount of coverage. So primary entry tear and the majority of the thoracic aorta, I think is the mainstay right now. Doing anything more than that really elevates their risk, the other associated risks with intervention, most notably paraplegia.

ROB MCBANE: Thanks. Alberto, final comment? Future directions?

ALBERTO POCHETTINO: Well endovascular therapy has changed our life and most importantly has improved the survival for a lot of these patients. And the technology is progressing, and I think we're going to be able to use this technology better with smarter, better devices to benefit more patients, and the role of open surgery will decrease.

I think it's important, however, that we have all options available so that when a patient comes in, we don't just have one tool, but we have multiple tools. And I think having open surgery as a backup is always important. To have the ability to manage the patient in any which way that is necessary is going to be important for success.

ROB MCBANE: Thank you.

TOM BOWER: Rob may make one final comment to what Alberto said? You know I think one of the key issues for future clinical research is trying to identify factors, whether they're anatomic or physiologic, that will predict the patients that have an uncomplicated dissection, and the timing of the intervention with a stent graft to allow for this remodeling, as my colleagues alluded to. I think the second key thing is that any institution that handles aortic emergencies of any sort, I think it's very important to have emergency room and care pathways and protocols in place and standardization of practice as best we can do it.

ROB MCBANE: Very good. Thank you. Thank you all. And thank you for listening, to the viewers. We appreciate your time. We hope that you'll continue to follow our roundtable review series at theheart.org on Medscape. Thank you. Thank you all.

ALL: You're welcome. Thank you.