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Advancing Cardiology and Heart Surgery Through a History of Collaboration

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Welcome to ReachMD. This medical industry feature is titled “Advancing Cardiology and Heart Surgery Through a History of Collaboration,” featuring Surgeon-in-Chief at NewYork-Presbyterian and Columbia, Dr. Craig Smith. This video is a production of NewYork-Presbyterian with world-class doctors from Columbia & Weill Cornell Medicine.

Erin Welsh:
The year was 1982. A young cardiothoracic surgeon, Dr. Craig Smith, was choosing a hospital for his residency. At first, he was not interested in what was then known as Columbia-Presbyterian Hospital, which later became part of the NewYork-Presbyterian health care system. But it wasn’t the hospital – it was New York. He said at the time, the city terrified him. But there was something intriguing about Columbia. Back then, it was one of only three hospitals in the country that was practicing heart transplantation. So he decided he would go for a visit.

It wouldn’t take long for Dr. Smith to realize that New York City was exactly the kind of place where he wanted to practice medicine. The people that the hospital served were diverse racially, socially and culturally, and its physicians worked hard to innovate and find novel solutions for every patient. He joined Columbia shortly after and has stayed for over 42 years.

Over his career, he’s helped pioneer various advances in heart care – contributing to the expansion of heart transplantation at NewYork-Presbyterian and Columbia, and inaugurating the heart-lung transplantation program. Dr. Smith also helped develop a key study into a groundbreaking cardiac procedure: TAVR, a less-invasive treatment for aortic stenosis that would revolutionize how cardiologists and surgeons treat the condition.

I'm Erin Welsh and this is Advances in Care, a podcast about groundbreaking developments in modern medicine. In this episode I speak with Dr. Craig Smith, Chair of the Department of Surgery and Surgeon-in-Chief at NewYork-Presbyterian and Columbia. We discuss various innovations in surgical technology and how he’s seen the field of cardiac surgery evolve over the length of his four-decade career.

Dr. Smith, it is so lovely to meet you. Thank you so much for taking the time to chat with me today.

Dr. Smith:
My pleasure.

Erin Welsh:
So, let’s jump right in and go back to where it all began. During your medical training, what was it about heart surgery that drew you to it over other fields? Like, was it love at first sight?

Dr. Smith:
That's as good a way to describe it as any. As a medical student I had decided I would be a surgeon, but hadn't differentiated beyond that. In my internship, the first thing I was exposed to that showed me a little bit what was behind the curtain was taking care of the cardiac surgery patients in the ICU. The complexity, the constantly changing ups and downs. I saw the first open heart procedure in the operating room and that was it. I knew what I wanted to do.

Erin Welsh:
And so for the first 10 years of your time at Columbia, you were actually in the heart transplantation program. Broadly speaking, what

did that field look like then? Like around the 1980s or so?

Dr. Smith:
Very new then, when I joined, we were one of the only three places in the country doing it. I remember the first meeting of the International Society of Heart and Lung Transplant was held in Hilton down here in a little conference room, and there were maybe 25 people in there. Now that's a meeting that's 15,000 people every year.

The beauty of it for me was that there was no textbook, there was no algorithm. We were making it up as we went along. There were really just two of us then doing it. We went from doing 5, 10 a year to doing 120 a year over about a decade or so. And to be part of that kind of growth is fun.

Erin Welsh:
Yeah, that's a significant scale of growth for sure. And all the more impressive considering we're talking about hundreds of lives being saved over the course of those decades. But after starting your career in heart transplantation, you ultimately chose to move on from the field. What were some of the things that led to that decision?

Dr. Smith:
Well, it was a cluster of things that had a lot to do with how involving or uninvolving it was. And as you get busier with more elective surgeries, it becomes harder and harder to be up all night doing a transplant and then stay up all day doing elective cases. It can get to be a bit much. The elective patients–a man comes to see me for his coronary bypass, he came to me for me. He sits in my office, we talk about why he should have this, how I'll do it, what he's going to go through, they ask questions, I meet his family. And then I see them in the holding area, take them through the operation, follow them post op. It's just much more involving and personal.

Erin Welsh:
Yeah, I mean, it seems like to be able to build those patient relationships and actually have continuity, I can absolutely see the appeal. And it must feel incredible to touch the lives of so many people individually. Can you tell me more about that?

Dr. Smith:
Just recently, a few weeks ago, I was walking in one of our floors where my post op patients are, and I walked by a man and his wife and the wife grabbed me and she recognized me and said, oh, you did my husband's transplant 33 years ago.

Erin Welsh:
Wow.

Dr. Smith:
And of course as we got to talking, I remembered a little bit more about it. And he's doing very well. He's one of our longest patients. And he looks great. But then they reminded me that they through sheer coincidence found out who their donor was. Because he came from a community near them in Long Island and somebody put them together, which is rarely done. So a month after his transplant, he met the parents of the boy who was his donor. He carries a picture of this young man in his wallet. So a month after the transplant, the family meets this patient and the mother asks if she could feel his pulse.

Erin Welsh:
Oh my goodness, that's, what a meaningful encounter. I can't imagine what that must have felt like.

Dr. Smith:
They can be pretty intense.

Erin Welsh:
Yeah, it absolutely sounds like it. But I know you don't just work with patients, you've also led some major clinical research projects, like the PARTNER trials which examined, as the acronym stands for, the Placement of AoRTic TraNscatheteR Valve.

And that procedure, TAVR, or transcatheter aortic valve replacement, became a huge advancement for your field. Can you talk a bit about the significance of that? Like what need did TAVR fill?

Dr. Smith:
Well, the need it filled was to find a simpler way to provide a very important operation that we had already very well worked out in the open heart setting. So, it's designed to treat aortic stenosis. Aortic stenosis is the most common valve disease in adults. And it's a lethal condition when it's not treated.

When they reach a certain stage, their chance of living two years is less than 50% which makes it a more lethal condition than most cancers. So lethal condition and the surgical replacement of the aortic valve, highly effective, life saving, but it's open heart surgery.

So, TAVR is an alternative to open heart surgery that would potentially simplify the operation for everyone, but even if it didn't become the treatment of choice for young healthy people, would be an alternative for many people for whom surgery was very high risk. So that was kind of where it started.

Erin Welsh:
Right, right. So, could you tell me more about how you got involved with the trial?

Dr. Smith:
I was greatly aided by the fact that Marty Leon was here, and was very involved in the technology, number one. And number two, it depends on a close relationship between cardiology and cardiac surgery. It just doesn't work well otherwise. And we've always

had a great relationship, comparatively, here between cardiac surgery and cardiology. That's not true at many, many places.

But we had that to build on and Marty's toehold in the technology and so on. So Marty Leon and I became the principal investigators on the first partner trials.

Erin Welsh:
Okay, so those first PARTNER trials were intended to assess the effectiveness of open heart surgery versus the transcatheter method, and looking at different groups of patients with aortic stenosis…

Dr. Smith:
Yes. So there were several years of trial design where we had to make sure things were set up to answer the questions in the fair way, in the right way, and then started the trial. And it was, as the history of innovation in many areas, and heart disease is a very big area, so it gets a lot of attention. So, stenting in coronary arteries was not studied in that way. Now we know that stenting isn't the place to start in certain categories but it took us 20 years of trial and error when it maybe could have been addressed with properly designed trials upfront. So I wanted to be sure the same thing didn't happen with aortic valve replacement.

Erin Welsh:
So you, you conducted the first PARTNER trial and determined that TAVR showed a lot of promise which led you, of course, to then the second and third PARTNER trials. What were some of the things that you found that sort of allowed you to expand upon just the decision tree when it came to TAVR versus surgery?

Dr. Smith:
Well, the exercise in going from one to two to three and then the iterations beyond involved kind of a plotting move down the risk spectrum. So it was less exciting at each step in a way because we knew it worked and we were trying to refine our understanding of where one is better than the other.

But TAVR is the biggest thing that's happened in my field, in my career, really. It's just most transformative thing that's happened. And it's still going, you know, within seven or eight years, it went from zero to doing 80 percent of aortic valve replacement.

Erin Welsh:
Right. I mean, I think just like you said earlier, having that well-thought-out, well-designed clinical trial where you're asking the right questions and then you can build upon that, I mean that's really key. And so looking back, what did these trials demonstrate about clinical collaboration and patient coordination?

Dr. Smith:
The longstanding history of good collaboration between cardiology and cardiac surgery at Columbia was important to getting us to a place at the table. That was in another way almost equally revolutionary part of the trial because it was really the PARTNER trial that came up with the PARTNER concept with the idea of a valve team, of a heart team, where the two disciplines or more sit down together and decide what's the best for patient A and patient B. Rather than having patient A go visit the surgeon first and get the surgeon's spin on things or go visit the cardiology first and get that spin and then have to sort it out.

So the idea of a heart team that would decide, what's the best thing for this patient based on the data in front of them, was kind of a new concept. And that's why we named it the PARTNER trial. I mean, that acronym was not an accident.

And that requirement for collaboration, cooperation was carried over into the labeling. So when the FDA approved it, they required that that continue to go on. It's been not easy to sustain that level of collaboration outside the trial environment. It's still very present here at Columbia. It's a archeological remnant of the culture that was required to get this going in the first place.

Erin Welsh:
Yeah, I'd love to hear a little bit more about that culture. Like what about Columbia's environment makes it especially conducive to this

type of cross specialty collaboration rather than competition?

Dr. Smith:
It preceded me, so I can't really say what got it started. I don't know, I wish I knew what the secret sauce was. Some people have argued that it had something to do with the fact that, back then, this was a somewhat surgically dominant place. So it was easier to remain collegial.

I don't know whether there's any truth to that 'cause this place quickly became well caught up in interventional cardiology. But no, I can't explain it very well except to say that it's true and that many, many people other than me have made the same observations.

Erin Welsh:
Right and, I mean, it also seems like if that's just part of the culture, then that's the expectation. And as a trainee, you go there and that's what you see, and so that's what you want to participate in. So I'd love for you to share a bit about where things stand with TAVR today and how is NewYork-Presbyterian still integral to continued training in this procedure?

Dr. Smith:
Well, people have said we've trained more than half the people that run TAVR programs in the country and things like that. An extraordinary proportion of them, anyway, have passed through our, our hands. And that is true. I don't know what exact percentage it is, but so many people who are leading the TAVR world now were trained by us at some level.

Erin Welsh:
In the years since Dr. Smith and his colleagues developed TAVR, NewYork-Presbyterian and Columbia have performed the procedure on over two million patients – and they're still working to streamline it.

You might have heard Dr. Smith mention his colleague, Dr. Martin – or "Marty" – Leon. He collaborated with Dr. Smith to lead the PARTNER trials and today, he's the Director of the Cardiovascular Data Science Center at NewYork-Presbyterian and Columbia.

I spoke with Dr. Leon to learn more about the latest advancements in TAVR.

Dr. Leon:
The current approach is very different. We still have a heart team and we still have a heart valve clinic where we see these patients. We get involved clinical cardiologists and imaging experts and interventionalists and surgeons. Every case is treated differently and we call it personalized medicine.

Now the way we do the procedure has also been significantly refined as the technology has dramatically improved.

The procedures are done in a dedicated setting with the highest level of advanced technology available. There are many new accessory devices to make the procedure safer, faster, more predictable, better. And all of those are available at Columbia, and many of them we've pioneered them and have been involved in testing these.

We've worked on the imaging side very intensively. The echocardiography algorithms to assess and define aortic stenosis have been markedly improved. We're using artificial intelligence to be able to identify and recognize and diagnose this condition earlier.

Erin Welsh:
Recently, Dr. Leon contributed to a trial that showed that even for patients who don't have symptoms of aortic stenosis yet, TAVR was more effective than simply monitoring the condition.

Dr. Leon:
What we've observed is that many times during surveillance of these patients, you miss the onset of symptoms, and we felt that the trigger, in other words the impetus for doing valve replacement should not be based solely on symptoms. And that study has taken us close to seven years to complete. The thing that we learned was, when we do early TAVR, these patients did spectacularly well.

Erin Welsh:
Both Dr. Leon and Dr. Smith say that they hope to see lessons learned from TAVR applied to other types of valve disease and approaches to heart surgery in the years ahead.

Dr. Smith:
Today we're still very involved, where we like to be involved, at the next sharp edge of the wedge, which is now other valves–mitral, tricuspid and so on–which are much more difficult to beat with transcatheter approaches than the aortic valve.

Erin Welsh:
Yeah, I mean given the complexity of the heart I can imagine that there's a truly vast array of ways to approach treatment of heart

disease. And while I'm sure you've seen a ton of advancements over your career, I'm curious to know what other innovations you're looking forward to in the years ahead and how you're implementing them at NYP and Columbia?

Dr. Smith:
One area where I'd say where robotic surgery has actually taken a leap recently is in mitral valve repair. And we have maybe one of the world's best practitioners here, Arnar Giersson, and it really looks like that could turn a corner on relevant application of robotic technique to surgery, to complicated surgery. And that could be pretty transformative.

Erin Welsh:
Right. And I imagine that the leap that you just mentioned is one of many. And I'm interested to know how else you've seen robotic surgery tech advance over the years.

Dr. Smith:
One of the problems with the robot in its early uses was, it could do the job, but very slowly. So that was a real problem for heart surgery. Much less of a problem now. As a broad generalization the more complex the surgery the more difficult it was to find a safe, time-efficient robotic application.

But now we're getting there with Jason Hawksworth who joined us from Georgetown about two years ago. Outstanding hepatic liver transplant robotic surgeon. He's one of a kind in that area. Now that was something nobody touched for a long time. And pancreas surgery with the robot, that was considered dangerous for quite awhile. And now he's doing some of that, so it's all sort of feeding on itself, but becoming more and more applicable for complex, high risk surgery. It's also moving down the size spectrum. And as they continue to miniaturize, it'll be more and more applicable to children, smaller adults. It's becoming more and more relevant.

Erin Welsh:
Yeah, I think that's really well put. And so aside from technology like robotics, I'm curious to know about other advancements that you've seen at NYP and Columbia, institutionally speaking. Can you talk about how you've seen the two evolve over the years, you know, as far as, like, research, innovation, leadership, or any other areas that stand out to you?

Dr. Smith:
Where I sit, I think of the two institutions together, which may not be obvious to an outsider, Columbia University and NYP. And they're absolutely bonded at the hip in the medical center. In this 42 years that I've been here, they've been on a steadily rising and parallel trajectory.

That's been a whole bunch of things, but it's many of the things you just mentioned. It's been more and better research and innovations. Looking back on it, I would say the thing that we, not just me, we were always moving ahead, the volume of heart surgery since I came as a resident has quadrupled. The volume of heart transplant has quintupled. The volume of congenital heart surgery is tripled, I think. I mean, in every area, and those are just the areas I know best, and you could probably go down the list of things in cardiology and medicine and so on. The place has just continued to grow.

Erin Welsh:
I know this is quite a broad question, but what legacy do you hope to leave behind?

Dr. Smith:
A place that doesn't need me anymore, that's off and running. If I become immediately irrelevant that would be a good sign.

Erin Welsh:
That's a great answer.

Dr. Smith:
It will be a different kind of life to not be operating. Operating is just so much fun. But I can't do it forever. I have a feeling I'll keep busy. One of my predecessors said that every department should have a dog. Because at least when the old chairman comes back to visit, the dog, it'll stand up and wag his tail.

Erin Welsh:
Oh my gosh, that's amazing. Well, what an absolutely fascinating conversation. Thank you again so much for chatting with me today.

Dr. Smith:
My pleasure.

Erin Welsh:

Huge thanks to Dr. Craig Smith for taking the time to speak with me about his extensive career, and the evolution of heart surgery at NewYork-Presbyterian and Columbia.

I'm Erin Welsh.

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