OREGON HEALTH SCIENCES UNIVERSITY HISTORY PROGRAM

ORAL HISTORY PROJECT

INTERVIEW

WITH

James A. Wood, M.D.

Interview conducted July 17, 1998

by

Annette Matthews, M.D.

SUMMARY

In this interview, University of Oregon Medical School alumnus and former faculty member Dr. James A. Wood, M.D., discusses his role in the development of the Starr-Edwards heart valve.

Wood was just finishing his medical degree at UOMS in 1957 when Dr. Albert Starr joined the faculty of the department of surgery. Under the influence of fellow resident Dr. Justin Aalpoel, Wood stayed on at the Medical School for residencies in both general and cardiac surgery. During that time, he began working with Starr, who was then beginning to develop his heart valve prosthesis.

Wood describes the dog lab and the initial animal testing, and then talks about the first human patients to receive the prosthesis. He explains that the enormous influx of patients awaiting valve replacement put a strain on the space allotted to the cardiac unit at the Medical School Hospital; in response, Wood and Starr established a cardiac surgical unit at St. Vincent Hospital. For many years, these two units operated in tandem to supply enough beds for the surgeons working with Dr. Starr.

To establish an historical perspective for the work, Wood comments on the importance of valve replacement in cardiothoracic surgery generally and describes some early efforts to develop a valve prosthesis.

Wood talks briefly about Lowell Edwards and the manufacture of the valves before moving on to describe some of the early surgical complications. He also comments on the technological needs of valve replacement, and notes that he and Starr were required to develop one of the first monofilament sutures for use in their work.

Wood also addresses the question of the financing of this research, and explains that Starr's early efforts were all funded privately by Mr. Edwards. It was only after initial success with human patients that Starr received funding from NIH and other granting agencies.

In the context of the broader scientific community, Wood indicates that the team felt a sense of excitement and cooperation, rather than competition, with other researchers working on valve prosthesis development. He notes that he and Starr worked to train other surgeons in the use of the Starr-Edwards valve.

In conclusion, Dr. Wood mentions other researchers and individuals who would have further information about the development of the valve.

TABLE OF CONTENTS

Interview with James A. Wood, M.D.
Interviewed by Annette Matthews, M.D.
July 17, 1998
Site: St. Vincent Hospital
Begin Tape 1, Side 1

MATTHEWS: Let me ask you where you were born and raised.

WOOD: I was born in Newtown, Missouri in 1926.

MATTHEWS: And then how did you end up in cardiothoracic surgery?

WOOD: Well, actually I came out here after World War II to go to college. I went to Reed College, and then I stayed here and went on to medical school. I was originally going to go into general practice because I had a very good friend out here in Hillsboro where my mother worked in a hospital that was a general practitioner and owned the clinic out there, Dr. A.O. Pitman. And so I was originally going to do that, and then I decided that, well, I'd take a little general surgery and it would help out and so forth and so on.

I got into the general surgical program up at the Medical School. Dr. Dunphy then became professor the year that I entered the program, and there were very few cardiac surgery people available. And I was sort of interested in that because I had met one of the residents there who had just finished his residency—prior to the onset of cardiac surgery, but in thoracic surgery, a man by the name of Dr. Justin Aalpoel, who was a very fine surgeon and was a great influence on me. And he sort of talked to me about going into chest surgery, so—they were combined chest-thoracic surgery, cardiac surgery. So I talked with Dr. Dunphy, who was head of the department at the Medical School, and he set up a program for me where I got my boards in general and thoracic surgery, in a combination way of five years.

At that period of time Dr. Starr was working on setting up the heart program because he came out here from Columbia about 1957, '58, about the time I was getting into my residency. So he started this research, and then I became interested in it, and when I finished my general surgery residency, there was no question I wanted to go ahead and go on. And during my first year of thoracic, cardiac-thoracic residency, we were working in the dog lab developing the various types of valves: Dr. Starr, myself, Dr. Colin McCord, Dr. Rod Herr, and a cardiac fellow by the name of Dr. John Vetta from India.

We worked in the dog lab two days a week implanting these valves that Dr. Starr and Mr. Edwards had made. Then after we had a series of—then we had about nine or ten living dogs that lived for a period of time, and Dr. McCord and I presented that work at the Surgical Forum in Atlantic City in the early '60s. And right after that, then, we did the first mitral replacement, and that was at the University.

The mitral valve was first, and we did that for a period of time, and that was in the early fall; and then in about January we did the first aortic valve replacement. That man's name was Calvin [Briley?], and he was from Klamath Falls, and he was about a 54- or 55-year-old man, and he had had rheumatic fever, heavily calcified valves. And we put that valve in, and he survived for a period of time, but ultimately died within a short period of time.

In the early '60s we did—the first year, I think, we did—I've forgotten now the exact number, but there were not many valve replacements, but maybe—

MATTHEWS: Eleven, does that sound right?

WOOD: Something like that, yeah. But the mortality rate was so high that we stopped operating for a while and went back to the dog lab and worked in the dog lab for a period of time.

MATTHEWS: That's one question that's actually later, but maybe I can ask you now, about the dog lab. I have a question about the animals that were used, and how you did that. Was it only dogs that you used?

WOOD: Yes. We worked on dogs at that period of time. Later we did work with calves and so forth and so on, and pigs, but in the early days we did only dogs.

MATTHEWS: Was there a difference between dogs and pigs in terms of the valves themselves?

WOOD: Yeah—well, the valve was the same, but I think the survival was—it was easier to get survival in pigs and calves than it was in dogs.

MATTHEWS: And how do dogs compare to humans? Was it easier to get—

WOOD: Well, no, no, it was much more difficult. Actually, it was very easy to do valve replacement in humans after you'd been doing it in dogs for a while. It was much easier, much easier.

MATTHEWS: Oh, really? Why is that?

WOOD: Well, because of the anatomy. The aorta is very thick in dogs, and the aortic root was small, and the blood pressure in dogs is much higher normally than it is in people, so bleeding was a problem. And also, if you got any injury to the lung—you know, if you inadvertently touched the lung or anything like that, why, then the dog generally died because they had persistent air leak, and it was very difficult to get them to seal so that they didn't get pneumothorax, or if they got a pneumothorax, a partial lung collapse with secondary infection and so forth and so on.

MATTHEWS: So actually the dogs were harder than people?

WOOD: Dogs were harder than humans, actually, yeah.

MATTHEWS: What about clotting, in terms of clotting—you said they bled.

WOOD: Well, bleeding wasn't so much of a problem. You had to be very careful with the suturing and so forth and so on because the blood pressure was higher, and any time you suture a high-pressure system, it bleeds more than, say, a low-pressure system.

MATTHEWS: Okay. I'm going to ask you, how did you get to St. Vincent? How did you end up here?

WOOD: Well, actually after I finished my residency, at that period of time we—the next year—I had one more year of residency—we were successful. You know, as I say, in January we did the first aortic valve replacement, and shortly after that we did two valves, aortic and mitral, at the same time. And in February of that same year we did a triple valve replacement on the first patient in the world that that was done on, and that was Virgil Roberts.

So it was presented, and we were the only ones in the world that were doing them, Dr. Starr and myself, and so we had patients coming from all over the world, and people were sending patients in and so forth and so on. At the University Hospital, the Medical School at that time, we only had seven beds assigned to cardiac surgery. So we had literally hundreds of patients that were awaiting surgery.

So Dr. Dunphy and Dr. Starr and Dr. Allen Boyden and myself got together and said, "Well, we need to do these other cases someplace." And so Dr. Boyden arranged for us to open up a cardiac surgical unit at St. Vincent Hospital. So, early days—I came down right after my residency in '63 and started the program here—well, it was at the old St. Vincent Hospital downtown.

We started doing these cases that were being referred in from all over the country at that time, as well as at the Medical School; and we did about two to four cases a week at St. Vincent, and about a similar number at the Medical School. But we used to be booked for a month or two ahead of time.

So we actually came to St. Vincent because we didn't have room at the Medical School, and the overflow was sent to St. Vincent under the auspices of Dr. Dunphy, who was Chief of Surgery at the Medical School at that time. That's how we ultimately opened up the program here. And then we also started a program at the Veterans Hospital shortly after that, Dr. Starr and I did, so we could do cases there and train people there. So we actually for a period of time had three programs: the University program, the Veterans program and the program here. And we had that for many years, actually.

MATTHEWS: So I'm going to go into part two, which is more about the valves, specific questions about the valve development.

WOOD: Okay.

MATTHEWS: Just sort of for my orientation, I'm going to ask you about how important is valve replacement in terms of cardiothoracic surgery, especially then, and then kind of now?

WOOD: Well, the two things that were—at that period of time it was very important because you must realize that there were no—there were operations on the valve at that period of time; Dr. Cutter and Dr. Chamberlain and Dr. Conklin were doing commissurotomies, and we were doing commissurotomies as well, but if you injured the valve badly and tore it inappropriately, the patient would die. So there wasn't any backup, so to speak, and people did not know how to repair the valves at that period of time. So this was a real breakthrough. And there were literally thousands and thousands of patients out there that had had rheumatic fever or whatever—but that was the most common thing at that time.

MATTHEWS: Other than that, what were some other common—

WOOD: Well, the rheumatic fever was the most common. Infection was another one that was also present, and then mucoid degeneration of the valve. Then in the early days we would see a case rarely that was due to scleroderma or one of the collagen diseases, but that was quite rare at that period of time. And also we would occasionally see cases that were syphilitic in origin at that time, as well.

MATTHEWS: So you know, syphilis is really less of a scourge than it used to be—

WOOD: Yes.

MATTHEWS: I guess rheumatic fever is, too?

WOOD: Yes, it is.

MATTHEWS: When did it really change?

WOOD: When did it change? I would say it changed—I saw the last acute rheumatic fever in this country probably in the late '70s, and so it was mid- to late '70s when it really changed. And it was due to the—actually, they talk about indiscriminate use of antibiotics, but it was due to the GPs and pediatricians treating patients vigorously that had, you know, infectious diseases that were—probably most of them, or many of them, were due to strep viridans. So they eradicated the sequelae from strep throats and strep viridans, thus eradicating rheumatic fever. So rheumatic valves now are quite uncommon. I don't know what the exact percentage is now, but it's not nearly as prevalent as it was at that time. However, in other parts of the world, like in India, China, et cetera, et cetera, Africa, it's very common, and it occurs in very young people.

MATTHEWS: So now, today, how much of cardiothoracic surgery is valve replacements?

WOOD: Oh, about twenty-five to thirty percent, depending upon the practice. That's the practice here because we still are, you know, known for valve surgery, and I'd say in a lot of practices of cardiac surgeons in the community it's probably not that high.

MATTHEWS: Okay. So in terms of that early development of the mitral valve, I read someplace that there were five groups that were involved in heart valve development at that time; is that true?

WOOD: Well, there were a lot of people. Dr. Starr and Mr. Edwards, they were—one of the first people that was involved in it was a guy by the name of Hufnagel, Charles Hufnagel from Georgetown. He had a caged ball that he put in the descending aorta for syphilitic aortitis, and that was the first one.

MATTHEWS: So was he the conceiver of the ball system?

WOOD: He may have been; you know, he may have been, but it was in the descending aorta, it wasn't subcoronary. Nobody had ever done that before Dr. Starr.

Then Jerome Kay you have here was about that period of time, somewhat later, and he was working on tissue valves and repair, and then he also was doing some work and research of artificial valves.

Braunwald was later. He was at the NIH, and also Nina Braunwald, who was a lady that was actually a resident with Dr. Starr; and she had a valve that she worked on in the dog lab, and it was never widely accepted.

Lillehei, the Lillehei-Kaster valve, he was one of the very great pioneers in that. Ellis was so-so. He wasn't very well known for that. There were other people such as Magovern and—oh, people like Cooley, and Merendino were all people that were working on valves.

There was another man that was working on plastic that was to make valves in the concept of the valve itself, and his name was Hank Bahnson, or Henry Bahnson. He was from Pittsburgh, and he did a lot of that research.

MATTHEWS: Is that the Cylastic?

WOOD: Cylastic, yeah, and Teflon. Yeah.

MATTHEWS: Okay. So I was going to ask you about your relationship to Lowell Edwards.

WOOD: Well, I knew him, of course, because I was there when we were working on the valves and he was involved in the mechanics of it and so forth and so on. He was a very unusual gentleman that had—as you may or may not know—had done a lot of inventions and a lot of research, and he developed, oh, such things as valves for airplanes and that sort of thing during World War II and everything, and was actually retired when Dr. Starr met him. And Dr. Starr met him at a cocktail party, I'm told, and was, you know, discussing this with him, and that's how they came about this joint venture together. And they were working on this.

The first valves were very crude. You've seen pictures of them, and so forth and so on. And he was, as I say—I traveled with him in Europe and Great Britain and the States, you know, at some of these valve meetings, and I went to—the valves were manufactured in Santa Ana, California, that's where Edwards' laboratory was, and I made several trips there, you know, working with him there.

Also, a lot of the prototypes of the valves were made at his home up near Mt. Hood.

MATTHEWS: Somebody described that, that you guys could do something in the dog lab one day, and the next day he would have a revision. Was it that fast?

WOOD: Well, yeah, that sort of thing, yeah.

MATTHEWS: So there was a story that Miles Edwards might have introduced Dr. Starr and Lowell.

WOOD: No, that's not true.

MATTHEWS: All right. And kind of similarly, kind of your relationship to Dr. Starr and your thoughts—and I put a comment, as part of the Oral History Project they've interviewed Dr. Sutherland, who is a cardiologist, and he says this about Dr. Starr: He said, "There are many things about him, but aside from his dexterity in the operating room, which is, I gather, very great, his great capacity is the ability to conceptualize, think and plan; his ability—to oversimplify it—to think in the operating room. was wonderful indeed. He was just an extremely canny, very smart, original thinking, conceptualizing cardiac doctor."

WOOD: I think that's true. That's good.

MATTHEWS: Do you have any other comments?

WOOD: No, I think that's very good.

MATTHEWS: So we already talked a little bit about the testing of the prototype valves, and you were telling me that it was mostly on dogs. I was wondering, what were some of the common things that sort of didn't go right in terms of the valve itself?

WOOD: The valve—well, clotting was the most common thing, and rupturing of the suture line, bleeding, infection. Those were all big factors that had to be overcome early on.

MATTHEWS: Okay. And then I guess in terms of surgical kinds of complications? I've seen in various articles like fixation, I guess, was a problem, where it would kind of come off?

WOOD: Yeah, it was. See, actually there were no monofilament sutures that were available at the time that we developed the valve. We used silk in the dog lab, and we found that, over the long period of time, silk fatigued and ruptured in humans. So then we tried larger sutures with more tensile strength, but they were bulky, and they caused clotting, and they caused impingement of the valve. So that's when we started working to develop monofilament sutures.

The first suture that was done was Tevdek. And that was one of the things that Dr. Starr and I developed early on in the '60s was monofilament suture, because this had to be developed before the valve could be sewn in. We actually closed down our operating room for about six weeks or so, or two months when we worked on this.

MATTHEWS: Were there other kinds of things that had to be developed in order—

WOOD: Yes. Such as evacuation of air from the left side of the heart, because some of the first cases died from air embolus, and people did not know how to evacuate air properly from the heart. These were some of the things we did in the dog lab and research facility, techniques for developing evacuation of air from the left side of the heart so when the heart was allowed to function you didn't pump air into the body, getting myocardial infarction and stroke, et cetera, et cetera. And the other way was also to control introduction of bacteria into the operating room and to—sepsis was a big problem in those early cases, and we had to go about that for a period of time to figure out how to keep from, you know, getting our cases with late infections, early infections, et cetera.

MATTHEWS: Is it a bigger problem in cardiothoracic surgery, the introduction of bacteria, than other types of surgery?

WOOD: Sure, because once you get an infection in that artificial value, you know, it's very difficult to cure, and the mortality rate's very, very high.

MATTHEWS: So how were the valves—they were manufactured, and were they sterilized?

WOOD: Oh, yes.

MATTHEWS: I guess they could go through the regular sterilization process?

WOOD: Sure.

MATTHEWS: I'm also interested in the testing—I guess on how the first people who received the valves were chosen?

WOOD: Well, they were very ill, and they were not amenable to the usual techniques, both medical and surgical, that were available at that time. They were sort of at the end of the road, so to speak, and that's how we chose them. And they realized that this was a new, experimental type procedure and were informed of this, signed a release form for experimental surgery and so forth and so on. Of the first ten cases we did, nine died in quite rapid fashion.

MATTHEWS: Were the patients eager to have the valve surgery?

WOOD: Yes. It gave them new hope. And then after the first year, because of solving the problems of the valve, of the mechanics of the operation, myocardial protection, how to protect the myocardium, how to protect the brain, the mortality rate dropped significantly.

MATTHEWS: Speaking in terms of protecting the brain, the next question is other technological keys to success? I mean, you've already mentioned the suture material, evacuating the air—

WOOD: Well, I'd say those things of the controlling of sepsis, myocardial protection, organ protection, vital organ protection: brain, kidney, lung.

MATTHEWS: Is that by hypothermia?

WOOD: No, we used hypothermia, but it was mild hypothermia. We didn't use—some people were using—at that period of time when other people started doing it, there were other people that did profound hypothermia, but we didn't. But also the technique of bypass itself improved a lot. You know, the heart-lung machines were improved, the oxygenators were improved, et cetera, et cetera.

MATTHEWS: Was the heart-lung machine—I don't really know the date of that. Was that invented before?

WOOD: Well, actually, a guy by the name of Gibbon was the one that developed the heart-lung machine in the early '50s. Dr. DeBakey was working on it before World War II, when he was, I guess, a resident or fellow or whatever. But Gibbon is the one that gets the credit for the heart-lung machine, actually. He was working on it, and then it was in the late '40s or early '50s that he perfected it. And it was a fairly gross one. The first ones that Dr. Starr and I ever had were made by a man by the name of Olson in Massachusetts, and they were custom made to our specifications. I think maybe one of them still is around here.

MATTHEWS: Really? Wow! [Laughs] In terms of surgical techniques, were those really perfected on the dogs before the humans?

WOOD: Yes, by and large they were, and then of course we learned as we were going along, too, you know. I mean, we continued to do dog surgery for years and years and years, both Dr. Starr and myself and other people that came—after Dr. McCord left and went back to New York and Dr. Herr left and started his own practice and Dr. Vetta went back to India—there were other people that came and worked in the dog lab and so forth and so on.

MATTHEWS: Where did you get the dogs from?

WOOD: Well, there was an animal farm out here in Washington County where we used to get them from. They raised them. We used labs, mostly.

MATTHEWS: And where was the dog lab up at OHSU?

WOOD: Well, it was in the old—what is Mackenzie Hall.

MATTHEWS: Oh really?

WOOD: Yeah. It was up there. That was the original one. The research lab we had where we did the implantations in the dogs was about as long as this thing [demonstrates], and about this narrow. It was just about where you and I are sitting; that's all the space we had.

Then after the valve was reported in the scientific literature and the NIH gave us a substantial grant, the new dog research lab was built over there, and that was the first one. Matter of fact, if you go in that research lab, there used to be—I haven't been there for a period of time, but there was a dog there, a German shepherd and a little boy. Have you seen that picture?

WOOD: I might have, yeah, because we did dogs; this year we do pigs.

MATTHEWS: That little boy I operated on, did a valve repair on his aortic valve, and also that dog was one that had an aortic replacement placed in it. And they took a picture of the two together, and it was a newspaper article that was placed at that one period of time.

MATTHEWS: That would be great.

WOOD: Yeah, look for that picture. It used to be there on the wall. It was a nice picture of a little boy and a German shepherd.

MATTHEWS: Okay. If I can't find it there, do you remember what year that was?

WOOD: That was about [pauses]—I don't know. It was probably, maybe late '60s.

MATTHEWS: Was it *The Oregonian*?

WOOD: I'm not sure. It was either *The Oregonian* or *The Journal*, I'm not sure. I tell you who you ought to talk to if you want to know some stuff that was in the paper about the time or get the articles and everything, would be a person, Ann Sullivan, who's a retired reporter for *The Oregonian*.

MATTHEWS: Okay.

WOOD: And Howard Stroud is another guy who—he's head of the Oregon Heart Association—you ought to talk to because he knows all about this business, and he was there, and we used to—he, you know, gave us money for certain things and so forth and so on because we were pretty hard up for various pieces of equipment and so forth and so on. So it would be interesting for you to talk to them.

MATTHEWS: Actually, one of the questions I had was the financing of the valve development.

WOOD: The financing of the valve was done privately by Lowell Edwards and some of his associates. There was no public money or no outside money went into that, it was all done privately by Edwards and some of his associates.

MATTHEWS: And so there was the program project grant from the NIH?

WOOD: That came in after we had successfully done it. That was all done after we had reported on all of the valves and it was an established procedure, then we had several million dollars that we got from NIH.

MATTHEWS: And then I noticed there was like a grant-in-aid from the Oregon Heart Association?

WOOD: Yes. That's what Howard Stroud could tell you about.

MATTHEWS: Okay. That would be great. Then as you guys were discovering the valve and getting the valve to work and all that, I was wondering, was there a sense of it kind of being a race?

WOOD: A race? No.

MATTHEWS: What was the tone?

WOOD: The tone was one of excitement and interest and scientific curiosity and problem solving; and all the problems, we would discuss them readily with our colleagues all around.

Dr. Starr and I went to Europe early on and operated before the Royal College of Surgeons, and we did the first valves that were ever done in Europe—in Scandinavia and Germany and so forth and so on.

So no, there was no—we went there and showed people how. We used to have, at the Medical School and at St. Vincent Hospital, we would have daily visitors from all over the world, you know, coming to see how to do it. No, there was no sense of competition. It was a sense of cooperation.

MATTHEWS: I was trying to figure out like the seminal paper, the paper that kind of announced—or the situation, the conference that kind of announced to the world that this valve works and patients are surviving, or we figured this out. There's a paper in the *Annals of Surgery* that's called "Mitral Replacement, Clinical Experiences with a Ball Valve Replacement." Is that the paper?

WOOD: Well, that's not the one. The one that was the first one that came out was in the *Journal of Thoracic Surgery*. And then there is also the experimental one, which was in the—what is that you call those proceedings of surgery? You know, it's the research part of the American College of Surgeons meeting? And that occurred in 1962, I think is when that paper was presented. And I think Colin McCord was the senior author on that. So look at Colin McCord.

MATTHEWS: Okay. I know somebody was referencing there was a conference on prosthetic valves for heart surgery in 1960. That's before.

WOOD: I don't know anything about that. I don't know that that—

MATTHEWS: Was anything.

WOOD: No.

MATTHEWS: All right.

WOOD: Have you looked up a bibliography on all this?

WOOD: Some, and I'm going to go get some more today.

MATTHEWS: Okay. When you get the bibliography, why don't you send it to me, and I'll go over it and I can mark what's important and what isn't?

MATTHEWS: Oh, okay. That would be great. I'll get that today.

WOOD: Just send it here to me.

MATTHEWS: Then my last question was other people to talk to. I'm actually going to go over in another hour or so and talk to Gary Grunkemeier.

WOOD: Gary Grunkemeier. Ann would be good.

MATTHEWS: Eddie O'Keefe next Tuesday. Miles Edwards soon. Dr. Starr, of course.

[End of Tape 1, Side 1, and interview]

INDEX