

complications in the last years of the experience reported emphasize the need for and effectiveness of fastidious care in the use of these devices.

### References

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### DISCUSSION

DR. ROBERT RICHIE LINTON (Brookline, Mass.): I rise primarily to give you a little different explanation for the high failure rate of bypass plastic grafts in the lower extremity from what Dr. Szilagy has given us. I have implanted 35 such grafts and only 2 (6%) are patent after five years, a failure rate of 94 per cent, whereas in 150 saphenous vein bypass autografts for the same number of years approximately 85 per cent are patent, a failure rate of only 15 per cent.

It is my opinion that the chief cause of failure is the tremendous amount of scar tissue that forms around these plastic grafts, with the resulting loss of elasticity in them. It is not, I am sure, in the majority of patients an advance in their disease or my ineptness of implanting this type of graft or we should see it in our saphenous vein autografts as well, since many of them have much poorer outflow or run-off vessels than those I used the prosthesis on.

(Slide) This first slide is a Dacron prosthesis, or a portion of one, removed 3 months after it was implanted because of occlusion. It demonstrates, I believe, the adherent difficulty with these prostheses as we have them today since it shows a tremendous amount of scar tissue which has formed around the prosthesis within as short a time as 3 months. The pseudo-intima on the inside looks extraordinarily good.

(Slide) Dr. Szilagy will recognize this as one of his combinations of Teflon and Dacron. It worked very well for 4 years and then one night while the patient was in bed it suddenly occluded. Like many of the occluded prostheses it resulted in such severe tachemia of the foot and lower leg that an amputation was necessary. Again notice the tremendous amount of scar tissue about the graft.

(Slide) This slide demonstrates an arteriogram performed on a patient who has had a successful prosthesis, now in for a period of approximately 5 years, but you will notice that when his knee is at a right-angle genuflexion there is a tremendous amount of kinking which I am sure interferes with blood flow through the graft. This also I think may

result in dislodgement of the pseudo-intima if it is loosely attached and this is especially true of the pure Teflon grafts with resulting embolization of the distal arterial tree.

(Slide) In contradistinction to this marked kinking with prostheses please note this arteriogram demonstrating the gentle curving of a saphenous vein bypass autograft with the knee in right-angle genuflexion without any evidence whatever of kinking.

It seems to me that further research is indicated in trying to develop some new type of prosthesis because of the failure of so many of these that have been used and because there are certain cases that they would be most valuable in, in which we cannot do a saphenous vein bypass graft or a thrombo-endarterectomy.

DR. JERE W. LORD, JR. (New York): I take issue with one point Dr. Szilagy has mentioned, namely, the question that all prostheses are essentially of equal value. This is suggested in the abstract, not so much in his presentation today.

Prostheses are like the Westerns on TV. There are the *good guys* and the *bad guys*. I think some Dacrons and Teflons are better than others, and we have had the best results with Dr. DeBakey's crimped, knitted Dacron over the past 7 years.

I would like to cite one case—a man of great stamina and faithfulness. I operated on him three times. In 1957 this man came to the hospital with an intermittent claudication of 6-month duration, early gangrene of the tips of the toes of both feet. Femoral pulses were absent. An aortogram showed a block of the common iliac arteries and terminal aorta.

An endarterectomy of the distal aorta and proximal common iliac arteries restored good pulses, and he did well for 6 months. His symptoms then then recurred, and he was re-admitted in October 1957 and another aortogram showed the same problem. This time we used an ethigraft manufactured by the Ethicon Company and anastomosed the aorta end-to-end to the prosthesis and end-to-end to each common iliac artery. This prosthesis functioned beautifully for 10 months and then

closed. In December 1958 a crimped, knitted Dacron developed by Dr. DeBakey was inserted end-to-end to the aorta and end-to-end to the right common iliac artery and end-to-side to the left external iliac artery.

He was last seen in December of 1964, 6 years postoperatively, with an excellent result. In our experience this particular Dacron is the best we have used, although as Dr. Szilagyi said, there is nothing quite like the autologous saphenous vein for peripheral reconstructive surgical procedures.

DR. RICHARD WARREN (Boston): I just wanted to ask Dr. Szilagyi how many of his aortic prostheses have shown a good neo-intima.

We have several biopsies of aortic prostheses of all types, both the stretch Dacron and the knitted Dacron, and we have had no neo-intima form. It stays perfectly smooth.

I am not saying it is desirable to get an intima; they do well in any case, but just from a biologic point of view this is quite a different experience from ours.

DR. D. EMERICK SZILAGYI (closing): I certainly hate to disappoint our distinguished guest, but homologous vein grafts have in the past been shown to deteriorate in a few months after insertion.

Dr. Linton and I disagree about the exact causative mechanism of the failure of femoro-popliteal plastic prostheses but we agree that they do not give satisfaction. I have presented my ideas of this mechanism and the evidence for it; it would be redundant to go over it again. There is one point

mentioned by Dr. Linton, however, that I should like to take up briefly. A great deal of importance has been attached to the kinking of these prostheses in the popliteal space with the knee in sharp flexion, as you see it here (Slide). However, the average person does not assume this position of the knee very often or for long periods of time. In a lateral view of the prosthesis with the knee in slight flexion or in extension, positions that are customarily assumed, there is no kink in the prosthesis.

Dr. Lord's statement that all prostheses are not equally good is probably correct, but at the present time there is no way of proving it. The experience of individual surgeons is generally limited to the prosthesis which, for reasons of their own, they have chosen to employ and there are no comparative studies of the clinical use of different types of prosthesis. I have shown our own results but cannot speak with authority about the clinical results achieved with the use of other types. However, in rather extensive experimental work I have found that at least three Dacron prostheses of somewhat varying methods of fabrication behaved pretty much alike.

And finally, in answer to Dr. Warren's question, I should like to say that the intima is always present in these prostheses but it is very thin. In the aorto-iliac area this makes little difference because of the hemodynamic conditions—the blood flow is fast and the blood pressure is high. In the femoral area, however, the imperfect development of the intima assumes great importance, and I am sure it is the most important single cause of failure.