

SOME OBSERVATIONS ON UPPER-LIMB PROSTHETICS AND ORTHOTICS¹

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On behalf of the State University of New York Upstate Medical Center, the Department of Orthopedic Surgery, and the Division of Orthotics Research and Education, I would like to take this opportunity to welcome you to Syracuse.

It has been my observation that when persons organizing a seminar or conference in the winter-time want to insure a good attendance, they schedule the meeting for some place like Aspen or a cruise ship in the Caribbean. When you are caught with Syracuse, New York, during one of the rainiest May's in history, you are left with only one alternative to attract a group of people; that is, to assemble the best program and faculty possible. Judging from the number I see here today, I would say that the program Chairmen have been extremely successful; and it is certainly a tribute to their organization ability and the quality of the papers you are going to hear.

I have another observation I would like to pass on to you after having looked over the sophisticated list of topics in this program. Fifteen years ago as I was training in Orthopedic Surgery, I developed an interest in prosthetics and spent some time at that point working on early fitting of below-knee amputees with plaster sockets and pylons. In the course of this work, I attended the standard courses in prosthetics and orthotics—learned about plastic laminated sockets, triceps pads, control cables, Dorrance terminal devices, shoulder harnesses, and so forth.

Over the years, the number of other responsibilities has encroached nearly 100 percent on the amount of time I have had to devote to a continuing interest in prosthetics. Suddenly,

after a long hiatus, I was called upon to attend a prosthetics clinic at the Upstate Medical Center last month as a substitute. Mind you, in the interval, we have seen the development of portable color television, the landing of men on the moon, the production of pocket-sized electronic computers, and cameras which spit out instantaneously a snapshot that is developed before your eyes. Therefore, it was with a certain amount of uncertainty and a feeling of inadequacy that I approached my assignment to the prosthetics clinic. The first patient was a youngster with a congenital below-elbow amputation. Would you believe I suddenly found myself back in the old world, talking about plastic laminated sockets, triceps pad placement, shoulder harness adjustment, ring position, and cable tension? Even the plastisol was peeling off the terminal device (a hook) in the same way that it used to peel off when I was attending clinic 15 years ago. In a way, it was comforting to realize that in this dynamic decade, something at least hadn't changed. On second thought, it was a bit surprising and not a little disappointing.

My own particular efforts over the past few years have been devoted for the most part to studying and utilizing internal prostheses such as hip joints and knee joints. Over the years, there have been two ways in approaching the problem of a destroyed joint. One group has attacked the problem by attempting to replace the joint with a biologic substitute—either a joint from another human being or a mechanism for internal repair of the damaged joint. The other group has approached the problem from the standpoint of creating an artificial substitute of inert material which could be implanted in the body. There is no question as to which group has been the most successful. We are currently implanting artificial joints in great numbers and the current success of these artificial substitutes have eclipsed attempts to improve on methods of biologic substitution.

Much the same thing seems to be going on in

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the area of substitution for destroyed or missing limbs. At the Veterans Administration Hospital several blocks away, Dr. Robert Becker is working on methods for regrowing normal limbs through electrical stimulation of tissue at the end of the amputation stump. It is his contention that lost limbs will eventually be replaced biologically. However, as evidenced by this program, other groups are actively at work developing sophisticated prosthetic replacements. If I had to bet on which approach would turn out to be the most feasible, there is no question but that logically I would place my money on the prosthetic replacements. Judging from my recent experience, however, on the practical improvements made in this field over the past 15 years, I am afraid I might have to hedge my bet.

There are generally three types of stimuli for accomplishment in any particular sphere. First of all, there may be a crying need for a solution. The development of the polio vaccine is an example of a response to this stimulus. Secondly, a problem may simply present a challenge. The climbing of Mt. Everest fits in this category as being a drama-

tic feat, but of no particular practical benefit. Thirdly, technological advances may suddenly make something possible that had been merely a pipe dream up to that point. We could place space exploration in this category.

Now as we look at the field of upper-limb prosthetics and orthotics, I think that all three of these factors apply. There is unquestionably a crying need for improvement—the challenge of a difficult problem is inescapable and I have to believe that the technologic capabilities are now at hand.

It seems like the time has arrived for educators and innovators in this field to get off the mark, to stop talking about the amazing features of the Dorrance 5XA hook and to apply their talents to the obvious, unsolved problems. From the topics listed for discussion at this meeting, I sense that a start is being made. I am sure that it will be a valuable day and a half, and I hope that seminars such as this, combining the talents of the leaders in this field, are heralding an era of innovative advancement in the orthotics and prosthetics fields.