Getting Down to Cases

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IT is the common teaching of all experience that even the most carefully planned activities seldom follow the course originally laid out for them. Man tends to play himself through life by ear, as it were, in a series of false starts and fortunate recoveries. In all fields of endeavor, therefore, hindsight is more often than not the quality which, in the long run, keeps people going in the general direction of progress. That such is the way things are is perhaps nowhere more patent than in the evolution of the Artificial Limb Program.

When, for example, in 1945, the Committee on Prosthetic Devices (now the Prosthetics Research Board) set out to improve the lot of the amputee population, it chose for itself the seemingly obvious, if also apparently simple, goal—the design and development of new and improved artificial-limb components. Because of the more or less widely held misconception, even among amputees themselves, that improved devices alone might well raise the level of the art of limb prosthetics to that existing in other fields of science and invention, the Committee established, through arrangements for contract research, a far-flung program with principal emphasis on the fundamental investigation of human locomotion, on time-and-motion studies of the human arm and hand, and on what might by some be called professional gadgeteering.

After a few years of organized effort on the part of engineers and prosthetists, with the consequent development of new and supposedly improved models and techniques, and after the application of experimental prostheses to amputees for initial tests of the new equipment, it became perfectly clear that, if genuine improvement in amputee service were to be had, something more would be needed. In retrospect came realization of the circumstance that no single design of prosthesis is ever apt to be superior for all amputees of a given type and, conversely, that every amputee presents in one way or another a special problem not amenable to mass treatment. Put in engineering language, the difficulty was seen to lie in the fact that dealing with the rehabilitation of

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amputees means dealing with a "nonstandard product," the human being. He comes in all sizes, shapes, and conditions. And his reaction to any given selection of equipment is almost always grossly influenced by his individual personal needs and characteristics—physical and mental—as well as by his activity requirements. Since most of the new devices and new methods were largely untried at the clinical level, there existed no valid criteria either for determining when components had been prescribed and fitted to best advantage in the individual case or for assessing the degree of utilization achieved by a given wearer. In the absence of demonstrable proof of successful application on a relatively broad scale, the limb industry was understandably reluctant to adopt the new ways and means with any ostensible enthusiasm. But at the beginning of the Artificial Limb Program in 1945 no one was in a position to predict such eventualities.

Lacking, in brief, was the experience necessary for the construction of a general set of principles of amputee management. In recognition of this state of affairs, and in view of the especially challenging problems prevailing in the upper extremity, there was established in mid-1950, in the Department of Engineering at the University of California at Los Angeles, the so-called "Case Study Program," with the purpose of investigating the application of prostheses to a wide variety of amputee types and of developing effective methods for evaluation of amputee service, not only with regard to the quality and applicability of the mechanical equipment but also with concern for the effect of training and of occupational, educational, recreational, and other personal factors on the final success of prescription and fitting. Intended to bridge the gap between fundamental work in the laboratory and practice in the field, and with excellent industry participation, the work continued until 1953. Analysis of the data thus accumulated continued until late in 1956.

So fruitful was the case-study work in upper extremities at UCLA that in the spring of 1953 there was organized at the University of California at Berkeley a similar investigation into the problems of the leg amputee, especially the above-knee case, a matter that had already been the subject of fundamental research and engineering design at that institution since the beginning of the Artificial Limb Program eight years earlier. Again with the wholehearted cooperation of the limb industry, the so-called "Clinical Study" in lower extremities has, like the UCLA Case Study, now garnered much valuable information on which to base some general principles.

Because the experience gained at UCLA and at Berkeley represents the most reliable data available on what now constitutes good practice in limb prosthetics, the bulk of this issue of ARTIFICIAL LIMBS is devoted to a presentation of selected case histories, predominantly the histories of typical problem cases as contrasted with cases that responded readily and well to routine fitting. The balance is given over to a discussion, by one of the world's best-known leaders in hand surgery, of the possibilities for surgical reconstruction of damaged hands and of the application of prostheses for the partial hand, an

area which offers, if anything, even more highly specialized individual cases and which therefore has not yet been the subject of any major investigation within the Artificial Limb Program. Bunnell's contribution fills admirably what would otherwise be a noticeable gap in the coverage.

As regards the broad implications of the case material, it is worth observing how many and diverse are the ways in which the problem of amputee rehabilitation must be attacked and how wide is the variety of skills necessarily brought to bear. In pursuit of clinical work it was found essential to enlist the participation of numerous specialists, each with his own particular interests and abilities. Functioning together, these people not only aided materially several hundred cooperating amputee subjects but at the same time contributed to their own self-development and hence to the growth of techniques suitable for widespread dissemination to practicing clinic teams. Thus, in a larger sense, they laid the basis for the nationwide program of prosthetics education now so well under way. Because, in turn, the education program resulted in a vast increase in the number of available clinic teams, amputees in the United States are today reaping benefits that could scarcely have been visualized seven or eight years ago. Here then, in the results of the case studies, lies the key to continued advancement in the mastery of limb prosthetics.