

# Need for Research in Surgical and Medical Considerations Dealing with Prosthetics and Orthotics

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The discussion of the Panel on Surgical and Medical Considerations at a Conference on Prosthetics and Orthotics sponsored by the Committee on Prosthetics Research and Development was divided into two parts—those considerations dealing with prosthetics and those dealing with orthotics.

## PROSTHETICS

Much fundamental work in the area of amputation surgery remains to be done, as briefly outlined in this article.

## INDICATIONS FOR AMPUTATION

It is believed that the modern methods of amputee management may have made amputation a more desirable procedure now than some reconstructive procedures currently in use, and the entire field needs a comprehensive review.

<sup>1</sup> Based upon the report of the Panel on Surgical and Medical Considerations of a Conference on Prosthetics and Orthotics held, under the auspices of the Committee on Prosthetics Research and Development, at the National Academy of Sciences, Washington, D.C., December 12-13, 1966. Funds to support the conference were supplied by the Vocational Rehabilitation Administration, Department of Health, Education, and Welfare.

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## SELECTION OF LEVEL OF AMPUTATION, ESPECIALLY IN CASES WITH VASCULAR INSUFFICIENCY

No reliable test for measurement of circulation in the extremities exists. As a result, it is the practice in many centers to amputate above the knee in virtually all cases with peripheral vascular disease. However, it has been shown that many times the knee joint can be saved even when standard tests indicate that the blood supply is apt to be insufficient. Objective tests of circulation coupled with surgical studies should result in more below-knee amputations and fewer above-knee amputations.

## SITES OF ELECTION OF AMPUTATION

Although it is generally agreed that all length possible should be saved, a study should be made in which length of stump is correlated with function and comfort when current fitting practices are used.

## SURGICAL TECHNIQUES

A comprehensive review of surgical techniques should be made. This should include special attention to the care of transected muscles.

The advantages of end-bearing and how much should be carefully reviewed in order to determine whether different techniques, such as myoplasty, osteoplasty and nonviable implants, should be vigorously tested in order to obtain varying degrees of end-bearing. Muscles that must be transected may eventually be control points for externally powered devices and careful attention must be focused on the preservation of their optimal ability to provide

control sources such as myoelectric signals or pure biomechanical motion.

#### POSTSURGICAL PROCEDURES

##### *Rigid Postsurgical Dressing*

There was agreement that the application of a rigid dressing postsurgically is desirable. To achieve the best results consistently it is necessary to determine the range and distribution of pressures that bring about the best results. Techniques for achieving and maintaining proper pressure will then need to be developed. Included in this study, of course, will be the problems of suspension of the cast.

##### *Ambulation*

Studies of the effect of ambulation should be made. Included in such studies would be such factors as time to begin ambulation, the amount of weight-bearing that should be taken, and alignment.

##### *Effect of Immediate Postsurgical Fitting on Cases with Vascular Problems*

In the opinion of some, immediate postsurgical fitting permits amputation at a lower level than is the case with conventional procedures, but no data have been accumulated to substantiate this opinion. This should be investigated, because the presence of the "normal" knee joint permits meaningful function that cannot be approached with an artificial limb and provides a much better chance for rehabilitation measures to succeed.

##### *Immobilization of the Next Proximal Joint*

Although it is recognized that a study of the effect of immobilization of the next joint in the early stage of immediate postsurgical fitting is a part of the overall suspension problem, it was recommended that attention be given this matter.

#### THE PHANTOM SENSATION

Although a good deal of work has been carried out in the study of the phantom sensation, especially in reference to phantom pain, very little is understood about these phenomena. It is felt that attention should be continued in this area.

#### ORTHOTICS

Out of a general discussion of the surgical and medical considerations in orthotics, three broad recommendations developed.

1. There is an urgent need for the development of criteria for the design of bracing based on the biomechanical needs of patients. Perhaps a system of classification of disability based on biomechanics is not only the proper approach to criteria development but, when brace components are related to it, a sounder basis for prescription can be developed.
2. Little is known about the response of human tissues to the application of pressure, yet every function of an orthopaedic brace involves the application of pressure. Studies on the effect of pressure are needed before it is possible to determine the efficacy of certain treatment procedures, especially some of those for children.
3. Studies involving buried and partially buried implants for facilitating control of externally powered devices should be continued.