Prostheses, Pain and Sequelae of Amputation,
As Seen By the Amputee*

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Abstract
Results of a survey of 19 organizations belonging to World Veterans Federation indicate that major complaints of amputees include; poor fitting, poor dissemination of knowledge to doctors and amputees regarding new prostheses, lack of opportunity for "input" from amputees at research level and inadequate measures to deal with phantom and stump pain. Suggested improvements by amputees; decrease in weight of prostheses, reduction in maintenance for swing and stance-phase control units, development of recreational prostheses, more frequent checks through use of X-ray and film techniques, particularly during the "break-in" of a new appliance. Older veterans showed increasing concern in regard to development of consequential disabilities arising from amputation; premature arthritic changes in spine and remaining limb, circulatory problems and gastro-intestinal problems due to ingestion of drugs to control pain.

Introduction
With the co-operation of the World Veterans Federation, information was requested from 19 veteran organizations in 14 countries. Replies were received of varying significance from all. The enquiries were based on a questionnaire, the basic elements of which were:

Legs
Weight of the prosthesis.
SACH feet versus articulated feet.
Wearing of rubber-soled shoes.
Cosmetic appearance.

Arms
Munster fitting versus harness.
Myo-electric hands.
Cosmesis—hands.
Wearing of prosthesis, above-elbow.

Adjustment
Do you see yourself in your dreams as an amputee?
Psychological effect of dismemberment.
Sequelae (medical) of amputations.
Recreational limbs.

The replies to the questionnaire were, in the initial stages of review, sent to a computer firm for analysis. It was evident, however, that the response could not be measured in terms of "yes" or "no" and it was recommended that an attempt be made to obtain a "feeling" from the replies which might be useful. Therefore, this survey should not be considered as a fully accurate statement of response and the views herein must be seen in this light.

Fitting
It seems possible to draw a startling conclusion from the replies concerning comfort. It appears that many amputees were prepared to accept an uncomfortable fit as "part of the game".

A significant number of amputees suggested that use should be made of X-ray and film techniques and of biomechanical devices in measuring the accuracy of a prosthetic fit.

Information on new prostheses
The amputees seemed to be overwhelmingly of the opinion that there was a lack of information on the part of medical doctors in this area.

It was evident also that, with certain exceptions the amputees themselves were poorly informed on new prostheses. Understandably, a number of amputees commented that they knew far more about the new models of automobiles than about the new models of limbs.

Input at the research level
The respondents stated they were unaware of any concerted effort to obtain opinions from amputees concerning the types of research which should be done to improve prostheses. To be fair, some replies indicated that "amputee input" may be going on but they did not know about it. Significantly, however, they felt that there should be more liaison at the "user" level with the researchers.

Pain
Universally, phantom limb pain appeared to be a significant problem and the amputees felt that very little was being done to develop remedial measures. A review of the replies indicated that the usual advice was to take aspirin and a hot drink. Obviously this has not been effective and the amputee is looking for something more concrete.
Many amputees complained also of stump pain, as separate from phantom limb pain, stating that massage, heat treatments and sometimes surgery had been successful in its elimination.

Weight of prostheses
There were two distinct "camps" in the replies, some 62 per cent wanted lighter prostheses but 12 per cent stated some weight was essential and felt that good hardware should be used, despite additional weight.

Feet
No trend was evident on the question concerning SACH versus articulated feet. There was, however, a small but dedicated group of amputees who sincerely believed that an articulated foot was much superior. This group described the SACH foot as "too springy" or "unstable".

Rubber-soled shoes
By far the majority of leg amputees preferred rubber-soled shoes for stability and heel strike.

Cosmetic appearance
This did not appear to be a factor. However, the respondees were all war amputees whose average age would be 60 which is perhaps significant.

Sockets
By far the majority of below-knee amputees preferred a soft socket for reasons of comfort.

The question on the plug versus quadrilateral socket for the above-knee amputee elicited the information that, for the most part, the quadrilateral socket users were well aware of the advantages, stating them as being "better circulation", "more comfort", "easier standing", "taking the weight on the ischium", etc. Tragically, perhaps, many plug socket users were unaware of the difference between the two types.

Controls
The question concerning swing phase controls elicited a very high response, indicating that a large proportion of the amputees were not familiar with these devices. (We had not dared ask for information on stance phase controls as we were reasonably certain that the concept is not known to the majority of amputees.) It would seem, from the replies, that many more amputees would be prepared to try these devices if they knew of their existence!

Modular versus exo-skeletal
Here again the majority of the amputees replying (approximately 60 per cent) did not know the difference. There were, however, a dedicated group of modular users who recognized the advantages of alignment, light weight and cosmesis who were "sold" on modulars. Here again, a conclusion can perhaps be drawn regarding the necessity for the dissemination of more information.

Munster versus harness fitting
The answer was predictable. The below-elbow amputee is very partial to a light fitting for a passive hand. Alternatively, he seems to have a passionate love affair with his hooks and harness when he wants to do heavy work or engage in recreation. This was an area in which the amputee seemed to be fairly well satisfied, except as brought out below.

Myo-electric hands
There was a distinct feeling among World War II veterans that they had been passed over by the myo-electric stage. Many had apparently been told that they were too old to adjust to myo-electric fittings. The majority of the replies stated "yes" to the question of whether they would like an opportunity to be fitted with a myo-electric hand.

Cosmesis
The replies on cosmesis (or lack of it) for hands contained comments such as "disgusting" and "lack of sensitivity". Surprisingly, many hand amputees appeared to have no knowledge of the cosmetic skins and stated they were wearing either brown or black leather gloves over their passive hands.

Wearing of prosthesis, above-elbow amputees
The rejection rate was predictably high. Some farsighted individuals (amputated one side only) suggested that they should get used to wearing a prosthesis in the event that they developed medical difficulties in their other arm, arising from strokes, arthritis, etc. The second part of this question indicated there was little knowledge of lighter prostheses now available through the use of modular designs.

Dreams
The question on dreams was thrown in only for general interest. The respondees seem to divide 50-50 as to whether they visualize themselves as amputees in their dreams or not.

Psychological effect
Perhaps surprisingly, a large number of war amputees describe their feelings about the loss of their limb in terms of being "grief stricken", "lost my best friend", "embarrassed", etc. It should be remembered that this survey asked for truthful answers. Psychological effect is perhaps an area which we tend to ignore as it could be interpreted as indicating a lack of machismo, etc. The Adolph Meyer school of psychiatric thought may be of interest on this subject should any one wish to develop it further, that is, depression can follow from a physical disorder such as amputation.

Sequelea
Most of the replies indicated consequential disabilities. Leg amputees; bad backs, arthritis in the remaining leg and foot. Arm amputees; cervical pain, headaches. Both; gastro-intestinal problems which were believed due to ingestion of drugs as well as "inner tension" associated with the continuing discomfort of amputation. The respondees were careful to suggest they were not trying to prove their case, but felt that more study should be done upon the medical after effects and side effects of amputation.

Recreational limbs
This question resulted in possibly the most significant response. There were requests for special legs for swimming, golfing, skiing, tennis, rowing and motor sports. The arm amputees were almost frightening in their requests for the development of special prostheses for fishing, playing baseball, cricket (for holding bats), golf, tennis and rowing.

Conclusion
It must be said that the information presented in this paper was not
Notice of Technical Meetings and Seminars.

1979, Jan. 25-27, AAOP Round-Up Seminar, Konover Hotel, Miami Beach, Florida.
1979, August 26-31, Interagency Conference on Rehabilitation Engineering, Atlanta Hilton, Atlanta, Georgia.

1980, September 28-October 4, Third World Congress (ISPO), Bologna, Italy.

Vacuum Forming

In an article I wrote in 1974 on vacuum forming of sheet plastics¹ I erred in stating that the first reference to vacuum forming of sheet plastics in orthotics and prosthetics was a paper by Gordon Yates in 1968². I should have remembered that Dana Steert presented this concept in Volume 1 of the Orthopedic Appliances Atlas³ for the fabrication of cervical orthoses. This is certainly an excellent example of how long it takes to get a technological development from the idea stage to fairly widespread application.

In the time since my article was published in "Orthotics and Prosthetics" vacuum forming of sheet plastics has been used more and more by private practitioners in both orthotics and prosthetics.

Although the educational programs, with a few exceptions, seem to have been very slow in teaching vacuum forming techniques, use of the technique seems to be expanding, owing in part to the several workshops sponsored by the American Academy of Orthotists and Prosthetists.

Every process and system has its limitations, and we all recognize that each design in orthotics and prosthetics represents a compromise, but as time goes on the gaps that engender compromise are narrowed as experience is gained.

Although the "Orthotics and Prosthetics Clinic Newsletter" has discussed several aspects of vacuum forming in the relatively recent past, in view of what seems to be a rapidly expanding program it seems appropriate that another survey be made concerning the uses of and problems encountered by the private practitioners.

A questionnaire on this subject is included in this issue. It will be appreciated greatly if each recipient will complete the enclosed form and add any comments he or she feels that will be helpful in improving service to patients.

Ben Wilson

REFERENCES CITED


ADDITIONAL BIBLIOGRAPHY