ate postsurgical prosthetic care for patients, and hopefully stimulate others to respond with other approaches so that we may all benefit.

I would like to acknowledge Dr. Elmer Franseen, from whom I have used references many times in this paper. Dr. Franseen is an Orthopedic Surgeon at Baystate Medical Center, Springfield, Mass. I am sad to say that Dr. Franseen is retiring this month, and I will miss working with this truly professional man. In the past fifteen years of working with Dr. Franseen, I have witnessed him employing I.P.S.F. on all of his B.K. amputees and only on rare occasions was a revision necessary.

Robert F. Hayes, C.P.

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

The War Amputations of Canada, Ottowa, Ontario

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.
Soft socket versus hard socket, below-knee.
Plug socket versus quadrilateral socket, above-knee.
Swing phase control units, above-knee.
Modular versus standard limb.

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 respondees 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 percent 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.

Sequelae

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

the subject of any strict statistical treatment. In this sense this is not a "scientific paper". This highlights the problem of communication in this field between the consumer on the one hand and the professionals involved on the other. However, it is essential that such communication be fostered if energies and resources are to be channelled in the most fruitful direction. It is hoped that against this background the views contained herein will prove useful, highlighting as they do the opinions of a substantial number of patients.

H. C. Chadderton

Notice of Technical Meetings and Seminars.

1979, Jan. 25-27, AAOP Round-Up Seminar, Konover Hotel, Miami Beach, Florida.

1979, May 22-26, Orthopadic-Technik 79, International, Exhibition Center/Convention Building, Nuremburg, Germany.

1979, August 26-31, Interagency Conference on Rehabilitation Engineering, Atlanta Hilton, Atlanta, Georgia.

1979, September 26-30, AOPA National Assembly, Washington Hilton, Washington, D.C.

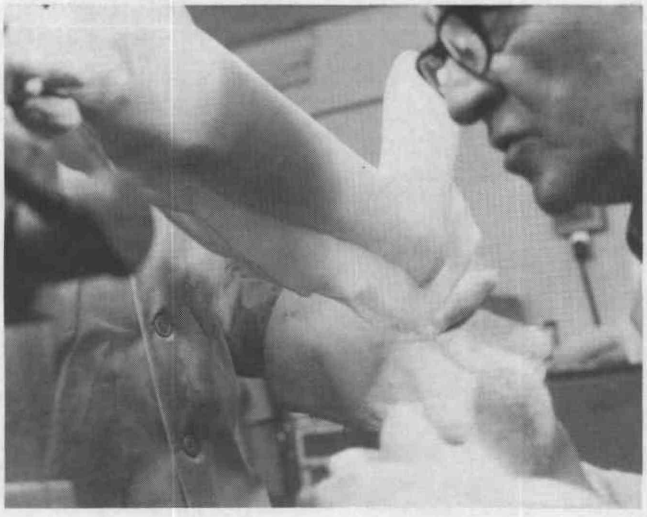
1980, September 28-October 4, Third World Congress (ISPO), Bologna, Italy.

Vacuum Forming

In an article I wrote in 1974 on vacuum forming of sheet plastics[1] 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 1968[2]. I should have remembered that Dana Street presented this concept in Volume 1 of the Orthopedic Appliances Atlas[3] 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.



Vacuum-forming a shank for a below-knee prosthesis using the hand-drape.

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

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