

# A Medical-Social Study of Upper Limb Amputees in Hong Kong— A Preliminary Report

K.M. Chan, M.B., B.S., F.R.C.S. (E), F.R.C.S. (G),  
M.Ch. (Orth.), F.R.C.S. (Ed. (Orth.)

S.Y. Lee, M.B., B.S. (Rangoon)

K.K. Leung, L.B.I.S.T.

P.C. Leung, M.B., B.S., M.S., F.R.A.C.S., F.R.C.S. (E)

## INTRODUCTION

Occupational hand injuries are the most common occupational injuries in Hong Kong.<sup>3</sup> Some of the severe injuries will lead to loss of the hand, frequently the dominant one. The orthopaedic care of a patient with an amputated upper limb does not stop after surgery. The essence of rehabilitation is prevention and integration. The importance of preventive measures in occupational hand injuries has been highlighted in a previous study.<sup>2</sup> The aim of this study was to assess the medical, social and psychological impact on patients with an amputated upper limb. The data collected will hopefully provide useful guidelines on the planning and development of services in the rehabilitation of upper limb amputees and on future research in upper limb prostheses.

## MATERIALS AND METHODS

One hundred patients were referred to the South Kwai Chung Prosthetic Clinic for assessment and fitting of prostheses from 1977 to 1982. Twenty of them were selected at random for this pilot study. There were 18 males and two females. The ages varied

from 15 to 57, and the marital status included seven singles, eleven married, and two widowed. The educational levels were below primary in eight, primary in ten, and secondary in two.

Eighty-five percent of the injuries were occupational. All of the victims were right-handed and 70 percent of the injuries involved the dominant hand. The levels of amputation were broken down into 75 percent below-elbow, 15 percent wrist disarticulation, and ten percent above-elbow. The ages for the first prosthetic fitting ranged from 3½ to 11 years. Clinical and social assessments were made at a joint interview by a surgeon and a prosthetist. The following information was obtained:

- The type of prosthesis with respect to its fitting, cost, training, condition under use, and maintenance
- Function of the prosthesis
- Cosmesis of the prosthesis
- The amputee's Activities of Daily Living (A.D.L.) and employment
- Changes in their family conditions
- Social welfare assistance given to the amputees
- Psychological assessment of the amputees
- Special comments from those interviewed on the different members of

the rehabilitation team, i.e., the surgeon, therapists, prosthetists, and medical social workers.

## RESULTS

### The Prosthesis

All patients were fitted with the body-powered prosthesis, voluntary opening hook, and an optional cosmetic hand with a built-in prehensile grip mechanism (Figure 1).

More than 90 percent of the fittings were done within three months of the amputation and the patients usually received a two to three month period of training supervised by the prosthetists. The follow-up had been generally regular in the first two years. After that, patients only had appointments for repairs or other specific problems.

the prostheses and handled minor repairs by themselves.

The cost of the prostheses varied from HK\$1,000 to HK\$2,000. The patient usually paid the fee out of the lump sum of workman's compensation granted, but 20 percent of them received financial assistance from the Social Welfare Department.

### Function of the Prosthesis

Sixty percent of the patients used the prosthesis for over ten hours a day, and the majority of them (80 percent) used it at home (Figure 2). Only 60 percent of them regularly used the prosthesis at work, and these amputees were primarily heavy metal workers who utilized the hook in pinning down an object. Nearly all patients used the cosmetic hand on social occasions. Relatively few (15 percent) regularly

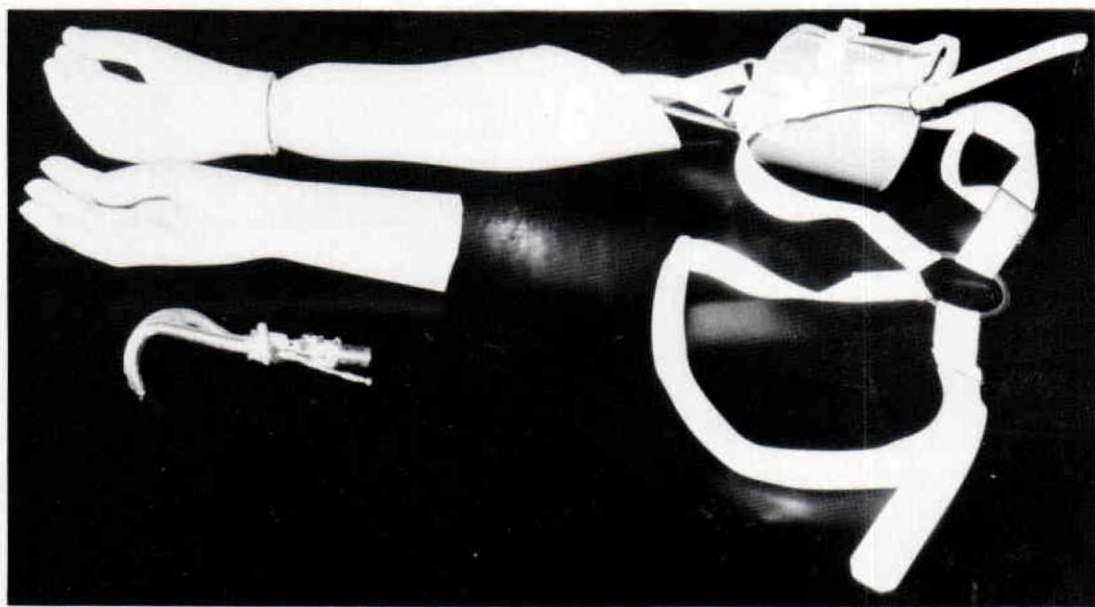


Figure 1: All upper limb amputees were fitted with a body powered prosthesis with a hook terminal device and functional cosmetic hand.

The frequencies of breakdowns were related to the duration of usage. The frequent users had an average of two to three minor repairs a year. Usually the repair work could be accomplished within one week. Some of the more innovative patients invented their own minor modifications on

engaged their prostheses in sports or recreational activities.

The overall comment given by the amputees on the functional achievement of the prosthesis was good in 70 percent, fair in 20 percent, and poor in ten percent.





2A.



2B.



2C.

**Figure 2: Functional achievement**

A 45 year old seamstress had a below-elbow amputation of her dominant right hand. She was fitted with a prosthesis two months later. She demonstrated a high degree of dexterity and skill in the use of the hook terminal device (A), (B), (C). She continued in her gainful employment, and managed most of the housework.

## A.D.L. and Employment

Table 1 illustrates the pattern of A.D.L. shared by amputees while using the prosthesis. Sixty to 70 percent of them were satisfied with the different modalities of activities, while the unsatisfactory group included the non-users and infrequent users.

It was interesting to note that the two non-users were both right hand dominants and their left hands had been amputated. They seemed to have developed a single-handed pattern of activities and rejected the alternative of using the prosthesis.

The majority of the right hand dominants with right hand amputations successfully shifted the dominance to the normal left hand and used the prosthesis on the right hand as an assistive device.

Only 15 percent of the patients retained their previous job after injury. Eighty percent found new jobs which adapted much better to the capability of their now much impaired upper limb function. Five percent remained unemployed.

As a result of the injuries, all the patients suffered a significant financial loss. The amount granted from the Workman's Compensation Board was usually just adequate for subsistence during the period in the hospital and during rehabilitation. The personal income per month dropped by 25 percent.

## Responses Regarding Use of the Prosthesis During Activities of Daily Living

Activities in Daily Living	Satisfactory	Unsatisfactory
Feeding/ cooking	14/20 (70%)	6/20 (30%)
Bathing/ cleaning	15/20 (75%)	5/20 (25%)
Dressing	15/20 (75%)	5/20 (25%)
Toileting	12/20 (60%)	8/20 (40%)

Table 1.

## Changes in Family Conditions

Among the 20 patients, 12 were the chief provider for the family. The injury and



3A.

### Figure 3: Activities of daily living

A 40 year old clerk had a below-elbow amputation of his dominant right hand. He used a functional cos-

subsequent loss of previous earning capacity led to serious financial problems for six of them. The wives and older children were forced to seek part-time jobs in order to support the family. However, no disruptions of marital ties were detected amongst the married patients.

## Social Welfare Assistance

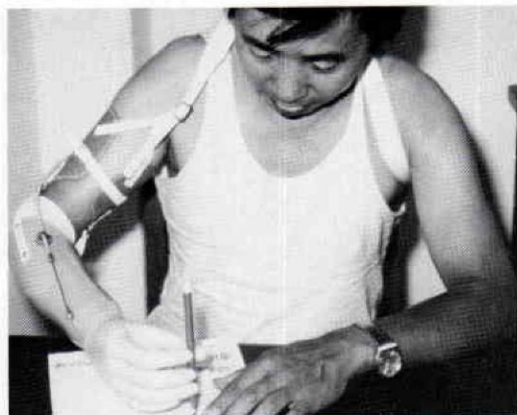
Table 2 illustrates the varieties of social welfare assistance available to the amputees.

## Cosmesis of the Prosthesis

The functional cosmetic hand was generally well accepted by the patients, their families, and friends. The hooks were regarded as "strange-looking" by over 60 percent of the patients. All of them preferred to hide the prosthesis in their trouser pockets.

## Psychological Assessment

This was the most difficult part of the study. Most patients were reluctant to disclose their genuine feelings regarding the injury they received and the ensuing consequences. The majority of them did reveal a period of grief, frustration, and uncertainty that lasted about six to 12 months following the injury. The feeling of helplessness gradually left when they found



3B.

metic hand well in most of the activities of daily living (A). He also attempts to write with the prosthesis (B).

## Varieties of Assistance Available to the Subject Patients

	No. of Patients
Counselling	20/20 (100%)
Disability allowance	10/20 (50%)
Public assistance	11/20 (55%)
Employment	3/20 (15%)
Housing accommodation	1/20 (5%)

Table 2.

that the prosthesis was actually functional and succeeded in assisting them through different activities. No patient received a proper referral to see a clinical psychologist. Any encouragement and counselling were given mainly by the surgeon, the prosthetist, and the medical social worker.

## Amputees' Comments on the Members of the Rehabilitation Team

### Doctors

Twenty-five percent of those interviewed complained that they were not adequately informed of the consequences of the amputation and the prospects of using the prosthesis. Sixty-five percent of them suggested that they would like the follow-up to be conducted by the doctors



and paramedical staff together, because some of the administrative procedures required the authorization of the medical staff and sometimes they had problems with the residual limb. Ten percent complained that the doctors were not helpful in the course of rehabilitation.

### Prosthetists

Eighty-five percent said that the maintenance service had been satisfactory. Twenty-five percent complained that their prosthesis took too long to be fitted (longer than three months). But the majority of the patients were satisfied with the technical supervision given at the initial period of prosthesis training.

### Therapists

Only ten percent of the patients were referred for training to occupational therapists and physiotherapists. They were not sure whether the assistance given was of much help.

### Medical Social Workers

The majority of patients relied heavily on the assistance of the medical social workers. Thirty percent of them would have preferred more frequent counsellings, but were aware of the limited time available for these visits.

## DISCUSSION

From this preliminary study, it can be seen that an upper limb amputee patient is confronted with various problems, including medical, psychological, social, and financial concerns. The upper limb amputee group is relatively neglected in the overall consideration of rehabilitation for amputees.<sup>1</sup> If the ultimate aim of rehabilitation, the true integration of the disabled into the community, is to be realized, there should be a well-coordinated system of rehabilitation care. The function of the team approach should be based on a special amputee clinic and registry headed by the surgical staff. The expertise of the partici-

pating members is then called upon under appropriate circumstances.

Of outstanding significance in this preliminary report is the need all patients have of increased financial and psychological support in the early phases of rehabilitation.

The help of the medical social worker, and if possible, a clinical psychologist, will be most appreciated in future rehabilitation efforts. It should be emphasized that only 15 percent of the patients retained their old jobs, and none of them acquired a better personal income following rehabilitation.

The training in use of the prosthesis should be a joint effort between the prosthetist, the physiotherapist, and occupational therapist. This retrospective review does demonstrate the lack of cooperation and coordination among the paramedical staff concerning this area. It must be recognized that if the patient fails to acquire the habit and skill of using the prosthesis in the first six to 12 months, the chance of a regular usage will be very remote. The initial training period is doubtlessly the most important phase of the entire program, and the medical staff should supervise very closely during this period.

Age does not seem to have a significant influence on the usage of the upper limb prosthesis. However, none of the patients are over 60 years of age. The majority of the patients are within the active income earning years, and are eager to obtain the maximum benefits from the prostheses.

The body powered hooks and functional cosmetic hands are quite well accepted by the majority of patients, although the prostheses are mainly used as assistive tools to the normal hand. The rehabilitation of a non-dominant hand to take over the job of its amputated counterpart is understandably faster than the training for the utilization of a prosthesis. However, after about one year's training, most patients adapt comfortably to a revised two handed pattern of activity.

The possibility of fitting a myoelectric prosthesis had been inquired by some patients who were aware of the recent developments in prosthesis manufacturing.

None of them however, was aware of the cost of such prostheses, nor were they informed about the complexity related to the maintenance requirements. The body powered prosthesis is reasonably priced, and easily maintained at the prosthetic workshop. It seems obvious that the expensive program of myoelectric prostheses will take many years to come to maturity. The optimism of some early workers in myoelectrics<sup>4</sup> does not seem to be present in Hong Kong.

Although the functional cosmetic hand is far from meeting all the aesthetic requirements, all patients preferred having it fit for special social occasions. Since the interchange of the hook terminal devices and cosmetic hands is simple, such combination does encourage an almost continuous use of the prosthesis throughout the day.

One of the non-users in our series lost his hand at the age of five, but the prosthesis was fitted 11 years later at the age of 16. Obviously, he totally missed the chance of

childhood rehabilitation and reeducation. Timely fitting of prostheses for children below the age of 12 should certainly be considered and special prostheses should be developed accordingly.

Having completed this preliminary study, we are looking forward to a large scale continuation study, which is expected to cover a target population of 400 amputees, in the near future.

## NOTES

<sup>1</sup>Chadderton, H.C., "Consumer Concerns in Prosthetics," *Prosthetics and Orthotics International*, 1983, 7, pp. 15-16.

<sup>2</sup>Chan, K.M., Cheng, Y.H., Chan, W.T., Leung, P.C., "The Rehabilitation of Occupational Hand Injuries in Hong Kong," presented at the 1980 World Congress of Rehabilitation International, Winnipeg, Canada, June, 1980.

<sup>3</sup>Leung, P.C., Chan, W.T., Occupational Hand Injuries—A Medico-social Research, 1979-1980, O.H.I. Research Report No. 1—Profile Study, March, 1981.

<sup>4</sup>Waring, W. & Antonelli, D.J., "Myoelectric Control Systems," *Orthopedic & Prosthetic Appliance Journal*, March, 1967, pp. 27-30.

## AUTHORS

The authors may be contacted through the Department of Orthopaedic & Traumatic Surgery, Faculty of Medicine, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong.