Profile of Users of Prosthetic Limbs provided by the Fund of Law for the Welfare of Physically Disabled Persons in Okayama Prefecture

Masato KOTAKEMORI*

Abstract: An epidemiological study on limb prosthesis users in Okayama Prefecture, an area with about 2 million inhabitants, was performed. We compared amputees who received prosthetic limbs from the fund of Law for the Welfare of Physically Disabled Persons during the period from 1981-1985 (Group I) with those who received prostheses between 1991-1995 (Group II). Analyses were performed based on the type of prosthesis and various parameters comprising the user profile, including sex, amputation date, cause, and level of amputation. In comparison to Group I, Group II showed a 26% decrease in the total number of upper limb prosthesis users, as well as a decrease in new upper limb prosthesis users. However, there was an increase in number of elderly users. The total number of lower limb prosthetic users in Group II was decreased by 17%, but there was an increase in new and elderly users. This was thought to be related to the increasing number of elderly dysvascular amputations. (Jpn J Rehabil Med 2004; 41: 854-858)

Key words: prosthetic limb (義肢), amputee (切断者), epidemiological study (疫学調査), dysvascular disease (血行障害)

Introduction

The incidence of the use of prosthetic limbs by amputees may change with increase in the proportion of elderly people in the population, changes in the living environment, and advances in medical technology. The purpose of this study was to examine the epidemiological trends in prosthesis use in Okayama Prefecture, an area of about 2 million inhabitants. The medico-social situation of prosthesis users should be determined based on accurate epidemiological community data, provided by the guidelines for planning and implementing the prosthetic service. This study was performed to
Prosthetic Limb Users

investigate the use of prostheses provided by the fund of Law for the Welfare of Physically Disabled Persons (LWPDP) based on a user profile within Okayama Prefecture. In Japan, the cost of the first temporary prosthesis after amputation surgery is covered by health insurance. Therefore, the prosthetic limbs provided by the fund of LWPDP are not the patients' first prostheses, and are used on a daily basis. This study was performed to contribute to future planning of the prosthetic service.

Materials and Methods

In this survey, users were characterized with prosthetic limbs funded by the LWPDP. The subjects were divided into 2 groups: users whose prostheses were provided during the 5-year period from 1981 to 1985 (Group I), and those whose prostheses were provided from 1991 to 1995 (Group II).

Data for upper and lower limb prostheses were collected for those above the trans-metacarpal level and above the trans-metatarsal level, respectively. Analyses were performed based on the type of prosthesis and various parameters comprising the user profile, including sex, amputation date, cause, and level of amputation. The survey was carried out by reviewing the prescription records stored at the Rehabilitation Consultation Center of Okayama Prefecture.

Results

A total of 981 limb prostheses were provided for 908 users during the 5 years from 1981 to 1985 (Group I), while 737 users received a total of 793 limb prostheses from 1991 to 1995 (Group II). Of the 981 prostheses in Group I, 210 were upper limbs and 771 were lower limbs. In Group II, the 793 prostheses consisted of 155 upper limbs and 638 lower limbs (Fig. 1).

1. Upper Limb Prostheses

The actual numbers of upper limb prosthesis users were 206 and 153 in Groups I and II, respectively. The respective classification and number of prostheses in Groups I and II were as follows: cosmetic prosthesis users, 137 (66%) and 101 (66%); work prosthesis users, 55 (27%) and 34 (22%); and body-powered upper limb prosthesis users 14 (7%) and 18 (12%) (Table). The male to female ratios were 2.5:1 and 2.2:1 in Groups I and II, respectively.

The percentages of amputees aged over 60 years old were 31% and 49% in Groups I and II, respectively. Proximal amputations (above the elbow) accounted for 29% of all cases of upper limb prosthesis in Group I and 24% in Group II. Body-powered upper limb prostheses were frequently used by patients with trans-radial amputation, with incidences of 11% and 17% in Groups I and II, respectively. Work upper limb prostheses were also used frequently by these users, and accounted for 29% and 23% of cases in Groups I and II, respectively. Trauma was the most frequent cause of amputation in each group.

The numbers of new amputees (initial provision within 2 years after amputation) were 33 (16%) and 18 (12%), and the male to female ratios were 1.8:1 and 1:1 in Groups I and II, respectively. The percentages of amputees aged over 60 years old were 22% and 44% (Fig. 2), the ratios of trauma to disease were 5.6:1 and 2.6:1 (Fig. 3), and the percentages of proximal as opposed to distal amputation were 24% and 22% (Fig. 4) in Groups I and II, respectively.

<table>
<thead>
<tr>
<th>Table Number of upper limb prosthesis users</th>
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<tr>
<td>Group I</td>
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</tr>
<tr>
<td>Cosmetic</td>
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2. Lower Limb Prostheses

The actual numbers of lower limb prosthesis users were 702 and 584 in Group I and Group II, respectively. The male to female ratios were 3.2:1 and 2.8:1, and the percentages of amputees aged over 60 years old were 34% and 53% in Groups I and II, respectively. Proximal amputation (above the knee) accounted for 37% and 32% of cases in
Groups I and II, respectively. Trans-tibial and trans-femoral amputations accounted for about 50% and about 25% of cases, respectively, in both groups. The numbers of work lower limb prostheses were 30 (4%) in Group I and 8 (1%) in Group II. Work lower limb prostheses were more common after trans-femoral amputation, with percentages of 8% and 3% in Groups I and II, respectively. The ratios of trauma to disease were 2.2:1 and 1.7:1 in Groups I and II, respectively.

The numbers of new amputees (initial provision within 2 years after amputation) were 74 (11%) and 106 (18%), and the male to female ratios were 3.9:1 and 2.7:1 in Groups I and II, respectively. The percentages of amputees aged over 60 years were 38% and 56% (Fig. 5), ratios of trauma to disease were 1:2.5 and 1:3.1 (Fig. 6), and the percentages of proximal amputations were 41% and 30% (Fig. 7) in Groups I and II, respectively.

The numbers of double prosthesis users in Groups I and II were 81 and 62, accounting for 9% and 8% of the total number of amputees, respectively. There were no obvious differences based on age, sex, or level of amputation.

Discussion

To our knowledge, there have been only two previous studies on prosthesis provision over a defined wide geographical region: a study performed in Osaka City in 1980 and another study of new amputees performed in Okayama Prefecture in 1996. Most amputees in Japan are given a Physically Disabled Person Certificate soon after amputation. We performed a retrospective investigation of the profiles of users of prosthetic limbs provided by the fund for LWPDP in Okayama Prefecture. Reports of such studies over a wide region are rare in Japan.

The results of the present study indicated a 26% decrease in number of upper limb prosthesis users and a 17% decrease in lower limb prosthesis users in Okayama Prefecture between the 5-year period from 1981-1985 and 1991-1995. This trend was probably related to the decrease in incidence of traumatic amputation and the aging of war-injured amputees. Both the total number and number of new users of upper limb prostheses decreased, while the number of elderly users increased between the period from 1981-1985 and 1991-1995. Most of the upper limb amputations in Groups I and II were of traumatic origin, as reported previously. Nakajima reported that cosmetic prostheses accounted for 88% of the total number of upper prostheses in Japan. The percentage of cosmetic prostheses were 66% and 66%, that of work prostheses were 27% and 22%, and that of functional prostheses were 7% and 12% in Groups I and II, respectively, which were slightly higher than the figures reported by Nakajima; this might have been the result of early prosthesis fitting in Okayama Prefecture. The numbers of both elderly and new users of lower limb prostheses increased, while the total number of users decreased between the two study periods. This might have been related to the increase in number of new amputees caused by dysvascular diseases among the elderly population and the increase in number of amputations preserving the knee joint as reported by Nagashima (1991). The biomechanical advantages of trans-tibial amputation are associated with a shortening of the rehabilitation period and longer life expectancy. A previous study by Nagashima et al. (1996) showed 5-year life expectancy to be 26% after trans-femoral amputation and 46% after trans-tibial amputation caused by dysvascular diseases.

The decreased number of new upper limb prosthesis users was probably related to the decrease in number of traumatic amputees. On the other hand, the number of lower limb prosthesis users increased, suggesting an increase in number of elderly patients undergoing amputation due to disease. The 5-year statistics from 1984 to 1988 regarding new amputees in Okayama Prefecture included that around 60% of cases were due to dysvascular disease. A report from Hyogo Prefecture showed almost the same results, with dysvascular diseases accounting for 66.7% of the total number of cases requiring amputation in 1988, and an increasing trend of dysvascular amputees in elderly patients. Many reports in other countries showed an incidence of dysvascular origin of lower limb amputation of over 80%, a figure that was larger than that seen in the present study.

The number of double amputees was 62 in the
period from 1991–1995, a decrease of 19 compared with 1981–1985. This might have been related to the decrease in incidence of traumatic amputation and the development of limb-preserving techniques for the treatment of dysvascular diseases. Most double amputees (about 85%) showed involvement of the lower limbs in both periods. The most common cause of double amputation was accidental trauma, the numbers being 66 in 1981–1985 and 50 in 1991–1995.

In contrast to the trend toward a decrease in the total number of lower limb prosthesis users, the number of new users increased between 1981–1985 and 1991–1995. This was thought to be related to the increasing number of elderly dysvascular amputations. Both changes in lifestyle and the aging population to increase the incidence of dysvascular amputation. In Okayama Prefecture, the administrative management is well conducted at the application for prosthetic provisions. However, it has still some problems regarding the simplification et cetera. And also, it seems that the follow-up system after the provision is poor. The author proposes that the system of community rehabilitation should be reexamined early, particularly for elderly new amputees to realize better qualities of their home-life.

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References