

Traumatic amputation of the upper limb: the use of body-powered prostheses and employment consequences

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Abstract

Forty three patients with unilateral traumatic amputations were reviewed as to the use of prostheses and employment consequences of the amputation. Seventeen of 19 below-elbow amputees, and 12 of 24 above-elbow amputees used their prostheses. Non-users compared to users of prostheses were characterized by: 1) Higher level of amputation 2) Non-dominant arm amputation and 3) Younger age at the time of amputation. However non-users usually did well on the labour market for various reasons.

Introduction

The rejection rate for upper limb, body powered prostheses varies in different reports from 3% to 68% (London, 1970; Jacobs, 1975; Vitali et al. 1986). Provision of a myoelectric prosthesis may increase the number of users to more than 90% (Heger et al. 1985). The present study was undertaken to identify the number of prosthetic users following a traumatic amputation of an arm, and to elucidate which factors made the patients reject the prostheses. The consequences of an amputation with special emphasis on employment were also investigated.

Patients and methods

In the period 1970-1986, 59 patients were referred to the authors' department, for fitting of a prosthesis following a unilateral traumatic amputation of the upper limb. It is supposed that the vast majority of the patients from

Eastern Denmark have been referred as the department has a centralized fitting service. Twelve patients were lost to follow up. In six cases the patients had died from unrelated causes, and the remaining six patients could not be traced. Three patients fitted with myoelectric prostheses and one patient fitted with a cosmetic prosthesis were omitted from the study. The follow up series thus comprised 43 patients (6 women and 37 men). Nineteen patients were amputated below the elbow and 24 patients above-, or in one case through the elbow. The mean age at the time of amputation was 30 (2-70) years and 11 patients were below 18 years of age. The mean follow up was 7.4 (0.5-17.5) years and the mean age at follow up was 37 (15-76) years with 3 patients being below 18 years of age. All patients were fitted with a conventional body powered cable operated prostheses.

The patients were interviewed about their use of prosthesis, occupation before the amputation and at the time of follow up, persistent stump pain, time elapsed before fitting of the final prosthesis and possible rejection of the prosthesis. For statistical analyses the Chi-square test was applied.

Results

At the time of the amputation 31 patients were in employment, one was unemployed and one was receiving retirement pension. Seven of the patients below the age of 18 were attending school and three were below school age.

At the time of follow up, 19 patients were employed, four were unemployed, six were under rehabilitation and the three patients

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below 18 years of age were all attending school. Three patients were receiving a retirement pension, and eight patients disablement pension (in five patients primarily granted for concomitant diseases). In six of these patients rehabilitation had been tried but had failed.

Fourteen patients claimed that they never used their prostheses. The user group consisted of 29 patients, 15 patients using the prostheses all day; 10 patients every day and 4 patients occasionally. Twenty one patients used their prostheses at work outside their home, 25 patients at home, 17 while eating and 24 patients claimed that they also used the prostheses for cosmetic reasons. One patient used the prosthesis only for cosmetic reasons. The mean age of the users was 38 years compared to 32 years of the non-users. There were no major differences between the groups concerning sex distribution; persistent stump pain (total of 22 cases); time elapsed from amputation until fitting of the final prosthesis (26 weeks) or follow up. The non-users rejected the prostheses within a few months in 10 cases and after 3–16 years in the remaining four cases. These four cases were all above-elbow amputations. The reason for rejection was in three cases change of occupation to a job where the use of a prosthesis was not needed. The fourth patient suffered from recurrent dislocation of the shoulder joint which made prosthetic use impossible.

Below-elbow amputees became users in 17/19 cases (Table 1) compared to 12/24 cases among the above-elbow amputees ($p < 0.01$, Chi-square test).

Table 1 shows the relationship between prosthetic use and dominance of the arm. It is seen that patients with non-dominant arm amputations especially above the elbow had the lowest proportion of users (6/13). The highest proportion of users (10/10) was found in the

Table 1. The relationship between prosthetic use, dominance of the arm and level of amputation.

	Users	Non-users
<i>Dominant arm</i>		
Above-elbow	6	5
Below-elbow	10	0
<i>Non-dominant arm</i>		
Above-elbow	6	7
Below-elbow	7	2

Table 2. Occupational pattern in users and non-users of prostheses following a traumatic amputation of an arm.

Occupation	Users	Non-users
<i>Available for the labour market</i>		
Skilled workers	1	4
Unskilled workers	6	1
Non-strenuous work	4	3
Unemployed	4	0
<i>Not available for the labour market</i>		
Retirement pension	2	1
Disablement pension	6	2
Studying (School, rehabilitation)	6	3

below-elbow dominant arm amputees. Table 2 shows that 8/14 non-users of prostheses had employment, and none were unemployed, compared to only 11/29 users being employed but four being unemployed. There was a tendency for non-users primarily to be employed as skilled workers or in non-strenuous jobs.

Discussion

The reported rate of prosthetic users at about two thirds accords well with those previously described in regard to body powered prostheses (Vitali et al. 1986), but are inferior to the user rate described for myoelectric prostheses (Heger et al. 1985). The authors found a higher rate of users among below-elbow amputees, compared to above-elbow amputees, which seems reasonable as a below-elbow prosthesis is lighter and allows better function than an above-elbow prosthesis. There was a tendency towards non-dominant arm amputees becoming non-users, which seems understandable as they had suffered a relatively lesser functional loss and learned to manage with the intact dominant arm.

A higher employment rate was found among the non-users of prostheses than among the users. This might be explained by the fact that patients occupying a job which they could manage with one hand probably stayed in that job and did not become motivated to use their prostheses; whereas patients needing rehabilitation had to leave the labour market for a period and then had difficulties getting a new job. Supporting this theory is the fact that non-users in contrast to users generally were occupied as skilled workers or in non-strenuous jobs.

In summary, the only statistically significant factor found was that the level of amputation seems to be a major factor in the determination of prosthetic use following a traumatic amputation of an arm. In addition there was a tendency towards younger patients and patients with non-dominant arm amputations becoming non-users. Although there was a tendency towards non-users of prostheses having a higher employment rate, this difference was not statistically significant and could be accounted for by the type of employment in the two groups.

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