IJPMR 8-9, April 1997-98

Jaipur Syme's Prosthesis
A Prosthesis for Ankle-foot Amputees

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Abstract :

A Study of 'Jaipur Syme's Prothesis' has been undertaken to evolve the relative merits of this type of prosthesis, in comparisen to other types of Syme's Prostheses, in management of Ankle Foot amputations. This study included 68 Syme's and other related types of amputees who had used the prostheses for more than 6 months. Fortynine amputees, wearing the prothesis without any major break points, were objectively evaluated to assess their abilities in activities of daily living. The functional out come was satisfactory in most of the amputees. these findings have suggested that the prostheses tailored for individual subjects would provide considerable benefits to Ankle-Foot Amputees.

Key Words : Ankle-Foot amputations, Jaipur Syme's Prothesis Stump conditions, Activities of daily living (A.D.L.)

Introduction

Until 1969 a Canadian type of Syme's Prosthesis[2] with a SACH-FOOT was avaliable in India and was highly unsuitable for Indian amputees. These protheses were rejected by a large number of Indian ampuutees who reverted back to their "Elephant Shoes"[9]. After analysing special requirements of Indian Syme's type amputees the "Jaipur Syme's Prosthesis" was devloped by Prof. P.K. Sethi[5-7]. This prosthesis can be used for all types of amputations of ankle and foot[1].

Material and Methods

In the present study the first 60 amputees who were fitted with "Jaipur Syme's Prosthesis" and reported to the Rehabilitation Research Centre of SMS Hospital, Jaipur after May First 1986 have been included in the present study. In this study only those cases who had used the prosthesis for atleast six months and the patients with Syme's amputation ankle disarticulation, Chopart's amputation and Lisfranc's amputations have been included.

The amputees have been questioned in detail about their experiences with present design of prosthesis, their subjective comparitive feelings about their prosthesis, if they used any, and impact of the present design on their activities of daily living (ADL). An objective examination of amputees wearing the "Jaipur Syme's Prosthesis"which were without any major break points (so that it does not interfere with the gait of amputees) was made to know the abilities of squatting, sitting crosslegged walking over plain surface, over rough terrain over inclined surface, to stand over ampuated leg and ability of jumping. The last two acivities were examined to know ability of weight bearing and ability of shock absorption. The activities were graded as following :-

(1) Good - Patient can perform the activity with ease.
(2) Fair - Patients can perform the activity with some discomfort or difficulty.
(3) Poor - Patient can not perform the activity.

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Results

In this study we found ratio of rural and urban amputees to be equal. The number of male amputees (87%) was higher than the female (13%). The maximum number of amputees were between 20 to 30 years of age. The youngest patient in this study was of age 7 years old and the eldest was 60 years old. There is no age bar for fitting of this prosthesis.

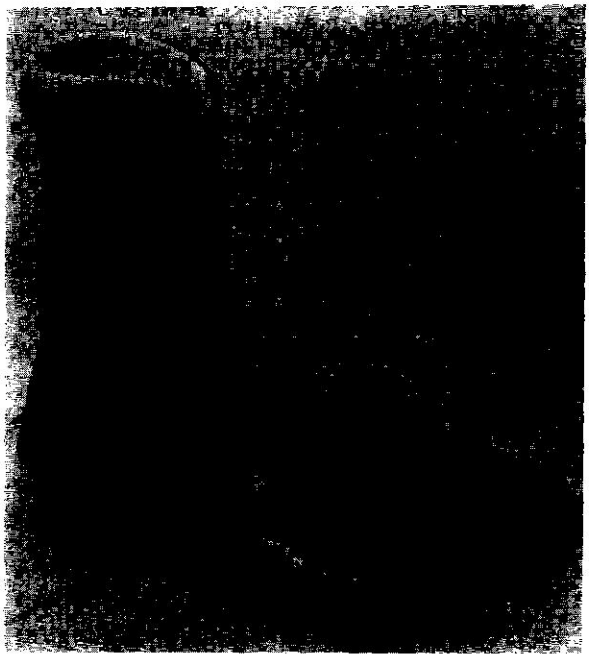
The design of prosthesis can be modified to suit individual needs of user. The majority of amputees (30%) had stump circumference of 20-25 cms. and maximum circumference was 35 cms. To solve the problem of donning and doffing of the prosthesis to a broad stump, an anterior slit is provided in the socket of prosthesis and if required, a posterior slit can also be provided with the anterior slit. This allows a comfortable insertion of broad stump. A large number of had inadequate, tender, wobbly and displaced heel pads. Eighteen percent of the prosthesis were modified by providing microcellular rubber (MCR) lining for tenderness at the end of stump. Ten percent amputees who had wobbly and displaced heel pads, were provided with the prosthesis fitted with side bars. The remaining 62% of the prosthesis were not altered.

Only nine amputees of this study had used a prosthesis other than "Jaipur Syme's Prosthesis" before opting for the percent design. All of them were not satisfied with the cosmetic appearence of other designs. The other major causes of dissatisfaction with these designs were their heavy weight (89%), unstability (56%), pain(56%), burning sensation while walking (45%) difficulty in donning and doffing of the prosthesis. 64% of amputees under this study had opted for Jaipur Syme's Prosthesis more than once. One amputee had been using this type of prosthesis for 11 years.

TABLE NO.-1

S.No.	Activities	No of amputees Good (%) Fair (%)	Poor %	Total
1.	Squatting	40 (81.6) 5 (10.2)	4 (8.2)	49
2.	Sitting Cross Legged.	42 (85.7) 4 (8.2)	3 (6.1)	49
3.	Standing on affected Limb	13 (26.5) 15 (30.6)	21 (42.9)	49
4.	Ability to Jump	28 (57.1) 9 (18.4)	12 (24.5)	49
5.	Walking on Plane	36 (73.5) 12 (24.5)	1 (2.0)	49
6.	Walking on rough terrain.	24 (49) 17 (34.7)	8 (16.3)	49
7.	Walking on inclined Surface	36 (73.5) 12 (24.5)	1(2)	49
8.	Going up and down stairs.	37 (75.5) 11(22.5)	1 (2)	49

The 49 amputees were evaluated objectively to know their functional ability with the prosthesis 92% and 94 % amputees respectively achived satisfactory level of squatting and sitting cross legged. We observed that 98% of amputees could walk over plane and rough terrain inspite of bad stumps (48%) 43% amputees could not stand over affected limb though they could perform jumping activities (76%). Since the remaining 11 amputees were having prosthesis with major break points, they were not included for objective examination (Table 1).



Discussion

Sethi P.K. etal[7,8] started work in direction of designing of a new prosthesis foot in 1969 to meet needs of Indian amputees and devloped "Jaipur Foot"[6,8] This is a vulcanised rubber foot. The "Jaipur Syme's Prosthesis" is a extension of the work done for "Jaipur Foot". The entire Syme's prosthesis resembles a "Gym Shoe" (Fig. 1). The prosthesis was modified under the guidance of Prof. Sethi and the present design came into existance since the year 1980. This design can be fitted to Syme's amputees as well as to the patients with other related type amputations of foot and ankle as mentioned earlier. This prosthesis has good properties of strength, resillience and wear resistance of water and chemicals. Till 1996, more than 3000 prosthesis have been fitted, which goes to prove that this prosthesis is well accepted.

The prosthesis can be fitted to the amputees of any age, sex and stump circumference. This design of Jaipur Syme's prosthesis is also versatile that it can be modified to suit the needs of the user. Since the prosthesis can be constructed as "Gym Shoe", the prosthesis has solved the problem of donning and doffing. This prosthesis can be fitted to bad stumps also with a little modification for example, for the stumps tender at their end and inadequate heel paid are provided with MCR pads in the socket of the prosthesis. Similarly for the stumps with wobbly heel pads the prosthesis is modified by providing lateral steel-bar to provide stability to stump.

Nine patients in this study had used prosthesis other than "Jaipur Syme's Prosthesis" before opting for the present design. The foremost cause of dissatisfaction with other designs was its heavy weight ; Others being sense of unstability, burning sensation while walking and difficulty in donning and doffing. The average weight of the prosthesis in this study is 900gms. This weight is quite physiological and patients with unilateral ampuation hardly feel any difference between the two extermities while walking. The other designs could not satisfy the amputees for their cosmetic values. Therefore these amputees rejected the other designs and adopted the "Jaipur Syme's Prosthesis". The majority of amputees (64%) opted for this design more than once.

In our country the working surface is floor and the postures of squatting and cross legged

sitting are very common. We assessed the prosthesis by objective evaluation while it was in use for its functional utility. More than 90% amputees could acheive satisfactory level of squatting, sitting cross-ledged, walking over plane and inclined surfaces. They could negotiate the stairs satisfactorily also. About 84% patients could qualify and objective examination over rough terrain inspite of bad stump conditions. This prosthesis helped these amputees a lot as in our country the amputees have to walk over terrain especially in rural areas where the roads are still unpaved. A large number of amputees could not stand over affected limbs, though they could perform activity of jumping, probably due to lack of practice. The patients with poor ability of shock absorption (Jumping activity) were examined again and it was found that the stumps were with inadequate heel pads i/e. the stumps were not ideal for weight bearing.

Conclusions

This prosthesis appears most suitable for Syme's and related types of amputees in which weight bearing surface of hind foot is not sacrificed. This design does not require any gait training and suspensory system for prosthesis. The Jaipur Syme's Prosthesis is so functional that amputees hardly feel any handicap due to loss of limb.

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