

SHORT COMMUNICATION

Rehabilitation of Partial Hand Amputations in Pakistan

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ABSTRACT

Objective: To describe prosthetic/cosmetic rehabilitation of partial hand amputations.

Study Design: Case series.

Place and Duration of Study: Out Patient Department (OPD) of the Rehabilitation Department Combined Military Hospital Multan from Jul to May 2020.

Methodology: Patients with partial hand amputations, due to any cause, reporting to OPD of Rehabilitation Department in CMH Multan were included. Demographic data (age, gender, education), cause, type and duration of injury and cosmetic intervention were documented.

Results: A total of 10 patients were recruited. All the participants were males. The mean age of the patients was 34.1 ± 2.8 years. The average duration of amputation was 5.2 ± 1.7 years. The most common cause of amputation was blast injury (n=3), followed by injury with heavy machinery (n=2), firearm injury (n=2), fall from the train (n=1), electric injury by high tension wire (n=1), and frostbite (n=1). The type of amputation included: left transmetacarpal with thumb sparing (n=3), ray amputation of the right index finger (n=3), right transmetacarpal with thumb sparing (n=1), ray amputation of the right middle finger (n=1), amputation left partial thumb and index finger (n=1), the right fourth and fifth finger amputation (n=1). All the patients could carry out activities of daily living even without a prosthesis. Ottobock silicon finger fillers with cosmetic sleeves were provided to all the patients.

Conclusion: Aesthetically acceptable silicon finger fillers are the mainstay of rehabilitation of hand amputations in lower-middle-income countries with poor access to rehabilitation.

Keywords: Pakistan, Partial hand amputation, Rehabilitation, Silicon ottobock finger prosthesis.

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INTRODUCTION

Causes of partial hand amputations may be traumatic or non-traumatic, including congenital loss and diseases.^{1,2} Traumatic partial hand amputations can result from many causes, including industrial and environmental accidents, blast injuries and firearm injuries.² Most commonly right hand is involved in accidents that occur due to heavy machinery.³ Finger loss, whether partial or complete, is the commonest occurring variant of partial hand loss.⁴

The Loss classification divides partial hand amputations into four major categories: 1) Trans phalangeal, thumb spared, 2) Thenar; partial or complete, 3) Trans metacarpal distal; thumb spared or involved, 4) Trans metacarpal proximal; thumb spared or involved.^{5,6}

Multiple treatment options exist, and the treatment of choice varies with each case as it depends on the cause of injury, type of partial hand amputation and number of fingers involved.⁷ A good multi-disciplinary

rehabilitation team starts attending the patients with different amputations right after the surgery before they are even discharged from the hospital. It starts with a detailed history and examination, followed by a detailed discussion about patients' preferences and the perceived outcome of treatment modalities.⁸ Multiple management options for partial hand amputations, including surgery and rehabilitation, are present. It includes thumb re-implantation, reconstruction surgeries, silicon prosthesis, titanium implants, osteo-cutaneous composite graft, integrated osseous implants, myoelectric prosthesis.⁹

Aesthetically custom made silicone prosthesis with matched skin tone sleeve of the patient is highly effective in addressing the various social and psychological impacts of partial hand amputation and has higher acceptance rates among patients.^{2,6} It also improves the quality of life.¹⁰

There are multiple options for prostheses for partial hand amputations in developed countries; however, not all options are financially feasible for patients in lower-middle-income countries. There was limited data on the rehabilitation of partial hand amputation

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in Pakistan. This study was planned to describe prosthetic/cosmetic rehabilitation of partial hand amputations.

METHODOLOGY

In this case series, patients with partial hand amputations reporting to the Outpatient Department (OPD) of the Rehabilitation Medicine Department, Combined Military Hospital (CMH), Multan, were recruited from July 2019 to May 2020. An ethical approval was obtained from the Ethics and Review Committee of CMH Multan (No. ERRP/2865-01). A total of 10 patients were recruited in the study period. The sample was collected using a consecutive sampling technique.

Inclusion Criteria: All the patients with partial hand amputations (amputation of at least one phalynx with or without metacarpal bone) were included in the study.

Exclusion Criteria: Patients with wrist disarticulation and persons unwilling to participate in the study were excluded.

Upon the patients' arrival, a thorough history and detailed examination were made. After that, the choice of prosthesis/cosmesis was discussed with the patient to cater for their requirement and expectations from the prosthesis/ cosmesis.

as mean ± SD and qualitative variables were summarized as frequency and percentages.

RESULTS

A total of ten patients were included in the study. The mean age of patients was 34.1 ± 2.8 years. The average duration of the presentation was 5.2 ± 1.7 years. All the participants were males. Out of the total, seven patients were married, and three were unmarried. Demographic details were shown in Table-I.

Table-I: Demographic details of patients.

Parameters		Age Groups of Patient (Years)		
		21-30 n (%)	31-40 n (%)	41-50 n (%)
Occupation of Patient	Army personal	4 (40)	2 (20)	1 (10)
	Teacher	1 (10)	-	-
	Gardener	-	-	1 (10)
	Electro medical worker -	-	-	1 (10)
Education of Patient	Matric	4 (40)	1 (10)	1 (10)
	Intermediate	-	1 (10)	2 (20)
	Graduate	1 (10)	-	-
Marital Status	Married-	2 (20)	2 (20)	3 (30)
	Unmarried	3 (30)	-	-

All the patients used the right hand as a dominant hand activity of daily living before the injury. The type and cause of injury were shown in Table-II.

Table-II: Type and cause of Injury.

Parameters		Age Groups of Patient (Years)		
		21-30, n (%)	31-40, n (%)	41-50, n (%)
Type of Injury	Left Transmetacarpal with Thumb Sparing	-	2 (20)	1 (10)
	Right Transmetacarpal with Thumb Sparing	-	-	1 (10)
	Right ray Amputation Index Finger	3 (30)	-	-
	Left Thumb And Index Finger Amputation	1 (10)	-	-
	Right Middle Finger Amputation	-	-	1 (10)
	Right Fourth And Fifth Finger Amputation	1 (10)	-	-
Cause of Injury	Blast Injury	1 (10)	2 (20)	-
	Firearm Injury	2 (20)	-	-
	Heavy Machine Injury	1 (10)	-	1 (10)
	Railway Injury	-	-	1 (10)
	High Tension Wire Injury	-	-	1 (10)
	Frost Bite	1 (10)	-	-

Age, gender, marital status, occupation, education, type of injury, cause of injury, the duration of injury and prosthetic/cosmetic intervention used were recorded on data collection forms. Statistical Package for Social Sciences (SPSS) version 21.0 was used for the data analysis. Quantitative variables were summarized

Six patients had right-sided partial hand amputations, while four patients had left-sided partial hand amputations. Ray amputation of the index finger was common among patients with a right-sided partial hand amputation. Trans-metacarpal amputation with thumb sparing was common among patients with a left-sided partial hand amputation. Eight patients had

isolated partial hand amputation, one patient had associated right big toe amputation, and one patient had a right trans-humeral amputation and left trans-femoral amputation.

All the patients could carry out activities of daily living even without a prosthesis. Ottobock silicon finger fillers with the cosmetic sleeve of patient skin tone were given to the patients except one who was comfortable and satisfied without the prosthesis.

DISCUSSION

In our study, six patients had right-sided partial hand amputation. Blast injury was the commonest cause of injury. Ray amputation of the index finger was common among patients with right-sided partial hand amputation, while trans-metacarpal amputation with thumb sparing was common among patients with a left-sided partial hand amputation. All the patients were independent in activities of daily living, even without prostheses. All the patients used the prosthesis for cosmetic effects while attending social events.

We found that in our study, patients reported rehabilitation after the mean duration of 5.2 ± 1.7 years. This can be because of a few reasons; the first being the lack of knowledge of rehabilitation services, the second being lack of access to a rehabilitation facility, and thirdly, since patients with partial hand amputation are independent in ADLs and need prosthesis only for cosmesis, the cost of prosthesis poses affordability issues which results in a delay to seek rehabilitation services.

More than 50% of traumatic occupational hand injuries result in amputations of the hand/wrist.^{11,12} Among them, left-hand amputations are more common.¹³ However, in our group of patients, right-sided partial hand amputation after traumatic injury was common since all patients were right-sided before the injury.

Garg *et al*, concluded that the patients most accept fabricated silicon fingers because of better esthetics and availability, which was in accordance with our experience.¹⁴ Similarly, Agrawal *et al*, pointed out that silicon fingers fulfil the esthetic and psychological needs of amputees and provide social acceptance.¹⁵

Partial or complete hand amputation results in loss of prehensile thumb functions and loss of strength, grip and debilitation of the hand, along with psychosocial insecurity, emotional disturbance, and financial difficulties.¹⁶ Often, partial hand amputations may lead to the inability of the person to pursue his job

depending on its nature, such as military personnel or a musician.^{17,18} In such circumstances, the goal of rehabilitation is functional, psychological and financial independence. However, in our case, all our patients were functionally independent in activities of daily living even without prostheses.

Pollicization, replantation, finger reconstruction with microvascular toe transfer and double toe transfer are surgical options for partial hand amputees to improve the functions of the hand, but the procedure of choice varies from patient to patient.^{19,20} Metacarpal lengthening by distraction followed by mini wrap-around flap (from big toe) transfer is yet another new approach toward reconstruction of thumb and other fingers.²¹ Long duration of treatment, inadequate patients co-operation and aesthetic compromise still pose some hindrances in applying the aforementioned procedures.²² Patients rarely agree to surgery after hand trauma.

Silicone prosthesis, implant-supported digital prosthesis and bone integrated implants for supporting digital silicone prosthesis are cosmetic options in rehabilitation settings.^{23,24} Use of half glove hides the junction between the prosthesis and normal tissue. Swanberg *et al*, concluded that an increase in the dexterity of non-amputated fingers/thumb/hand along with the use of aesthetically pleasing prosthesis paves the way for social acceptance and improved ability to perform activities of daily living, which was consistent with our study.²⁵

A good initial surgery at the time of amputation, as in our patients, and silicone prosthesis for cosmesis ensures good functionality of the hand and patients' satisfaction. It is a method of successful retention by sleeving the remnant stumps of fingers with silicon material. Our partial hand amputees were functionally independent. They all used the other hand to aid prehensile functions. The primary goal is psychological well-being through silicon cosmetic hand prosthesis. Silicone prostheses used in finger amputation are an aesthetically satisfying modality. It alleviates issues of patients in social interactions. Silicon prosthesis does not assist hand functions but improves the amputee's quality of life.

It is recommended that rehabilitation services should be made accessible and affordable for people with amputations, and government should formulate policies to provide facilities for the provision of the prosthesis in district hospitals throughout the country

to meet the demand, which will ultimately decrease the time to seek rehabilitation care among amputees.

LIMITATION OF STUDY

Our study has limitations in terms of the small sample size.

CONCLUSION

Aesthetically acceptable silicon finger fillers are the mainstay of rehabilitation of hand amputations in lower-middleincome countries with poor access to rehabilitation.

Conflict of Interest: None.

Authors' Contribution: MTK: Conception, design, analysis & interpretation and drafting of article, AR: Conception, Design, and drafting of article.

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