ISSN 2515-8260 Volume 07 Issue 01, 2020

A Study on Lower Limb Amputation Outcome Analysis Following a Traumatic Event

Dr.G.Kartheesan[1] and Dr.SenthilKumar[1]*

1. Assistant Professor, Department of orthopaedic surgery, Government Tiruvannamalai Medical college

*Corresponding author: drrsktvm@gmail.com

Abstract:

Introduction: Lower limb amputation (LLA) is a procedure that changes one's life. There is continuous discussion about whether through-knee amputations are better than above-knee amputations, despite the fact that shorter residual limbs are known to put patients under more physiological pressure than longer residual limbs. By methodically compiling and combining public and unpublished data on this topic, this investigation seeks to answer that question.

Aim: This study examines the post-traumatic quality of life, mobility, and prosthesis use in lower limb amputees. Moreover, it assesses how rehabilitation affects individuals with amputations' functional wellbeing.

Materials and methods: 50 lower limb amputee cases were examined in a retrospective and prospective study between 2016 and 2019 to assess the quality of life using the SF-12v2 score, prosthesis usage, mobility of 500 metres, and stump length.

Result: The patients in our research ranged in age from 13 to 83, with a mean age of 44.08 years. Out of 50 patients, 10 complained of stump discomfort. 20 of 50 patients reported feeling phantom pain. 72% of amputees above the knee and 95% of those below the knee exhibited mobility of more than 500 metres. The SF-12 score demonstrated that amputees below the knee had a higher quality of life than those above the knee. There were just 5 below-the-knee amputees employed, and no patients above the knee.

Conclusion:

Our investigation leads us to the conclusion that amputees below the knee enjoy a higher quality of life than those above the knee. Optimal stump length is not very significant when it comes to an amputee's rehabilitation. Better quality of life and prosthesis fitting were experienced by patients who underwent pre-prosthetic gait training and early prosthetic fitting.

Introduction:

Amputation is alife impacting surgery. Amputation is the removal of an extremity by trauma or surgery. Amputation is a surgical procedure used to treat diseases or treat pain in the damaged limb. One of the most prevalent acquired impairments is amputation. [1]. Almost 51% of respondents to the 58th round of the National Sample Survey (NSS) in 2002 reported having a locomotor handicap. With the exception of locomotor disability, prevalence rates for all categories of disabilities have decreased between 1991 and 2002. [2] The age and the reason for the amputation are related. Trauma and malignancy continue to be the leading causes of amputation up until the age of 60. [3] 80–90% of all amputations in the western world are caused by peripheral vascular disease, whether or not the patient has diabetes mellitus.In developed nations, amputations following trauma are either steady or decreasing. Lower limb amputations occur 500 times annually per 100,000 people in the United States,

ISSN 2515-8260 Volume 07 Issue 01, 2020

18–20 times annually in the Netherlands, and 6.6 times annually in France. [3] Yet, in underdeveloped nations, trauma continues to be the predominant factor leading to amputation. In India, more than 70% of amputations are performed due to trauma. [2] Road traffic accidents, railroad accidents, fire burns, electrical injuries, and chemical injuries were among the most frequent traumas documented. At 16.8 fatal injuries per 100,000 people and 38.9 non-fatal injuries per 100,000 people, according to data from 2006, India has the highest number of traffic accidents in the world.It is conceivable that trauma might account for a significant portion of lower limb amputations. [3]

Peripheral vascular disorders, which are on the rise due to an older population, account for around 27.7% of amputations after trauma. Studies from Tamil Nadu, Andhra Pradesh, Punjab, and West Bengal all supported the conclusion that trauma is unquestionably the main factor leading to amputation. [2] According to studies, men are more impacted than women, and the productive age range of 21 to 40 is the most affected. As the productive age group is most impacted, they also struggle with adjustments to everyday activities like personal care, recreation, and social interaction. They often have problems finding work and managing their finances. Although these young individuals represent prospective economic contributors, it would also be a loss for the nation. [4]

Amputation itself alters the body's structure and significantly lowers quality of life. Amputation, on the other hand, results in a number of physical and psycho-social difficulties, such as changes to body image and lifestyle, adjustments to self-concept, limitations in physical function, the need for prosthetics, and the perception of pain [1]. The physical/structural environment was cited by Ephraim et al. 5 as having the biggest perceived difficulties for those who have lost limbs. 94.8 percent of all amputations involve the lower limb.Whereas various factors including demographics, injury characteristics, amputation level, post amputation procedures impact the prognosis, rehabilitation dramatically improves the health and career prospects of patients with trauma related amputations.It is recommended that the participants receive a structured rehabilitation programme which is tailored according to the specific needs of people with limb amputation in order to bring an impact on their functional status and quality of life. [1] It was strongly recommended that all amputees should be encouraged to undergo a well-structured rehabilitation program which includes physiotherapy, occupational therapy and vocational rehabilitation. Amputees must be encouraged for early ambulation by early provision of prosthesis [8]

Aim and Objectives:

This study aims to evaluate the functional result of patients who underwent lower limb amputation following trauma in terms of physical and mental health, mobility, and prosthesis use. It also analyses the efficacy of rehabilitation in enhancing the functional well-being of people with amputations.

Methodology:

This prospective retrospective study carried out in Department of Orthopaedics of-Government Thiruvanamalai Medical College. We included all the 50 study participants those who are all admitted in casualty for crush injury during the study period of 2016-2019. We included those who are admitted for crush injury, Traumatic amputations and Gustilo – Anderson grade III b and c compound injuries leading to amputations. Those who are with Distal to ankle joint / Hip disarticulation; Age < 10 years 3. Other indications of amputations

ISSN 2515-8260 Volume 07 Issue 01, 2020

like peripheral vascular disease, Diabetes Mellitus, wet Gangrene were excluded from the study.

All trauma patients received in casualty were resuscitated using ATLS procedure. Two large-bore cannulae are inserted to collect a venous sample for blood grouping and typing, cross-matching, complete blood counts, renal and liver function tests, and viral markers. The patient's vital signs, including pulse, blood pressure, respiratory rate, and oxygen saturation, are also recorded. Sending Hbsag, HIV, and HCV. Assessment of A-airway maintenance with cervical spine protection is part of the first study. B. Ventilation and breathing C- Circulation with Control of Hemorrhage D- Disability (Neurological examination) E- Exposure were done.

A- Airway maintenance with cervical spine protection

If there is an airway compromise, it is first treated with airway placement, suction, and adjuncts such the oropharyngeal airway. Notwithstanding these precautions, patients are given early definitive airway management via a cuffed endotracheal tube if they have a chronic airway blockage, insufficient oxygenation, or are unable to secure their airway because of a decreased level of consciousness. Semi-rigid cervical collars, blocks, and tape protect the cervical spine from further harm.

B: Ventilation and breathing. When the airway has been established, the patient is examined for lung, chest wall, and diaphragm injuries before receiving high flow oxygen via a face mask or endotracheal tube. Pneumothorax, hemothorax, flail chest, and cardiac tamponade are quickly evaluated.

C - Control of Circulation and Hemorrhage Individuals exhibiting indications of hemorrhagic shock, urgent resuscitation with crystalloid is initiated initially and afterwards cross matched blood is transfused. The patient is examined for lengthy bone fractures and concealed bleeding in the chest, abdomen, and pelvic cavity.

D: Disabilities (Neurologic evaluation) Glasgow coma scale is used to assess neurological conditions. Patient with E-Exposure is undressed to check for clinical indications of concealed injury.

Secondary survey

In the secondary survey, the patient's medical history is taken, a thorough head-to-toe examination is performed, and appropriate radiographs are requested based on the clinical findings. These radiographs include the trauma series X-rays, which include the cervical spine antero-posterior/lateral, the chest PA view, and the pelvis with both hips - AP view. Inj. tetanus immunoglobulin 500 IU intramuscular stat dosage and third generation cephalosporin Inj. cefotaxime 1g iv and aminoglycoside 500 mg iv stat dose are given to patients as preventative medication for compound injuries. All compound injuries are classed using Gustilo-Anderson classification.After consulting with a vascular surgeon and a plastic surgeon, Gustilo-Anderson Grade IIIc complex fractures and mangled limbs with a MESS score of >7 are taken up for amputation. Serial wound dressing was performed and monitored in Gustilo-Anderson Grade IIIb complex fractures that were first treated with an external fixator. The patient is sent in for amputation surgery if the wound worsens and continues to be unsatisfactory despite repeated debridement after obtaining plastic and vascular opinion. Guillotine amputation is first used because the wound is polluted and causes infection and sepsis. This is followed by daily dressing and medications. If the incision heals and is

ISSN 2515-8260 Volume 07 Issue 01, 2020

covered by good granulation tissue, the patient is sent in for a split thickness skin transplant or revision amputation.If the wound is still infected after the initial amputation, the patient is sent in for debridement, a wound sample is collected for culture sensitivity testing, and the proper medications are given. After a revision amputation, a slab is placed on, wound care is administered, and an antibiotic is given for three days after surgery. The patient is sent to a rehabilitation centre for rehabilitation once the sutures are removed. Gait instruction is provided to the patient after prosthesis implantation. Patients were questioned and given questionnaires three months following surgery. Standardized SF-12 score, patient morbidity, usage of prosthetics, mobility, and employment are among the survey's questions. The trauma ward and general ward registries provided retrospective patient data. Demographic information about the patient (name, age/sex, address, phone number, diagnosis, and completed operation) was gathered.The SF-12 score, a gauge of health-related quality of life, is part of the questionnaire. It enables the computation of an overall score as well as individual scores for the physical and mental components. Each score is given as a number between 0 and 100, with a high score signifying a higher quality of life.

Result:

Table-1: Demographic factors of the study participants

Demographic factors	**No. of patients**	**Percentage**
Age (IN YEARS)		
Less than 30	16	32%
31-45	11	22%
46-60	12	24%
More than 60	10	20%
Gender		
Male	40	80%
Female	10	20%
Employment		
Yes	5	10%
No	45	90%

The above table shows the distribution of our study participants as pet the demographic factors. Majority of the study participants were belong to less than 30 years of age which is of about 32% and minimum participants were belong to more tan 60 years of age which is of about 20%. Among our study participants majority were male of about 80% and only 20% were female among our study participants. with regarding to the unemployment majority were and only minimal had employed.

Table-2: Details regarding the injury and its related features

	No of patients	Percentage
Mode of injury		
Road traffic accident	40	80%
Train traffic accident	10	20%
Type of Amputation		
Below Knee	24	48%

Above Knee	26	52%
Stump pain		
Present	10	20%
Absent	40	80%
Phantom Pain		
Present	20	40%
Absent	30	60%
Mobility Of 500 Metres		
Present	40	80%
Absent	10	20%

The above table shows the distribution of study participants as per details regarding the injury and its related characteristics features like type pf amputation, pain and mobility. Among our study participants majority had to road traffic accident which is of about 80% and remaining 20% had train accident. With regarding to the amputation majority had above knee amputation of about 52% and about 48% had below knee amputation. Majority of about80% did not have any stump pain and only 20% had complained about the stump pain. Similarly regardingto the phantom pain majority of about 60% didn't have any complaints of pain. And about 20% had complained about the pain. Majority had successful mobility of 500 metres of about 80% and only minimum of about 20% had difficulty in mobility of 500 meters.

Table-4:

Functional analysis of patients in terms of Physical and Mental Component score

Type of Amputation	**Functional analysis**		**P value**
	Physical Component Score		
	MEAN	SD	0.025*
Below Knee	43.84	7.2	
Above Knee	38.47	8.07	
	Mental Component score		
Below Knee	43.91	7.89	0.039*
Above Knee	39.43	6.26	

P value less than 0.05

The above table depicts the function analysis of amputated patients in terms of Physical and mental component. From the table it had been found that physical component is better among below knee amputated when compared to above amputated patients. Similarly mental component score also better among below knee than above knee. Both of the component scores found to be statistically significant.

Discussion:

The mean age of the patients in our sample was 44.08 years, ranging from 13 to 83; Walker et al[5]. reported an average age of 30.83 years, but. Pezzin et al[6] reported a mean age of 32 years, whereas Dillingham et al[7] reported an average age of 32.9 years. That mayas senior people tend to have more comorbidities and are more vulnerable to problems than the general population, they are likely to be drawn to tertiary care facilities.Our study has a male preponderance with a male:female ratio of 40:10 . Male to female ratio was 72:15, according

ISSN 2515-8260 Volume 07 Issue 01, 2020

to Walker et al[5]. Male dominance was found to be 87% by Dillingham et al[7]. Similar 86% results with a predominance of men were observed by Pezzin et al[6].This follows the traumatization trend in the Indian population, where males are more frequently afflicted than females. Just five below-the-knee amputees and no patients above the knee participated in our study. Yet these individuals were compelled to work in fields more suited to their present impairment. 25% of amputees below the knee and 21% of those above the knee, according to Walker et al, were employed. In the Penn Barwell meta-analysis, 74% of patients below knee and 70% of patients above knee returned to work.Road traffic accidents were the most frequent cause of injuries (80%), followed by train traffic accidents (20%). According to Ghosh et al[8], trauma accounted for 70% of amputations. There were 26:21 people with below-knee to above-knee amputees. 47 below-knee amputees, 24 above-knee amputees, and 7 bilateral amputee cases were documented by Walker et al[5]. 23 below knee to 10 above knee amputee cases were described by Pezzin et al[6].Out of 50 patients, 10 complained of stump discomfort. Stump discomfort was reported by 10% of below-knee amputees and 20% of above-knee amputees. 40% of below-knee amputees and 46% of above-knee amputees, according to Walker et al[5], had stump discomfort. In a meta-analysis by Penn-Barwell[9], 58% of amputees above the knee and 52% of those below the knee reported having painful stump-related symptoms. 20 of 50 patients reported feeling phantom pain. Phantom pain was reported by 40% of below-knee amputees and 44% of above-knee amputees. According to Walker et al.[5], 68% of amputees below the knee and 75% above the knee had phantom pain. According to Pezzin et al[6], 23% of amputees below the knee and 10% above the knee had phantom pain.72% of amputees above the knee and 95% of those below the knee exhibited mobility of more than 500 metres. According to Walker et al., 46% of amputees above the knee and 36% below the knee showed mobility of more than 500 metres. According to a Penn-Barwell[9] meta-analysis, 75% of patients with below-knee and above-knee amputations exhibited mobility of at least 500 metres. These studies concluded that keeping the patient's maximum limb length considerably improves their functional result since mobility worsens the closer the level of amputation becomes.The physical component score of below-knee amputees was significantly poorer than that of above-knee amputees, according to the SF12 score, which is a measure of quality of life. Similar to the physical component score, the mental component score of above knee amputees showed a lower score than that of above knee amputees. The Physical Component Score significantly decreases as the amputation level approaches, according to meta-analysis.

Conclusion:

From our study we come to the conclusion that amputees below the knee enjoy a higher quality of life than those above the knee.With the exception of the mechanical benefit of a long lever arm, maintaining the optimal stump length is not very crucial to an amputee's effective rehabilitation with a prosthesis.Promoting rehabilitation services such as pre-prosthetic gait training activities and early prosthetic fitting among amputees helps to enhance prosthesis usage, health, and employment prospects.The ultimate aim of effective re-integration of an amputee to the level of pre-amputation everyday living is achieved by an interdisciplinary, well-coordinated team of physical therapists, occupational therapists, nurses, psychologists, and social workers.The quality of life has improved dramatically as a result of recent advancements in prosthetic interface and stump pain control.

References:

1. Mohammed SA, Shebl AM. Quality of life among Egyptian patients with upper and lower limb amputation: sex differences. Advances in medicine. 2014 Jun 4;2014.
2. Dhole SR, Gaur AK, More SN, Popalwar H, Lokhande V. Study of locomotor disability due to various types of trauma. National Journal of Medical Research. 2015 Sep 30;5(03):194-8.
3. Pooja GD, Sangeeta L. Prevalence and aetiology of amputation in Kolkata, India: A retrospective analysis. Hong Kong Physiotherapy Journal. 2013 Jun 1;31(1):36-40.
4. Gallagher P, O'Donovan MA, Doyle A, Desmond D. Environmental barriers, activity limitations and participation restrictions experienced by people with major limb amputation. Prosthetics and Orthotics International. 2011 Sep;35(3):278-84.
5. Walker CR, Ingram RR, Hullin MG, McCreath SW. Lower limb amputation following injury: a survey of long-term functional outcome. Injury. 1994 Aug 1;25(6):387-92.
6. Pezzin LE, Dillingham TR, MacKenzie EJ. Rehabilitation and the long-term outcomes of persons with trauma-related amputations. Archives of physical medicine and rehabilitation. 2000 Mar 1;81(3):292-300.
7. Dillingham TR, Pezzin LE, Shore AD. Reamputation, mortality, and health care costs among persons with dysvascular lower-limb amputations. Archives of physical medicine and rehabilitation. 2005 Mar 1;86(3):480-6.
8. Ghosh AK, Tibarewala DN, Chakraborty S, Ganguli S, Bose KS. An improved approach for performance evaluation in lower extremity involvement. Journal of Biomedical Engineering. 1980 Apr 1;2(2):121-5.
9. Penn-Barwell JG. Outcomes in lower limb amputation following trauma: a systematic review and meta-analysis. Injury. 2011 Dec 1;42(12):1474-9.
10. Mozumdar A, Roy SK. Depression in adult males with lower extremity amputation and its bio-social correlates. Health. 2010 Aug 25;2(08):878.
11. Htwe O, Suganthini S, XZ KL, AH SM, MS H, Kumaragu S, Naicker AS. Quality of Life among Lower Limb Amputees Treated at the Tertiary Hospital, Malaysia. International Medical Journal. 2015 Jun 1;22(3).
12. Campbell's operative orthopaedics 12th edition, volume 1 page: 598-599.
13. Rotter K, Sanhueza R, Robles K, Godoy M. A descriptive study of traumatic lower limb amputees from the Hospital del Trabajador: clinical evolution from the accident until rehabilitation discharge. Prosthetics and orthotics international. 2006 Apr;30(1):81-6.
14. Baum BS, Schnall BL, Tis JE, Lipton JS. Correlation of residual limb length and gait parameters in amputees. Injury. 2008 Jul 1;39(7):728-33.
15. Majumdar K, Lenka PK, Mondal RK, Kumar R, Triberwala DN. Relation of stump length with various gait parameters in trans-tibial amputees. Online J. Health Allied. Sci. 2008 Jul 21;7(2).