ORIGINAL ARTICLE

Assessing pre-prosthetic rehabilitation outcome of amputees with major limb amputation at the National Orthopaedic Hospital, Dala, Kano

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Abstract

Background: Major limb amputation is the removal of part or a whole of a limb proximal to the wrist or the ankle. It is the last, albeit valuable option when limb salvage is impossible. It impacts negatively on patients' participation in valued activities, body image perception and quality of life, hence multi-disciplinary approach is rewarding.

Methods: A hospital based prospective study carried out at the National Orthopaedic Hospital, Kano between August 2014 and July 2015. A proforma was filled which included demographics, clinical history, diagnosis, type of surgery done and clinical outcome. Rehabilitation was assessed using functional independent measure. Data was analyzed using Statistical Package for Social Sciences (SPSS) version 16.0 for windows.

Results: Fifty four participants completed the study. Patients' age ranged from 18-82 years. Mean age for females was 33 years±16.51 and males 28.36 years±16.62. Thirty (55.6%) were between the ages of 18-30years. Majority(94.4%) were of the working age group (18-60years). Amputations due to trauma (n≤46) had higher Functional Independent Measure (FIM) mean score of 117.50±3.582 with a p-value of 0.00 (not significant). Upper limb amputations (n-15) had better FIM score of 118.67±0.62 with a p-value of 0.00. Patients 60 years and below (n≤51) recorded FIM scores of 118.29±1.171 with a P-value of 0.00.(better than the elderly). Females (n≤12) had better FIM mean score of 117.67±2.84 with a P-value of 0.00.

Conclusion: Pre-prosthetic rehabilitation is better in amputations due to trauma, in females, younger age group and in upper limbs.

Keywords: Pre-prosthetic, Rehabilitation, Major Limb, Amputation.

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Introduction

Amputation is the removal of a part, or the whole of a limb, and when done proximal to the wrist or the ankle it is termed major limb amputation.[1,2] Advancement in surgical principles and especially the availability of appropriate prosthesis has significantly improved outcome. This has however been less than optimal in the developing world and has made rehabilitation of amputees a difficult task. A treatment team that includes the surgeon, physical therapist, prosthetist, and a social worker is necessary but not readily available in the developing nations to give optimal rehabilitation and as such most of them end up living there lives without even a prosthesis[3,4] Current indications for amputation include trauma, peripheral vascular disease, tumors, infection, and congenital abnormalities.[2] Trauma tops the list of indications with peripheral vascular disease following in the third world but reverse is the case in the developed nations.[5,6]

The incidence is higher in the younger age group in the developing countries as opposed to the developed nations.[1,4,7] Worldwide, it's more common in males than females with most studies reporting 60-80% being males.[8,9] The goal is to optimize a patient's function with little or no morbidity. The optimal level has been chosen traditionally to provide a stump length that allows a controlling lever arm for the prosthesis with sufficient circulation for healing and soft tissue for protective weight bearing. Level of major limb amputations in the lower limb includes; ankle disarticulation, symes amputation, trans-tibial amputation, knee disarticulation, trans-femoral amputation, hip disarticulation and hind quarter amputation. Levels in the upper limb are; wrist disarticulation, below elbow amputation, elbow disarticulation, above elbow amputation, shoulder disarticulation and fore quarter amputation. Below knee amputation is the most commonly done according to most writers.[1,9]

The increase in major limb amputee's dependence also implies a significant financial burden both for families and the health care system.[10] To improve outcome wherever possible, process of rehabilitation should be commenced before surgery. The pre-operative evaluation should include assessment of muscles strength, range of motion and discussion of any future work adaptations that may be necessary for improved outcome. It's worth noting that for a patient with

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amputation, the psychosocial issues that he faces often have more direct significance to the patient's life than the quality of the surgery or the nature of prosthetic device. After all, less than 20% of amputees in developing countries like ours can afford a prosthesis compared to developed world where more than 60% can afford it.[11,12] Post operative rehabilitation should begin as soon as medically feasible

A significant number of patients are usually independent with their self care.[13] Cox and colleagues in their article titled 'Life after lower extremity amputation in diabetics' found out that females have significantly higher functional independent measure than men.[14] Lower levels of amputation (e.g. below knee) are reported to have higher functional independent score than more proximal levels such as above knee.[14-17] Mol M.K. et al found out that age and disease states such as diabetics have negative associations with functional independent measure discharge rating in their article "Association between Functional Severity and Amputation Type with Rehabilitation Outcomes in Patients with Lower Limb Amputation". Functional Independence Measure (FIM) is a tool used to assess rehabilitation outcome, putting into cognizance patient's ability to take care of self, sphincter control, mobility, ability to communicate, cognition and psychosocial behaviors with 18 parameters shared among them. Each parameter is scored from 1-7 with 7 being completely independent and 1 totally dependent.[18]

The tool is designed to measure "burden of care," or "the type and level of assistance required for a person with a disability to perform basic life activities". It has intra-rater reliability and can be administered by the patient or the investigator. It is usually administered twice, during discharge and during follow up with total score of >72 taken as good, 36-72 as fair and <36 as poor.

Materials and Methods

This was a prospective study which was carried out at the National Orthopaedic Hospital Dala Kano from August 2014 to July 2015. Patients who met the inclusion criteria and consented to be part of the study were enrolled consecutively as they presented and were admitted via either the emergency unit or the general out patient's clinic for a major limb amputation. Patients with neurologic disorders, paraplegics, comatose patients, multiply injured patients or those that required more than one major limb amputated and children less than 18yrs were excluded. A well structured proforma was used to collect data regarding the socio-demographic characteristics, clinico-pathologic characteristics and the clinical outcomes.

Each patient's disease condition was assessed; level of amputation determined and patient adequately informed about his/her disease condition. Levels of the intended amputation as well as post operative prosthesis plan. Patients had psychotherapy, chest physiotherapy and range of movement exercises on the limbs done preoperatively. Antibiotics, analgesics were given as indicated and patients were optimized for surgery.

Amputations were done following standard amputation techniques (length, myoplastic closure, skin closure, nerve and soft tissue handling and rigid dressing).

Proper wound care was given, post operative analgesics and antibiotics were appropriately given and patients resumed chest physiotherapy immediately. Gentle stretching, range of movement exercises, rolling on bed, sitting on the chair, muscle strengthening exercises and positioning to prevent contractures were started on the third post operative day and as pains permitted..

Post discharge rehabilitation was done encouraging patients to get back to their family, community and recreational roles as much as possible. They were also encouraged to modify and find vocations that would suit their present conditions. They were followed up on six weekly clinic visits.

Pre-prosthetic rehabilitation was assessed three months post surgery using Functional Independence Measure to ascertain level of rehabilitation.

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 16.0 for windows. Data collected on the study questionnaire was entered using numeric codes.

The study was carried out following approval from the hospital research ethics committee.

Results

Fifty four participants completed the study with a male to female ratio of 3.4:1(Figure 1). Age range for the females was 18-82 years with a mean of 33yrs±16.51 while that for males was 19-62years, with a mean of 36yrs±16.62. Majority were youths with the elderly accounting for only 5.3% (Figure 2). Trauma accounted for 85.2% of the patients, peripheral vascular disease 5.6 %, burns and tumors contributed 3.7% each (Figure 3). Emergency surgeries were done in 92.6% of the cases, 68.5% were lower limb amputations and 31.5% upper limb (Table 1).

The rehabilitation of all the patients were good with a mean functional independent measure score of 117.59±3.33 and a p-value of 0.00 (which was not significant) at discharge and even after follow up.

Comparing the mean functional independent measure (FIM) score across individual groups, patients who had their amputation due to a trauma (n≤46) had higher FIM mean score of 117.50±3.58 with a p-value of 0.00 indicating better rehabilitation outcome than those due to non traumatic causes who had FIM mean score of 115.50±3.03. Those that had upper limb amputations

(n≤15) had better rehabilitation with FIM score of 118.67±0.62 with a p-value of 0.00 than those with lower limb amputation (n≤39) mean FIM score of 117.38±3.60 (p-value≤0.00). Patients who were 60 years and below n≤51 recorded FIM scores of 118.29±1.17 with a p-value of 0.00 while the elderly, older than 60 years (n≤3) came up with mean FIM of 105.66±5.77 and a P-value of 0.00. Females (n≤12) had better rehabilitation with FIM mean score of 117.67±2.84 with a p-value of 0.00 than men (n≤2) whose mean was 117.57±3.4 and a p-value of 0.00. (Fig 4).

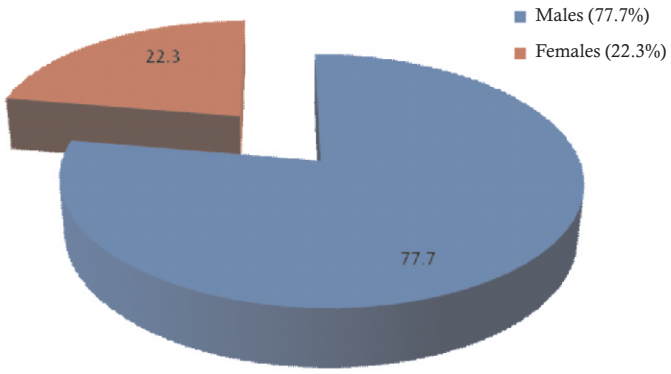

Fig 1: Distribution by Sex

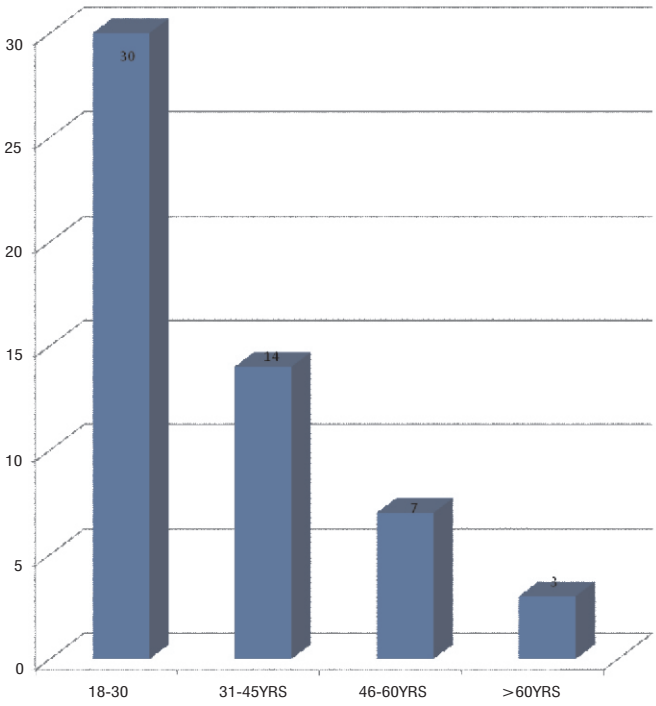

Fig 2: Distribution by Age

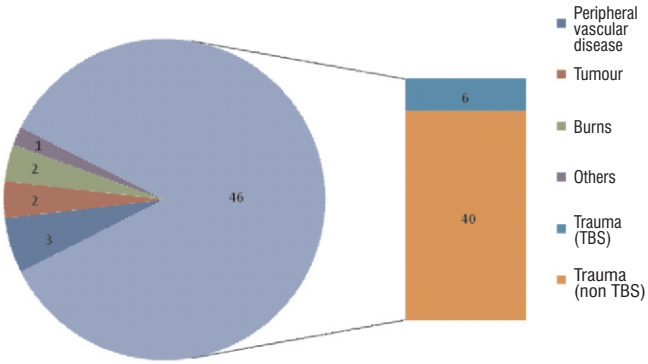

Fig 3: Indications for Amputation

Table 1: Distribution by Level of Amputation

	Frequency	Percent	Valid Percent	Cumulative Percent
Wrist-disarticulation	1	1.9	1.9	1.9
Below-elbow	1	1.9	1.9	3.8
Elbow-disarticulation	4	7.4	7.4	12.3
Above-elbow	9	16.7	16.7	31.6
Below-knee	16	29.6	29.6	59.6
Knee-disarticulation	2	3.7	3.7	63.2
Above knee	17	31.4	31.4	93.0
Hip-disarticulation	2	3.7	3.7	96.5
Shoulder-disarticulation	2	3.7	3.7	100.0
Total	54	100.0	100.0	

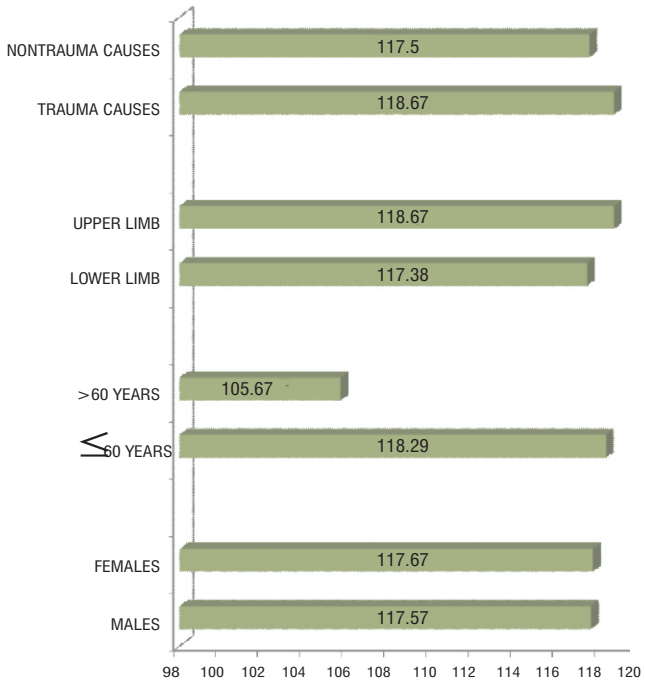

Fig 4: Comparism Between Mean values of Functional Independent Measure

Discussion

Major limb amputation is considered the last resort when limb salvage is impossible.[7,19] Amputation is looked upon in recent times as a part of treatment and not purely a life-saving procedure in response to injury or disease with a target of restoration of body image, perception of the amputee and improving his quality of life vis-a-vis returning the individual to an active productive role in the community.[7]

In this study 57 patients with major limb amputations were enrolled after meeting the inclusion criteria. Fifty four of them completed the study while 3 signed against medical advice after the amputation and while still on admission as such never showed up for follow up (fell out of the study) bringing the attrition rate to about 5.3%.

Most of the amputations were done in the age groups between 18-60yrs with about 94.4% of the amputations, similar to studies done by Kidmas et al, Muywmbe et al and so many other writers mostly from the developing countries[1,3,4,11,20] This may be explained by the fact that the group being the productive age group is commonly exposed to hazardous life styles all in an attempt to take care of the younger and older age group.

Male preponderance with a ratio of 3.4:1 is consistent with findings by others even though much more depicted in those from developing nations.[4,9,21] This is not far from the fact that men as it is are much more involved in outdoor hazardous activities to earn a living and also more involved in sporting activities. Young men are also used as agents of war and in civil unrests; women and children are usually spared.

Trauma was the most common indication with as high as 85.25%.[3,4,22,23,24] This finding is in keeping with the picture in the developing nations and is the reverse in the developed worlds. Amputation of the lower limb was the more common than in the upper limb, accounting for 68.5%.[3,9,11]

Rehabilitation in all the patients was good using the functional independent measure. Mean score was 117.6±.328. This is similar to findings by Jane et al.[13] Women were noted to be rehabilitated better than men (117.67:117.57).[14,25] This was also observed byCox et al and other papers and could be justified by the fact that women tend to attract the sympathy of their children and parents more than men who are usually looked upon as able, and as such more attention is given to women from their relatives and sometimes the physiotherapist. Younger age group responded better to rehabilitation than the elderly (118.3:105.7). This is similar to findings by Amol et al in their paper "Association between Functional Severity and Amputation Type with Rehabilitation Outcomes in Patients with Lower Limb Amputation".[25] The Younger patients appear to have greater determination to return back to their pre-injury state and as such are more motivated than the elderly. Rehabilitation was found to be better in amputees who had trauma as the cause of their amputations than those from disease. Probable reason can stem from the fact that most patients who had limb amputations from disease may have other co-morbidities and as such may not be fit to get on with active lifestyles. They are usually of the older age group and usually less motivated. Patients with upper limb amputations come up with better rehabilitation than those with lower limb amputations which could be explained by the fact that most activities of daily living especially those assessed by this tool are largely dependent on the functionality of the lower limb.

Conclusion

Pre-prosthetic rehabilitation is better in patients whose indication for the amputation is traumatic, in females, the younger age group and patients who had upper limb amputations.

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