Indications and Early Post-Operative Complications of Major Limb Amputations in University of Ilorin Teaching Hospital, Ilorin

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Abstract

Major limb amputation (MLA) is an amputation at or proximal to the wrist or ankle and has been practiced for centuries for a variety of reasons which change with community dynamics over time. In the last 2 decades, no study has been carried out on the current indications and early post-operative complications profile in this centre hence the reason for this study.

Consenting patients with indications for MLAs were recruited and prepared for amputation following standard operating procedure. A standard protocol for post-operative management was carried out tailored to each patient's need. Discharge was considered when patient was fit.

Fifty-three patients were recruited with a male:female ratio of 2.8:1. The mean age was 42+/-19.8yrs while the peak age range was 21 – 30yrs (32.1%). Majority (28%) were traders and trauma (34%) was the leading indication for amputation followed by diabetic foot gangrene (22.6%). Road traffic accidents accounted for 66.6% of all trauma cases while the mean waiting period before surgery was 7days. Amputations were commoner on the right side of the body (52.8%), in the lower limbs (84.9%) and below knee amputation was the commonest (58.7%). The early post-operative complication rate was 66%, the commonest complication was wound infection while the mortality rate was 5.7%. No patient (0%) was fitted with prosthesis prior to discharge or during follow up.

Trauma remains the commonest indication for amputation in this centre and is predominant among young active males. Diabetic foot gangrene follows closely as the commonest non-traumatic cause.

Keywords: Major limb amputation, Indications for Amputation, Early post-operative complications, Ilorin

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Introduction

Amputation is an ancient procedure which has been carried out for therapeutic, punitive and ritual reasons.[1] Major limb amputation is an amputation at or proximal to the wrist and ankle. This is a common surgical procedure carried out in centres around Nigeria and trauma is one of the most common indications in this part of the world.[3-9]

In the United States, 30, 000 – 40, 000 amputations are done annually, the commonest indication is peripheral vascular disease representing about 82% of all limbs amputated and this has been on the increase in contrast to other indications such as trauma, tumors, congenital abnormalities and diabetic foot gangrene.[10]

In Africa, trauma has been the commonest indication for extremity amputation resulting mostly from road traffic accidents.[11-13] In Nigeria, trauma is the leading indication for extremity amputations in many centres however some centres report that diabetic foot gangrene was the commonest. Other common indications include traditional bone setter's (TBS) gangrene, infections, tumors, congenital abnormalities and peripheral vascular disease.[2,4,5,8,11,14-18] Rarer indications are nuisance limbs, burns and snake bites.[4,19] Major Limb amputations are 3 times commoner in males than in females, involving people between the ages of 27 – 36yrs and mostly performed below the knee.[2,3-9,11,13,17,20]

The decision to amputate is a crucial one, therefore limb salvage whenever possible should be considered. Limb salvage has reduced the incidence of whole limb amputations in developed countries where facilities such as sophisticated imagining and micro-surgical techniques exist though multiple surgeries may eventually be required.[6,18,20] The study aims to determine the indications and common early post-operative complications of major limb amputations in University of Ilorin Teaching Hospital, Ilorin.

Patients & methods

This was a prospective descriptive hospital based study carried out in the University of Ilorin Teaching Hospital, Ilorin over a 12 month period (Nov 2010 – October 2011). Ethical approval was obtained and prospective patients were recruited through Accident and Emergency and out-patient clinics. Informed consent was obtained and each patient was evaluated, examined and a structured questionnaire was filled and updated as the patient's management was

on-going. Information such as age, sex, occupation, level of education, indication for amputation, time of injury, time of presentation, time of surgery, level of amputation, laterality, duration of hospital stay, development of complications and mortality amongst other parameters where obtained.

Pre – operative anaesthetic review was carried out and appropriate anaesthesia was administered depending on age and site of amputation. The use of tourniquet was individualised. Amputation was carried out following standard procedure.[13-14] Patients were followed up for 3 months to assess early post-operative complications such as soft tissue infection, haemorrhage, phantom sensation and mortality.

The data generated was collated and sorted out for errors. Statistical analysis was carried out using SPSS version 17 software (IBM, New York, USA). Results were presented with the aid of tables, graphs and charts. The Pearson's chi – square and Fisher's Exact test were used to determine the statistical significance between qualitative variables. Relationship of differences with p value < 0.05 was accepted as significant.

Results

Fifty-three patients with 53 limbs were recruited into the study with age range between 4 – 84yrs (mean = 42±19.8yrs). The paediatric age group (< 15yrs) made up 5.7% (n= 3) of all patients while the peak age group was 21 – 30 years (table I). There were 39 males (73.6%) and 14 females (26.4%) with a M:F ratio of 2.8:1. A significant proportion were traders (n=15;28.3%) who were of low economic class (fig 1). Of those with western education (n= 44;83%), those with primary and tertiary education were of equal occurrence as seen in fig 2.

Trauma was the leading indication for amputation (n=18; 34%) followed by diabetic foot gangrene (n=12;22.6%) and traditional bone setter (TBS) gangrene (n=12;22.6%) (table II). Road traffic accidents (72.2%), assault (17.2%) and gunshot injuries (5.6%) were the three most common forms of trauma (table III). A statistically significant relationship between the age and indications for amputation was found ($p<0.05$). Patronage of traditional bone setters at onset of illness accounted for 45.3% (n=24) followed by 34% (n=18) of patients who presented to private and general hospitals. There was a significant relationship between place of presentation and level of education (p=0.014).

There were 51 trans-osseous amputations and 2 disarticulations. In relation to laterality of amputation, 52.8% (n=28) were performed on the right and 47.2% (n=25) were on the left limb. There were no

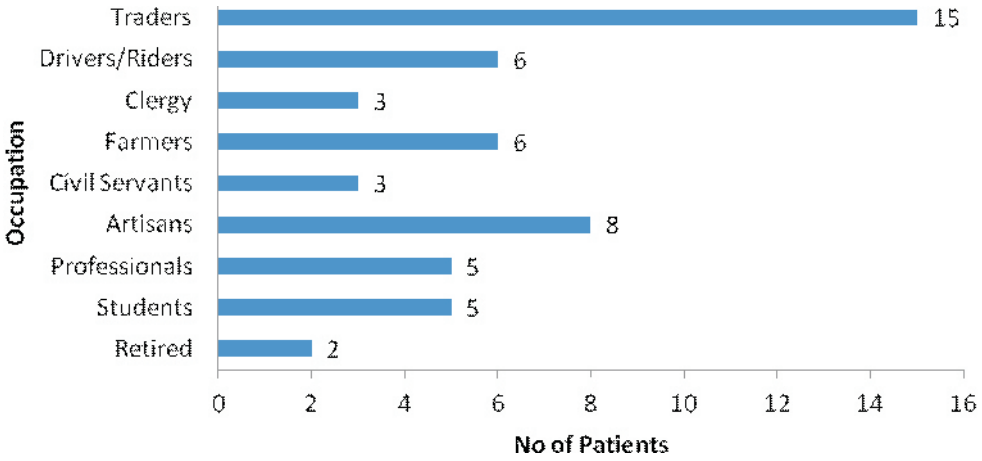

Fig 1. Bar chart showing Occupational Distribution of patients

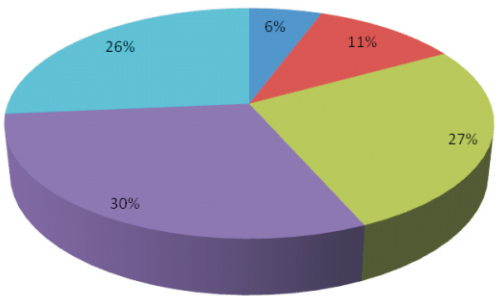

Fig 2: Pie chart showing Level of Education of patients

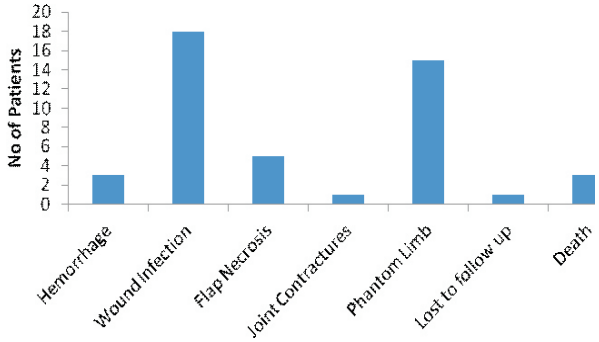

Fig 3: Bar chart showing the pattern and frequency of Early Post-Operative Complications

Table I: Age Group Frequency Distribution

Age Group (Yrs)	No of Patients (n)	Percentage (%)
< 10	3	5.7
11 – 20	-	-
21 – 30	17	32.1
31 – 40	8	15.1
41 – 50	7	13.2
51 – 60	8	15.1
61 – 70	4	7.5
71 – 80	5	9.4
81 >	1	1.9
Total	53	100.0

Table III: Types of Trauma

Type of Trauma	No of Patients (n)	Percentage (%)
Road Traffic Accidents	13	72.2
Industrial Accidents	1	5.6
Gunshot Injuries	1	5.6
Assault	3	16.6
Total	18	100.0

Table V: Waiting Period prior to Surgery and Duration of Hospital Stay

Waiting Period (days)	No of Patients (n)	Percentage (%)
<7	40	75.5
8 – 14	8	15.1
15 – 21	4	7.5
22 – 28	-	-
29 – 35	1	1.9
Total	53	100.0

Duration of Hospital Stay	No of Patients (n)	Percentage (%)
<7	1	1.9
8 – 14	2	3.8
15 – 21	5	9.4
22 – 28	18	34.0
29 – 35	12	22.6
36 – 42	6	11.3
43 – 49	4	7.5
50 – 56	2	3.8
57 – 63	1	1.9
64 – 70	-	-
71 – 77	2	3.8
Total		100.0

bilateral amputations performed during the study period. Lower limb amputations accounted for 84.9% (n=45) of all major limb amputations and included 30 (56.6%) below the knee and 14 (26.4%) above the knee. Of the 15.1% representing upper limb amputations, 9.4% (n=5) were above the elbow and 3.8% (n=2) were below the elbow (Table IV). The mean waiting period prior to surgery was 5.7 days (range 1 – 29 days) with 75.5% (n=40) of patients having their surgeries within the first week of admission (Table v). The mean duration of hospitalization was 32 days (range 3 – 73 days); 18 (33.96%) patients spent between 22 – 28 days

Table II: Indications for Amputation

Indications for Amputation	No of Patients (n)	Percentage (%)
Trauma	18	34.0
TBS Gangrene	12	22.6
DM Foot Gangrene	12	22.6
Peripheral Vascular Disease	6	11.3
Infections	1	1.9
Burns	1	1.9
Tumors	3	5.7
Total	53	100.0

Table IV: Level of Amputation

Level of Amputation	No of Patients (n)	Percentage (%)
Below Knee	30	56.6
Above Knee	14	26.4
Above Elbow	5	9.4
Below Elbow	2	3.8
Knee Disarticulation	1	1.9
Elbow Disarticulation	1	1.9
Total	53	100.0

on admission. (table V)

Early post-operative complication rate was 66% (n=35) and of these, the common complications observed were post-operative wound infections (n=18;51.4%), phantom limb (n=15;42.9%), flap necrosis (n=5;14.3%) and post-operative hemorrhage (n=3;8.6%) (Fig 3). Indication for amputation was statistically associated with time of presentation (p=0.001) and the development of complications while no relationship exists between development of complications and waiting period prior to surgery. The mortality rate was 5.7% (n=3).

All patients who had lower limb amputation were discharged with an ambulatory aid such as bilateral axillary crutches (n=40;93%) and wheelchairs (n=3;7%). No patient had prosthetic fitting prior to or after discharge.

Discussion

The goal of an amputation is to eliminate a potential threat to the patient's life and reconstruction of the residual stump to facilitate prosthetic fitting and rehabilitation.[20]

The young age group represents the most active and mobile members of the society and as such are susceptible to trauma. Studies in Ilorin, Maiduguri and Kenya reported findings stating that major limb amputations are commoner in this age group.[2,3,5,7,8] The significant relationship found between the age of patients and indications for amputation in this study implies that different indications for amputation affect different age groups; therefore post traumatic amputations are commoner in younger age group while

non-traumatic causes e.g. gangrene from DM foot and PVD are commoner in the middle age group and the elderly. The presence of systemic illnesses in the latter group might have been a contributing factor. The preponderance of males found in this study and many other centres may be because they are more active and adventurous and are thus disproportionately injured.[3,6,8,9,11]

Road traffic accidents are commoner in traders and could even be described as an occupational hazard since they commute long distances during the course of their business. In Maiduguri, farmers were found to have made up a large portion of patients who had major limb amputations probably because the population in question are largely rural dwellers, live far away from hospitals and as such depend more on traditional bone setters in the event of injury or disease.[3]

Major limb amputations were commoner in patients who had secondary education (fig 2) in this study while in Kenya those with primary education were in the majority. The assumption is that the lower level of education, the more likely the patient will patronize traditional bone setters. However there was no association between both variables.

Indications for major limb amputations found in this study are as listed in table II. Trauma being the most common indication is followed by diabetic foot gangrene. Road traffic accidents continue to be the commonest cause of major limb amputations of traumatic origin followed by industrial accidents comparable to the finding in Ile-Ife.[6] (table III). Solagberu observed an increasing incidence of Diabetic foot gangrene as an indication for amputation in this centre about two decades ago but trauma was the leading cause.[9] Reasons that may be adduced include the deplorable state of our roads, use of suboptimal tyres, vehicles and machines, lack of use of protective gadgets among other things.

Mismanagement of fractures by traditional bone setters (TBS) have also resulted in major limb amputations.[4,16] An analysis of the primary cause resulting into TBS gangrene in this study shows that all these patients were involved in road traffic accidents prior to presentation at the traditional bone setters.

Peripheral vascular disease (PVD) though said to be uncommon in developing countries was also observed in this study (n-6;11.3%). This is similar to reported incidences of amputation resulting from PVD which were 11.8% in Lagos and 10.2% in Maiduguri. This is in contrast to developing countries where the incidence could be as high as 82%.[10] Tumors resulted in 5.7% of major limb amputations in this study ranked low (4th) in the indications for amputation as previously observed.[9] In Maiduguri, though the incidence of amputations resulting from tumors is higher (18.4%), it is the second most common indication after trauma.[3,8,11] It is expected that patients with a higher level of education will present to hospital at onset of awareness of illness thereby reducing the presentation time while those with lower level of education may initially present to traditional bone setters however, no association was found.

The emergent nature of trauma ensures that awareness is immediate and thus time of presentation to hospital is short. This was evidenced by a statistically significant relationship. In contrast, patients with tumors present late because awareness of the illness is late.

It will also be noted that patients who had TBS gangrene and DM foot gangrene presented within the same duration. This may have been due to the undeniable presence of gangrene, pain, purulent foul smelling discharge and the associated embarrassment. Lengthy time of presentation is however more common amongst patients with tumours.[11] They are known to present only when there is a change or progression of symptoms.

The place of initial presentation is defined as a facility where the patient presented to at onset of illness. These include the Teaching Hospital (UITH), private/general hospitals and traditional bone setters (TBS). Majority (n=24;45.3%) of patients presented to traditional bone setters in this study. This high patronage could be due to tradition, cultural practices and beliefs, lack of trust in orthodox medicine, presumed high cost of orthodox care, the attitude of health workers, greater empathy and provision of quicker service by TBS thereby avoiding the long waiting period before treatment in tertiary/government hospitals.[21] This implies that the lower the level of education, the more likely that the patient will visit traditional bone setters while those with a higher level of education most likely visit orthodox health services for treatment. Though patients with a higher level of education may present to TBS.[22] In quite a number of cases, the decision to patronize the TBS was not the patients' but by the parent or relative in charge of footing the bill.[23] Complications following management by TBS include gangrene, infections, joint ankylosis, mal-unions and non-unions.[4,7,16] Inappropriate splinting or occlusive bandaging of the injured limb without allowing soft tissue swelling to resolve results in vascular occlusion distal to the applied splint, external compartment syndrome and subsequent gangrene.[4,5,7,8,14,16]

Below the knee amputation was the commonest procedure carried out followed by above knee amputation and this is the trend in most other centres.[2,4,6-9,11,13,24] All patients in this series had unilateral amputations with a predilection for the right side of the body for both the upper and lower limbs.In Zambia bilateral amputations accounted for 10% of all amputations.[13] In Britain, the laterality of amputations in 2000 DM foot gangrene patients were studied and a

propensity for the right limb was discovered. It was postulated that the difference in laterality of amputation could be as a result of cumulative physical stress or pressure applied to the foot an individual favours in starting and stopping during movement.[25] The laterality of amputations is most important in the upper limb and principally in relation to handedness and occupation of the patient as the rehabilitation of a right handed person who loses his right hand would be more difficult.

The waiting period prior to surgery was found to be 5.72 days (SD 5.48) in 75.5% (n=40) of patients. This is considerably less than that found in Lagos where the waiting period was between 10.4 – 11.8 days.[11] Financial constraints, refusal to give consent and logistics problems were the main reasons for this delay.[26,27] Resuscitation on presentation is important for optimum operative outcome if the "second hit" phenomenon is to be avoided.[26] This may also have contributed to prolonged waiting period.

The duration of hospital stay in this study was found to be similar to that observed in other centres,.[7,11] This may be as a result of prolonged waiting period before surgery, delay in giving consent, financial constraints and the presence of post-operative complications notably wound infection.[6] Other reasons include prosthetic fitting, procurement and wound healing. In the elderly, the presence of co-morbid illnesses and development of nosocomial infections has been shown to prolong the duration of hospital stay.

The complication rate observed was 66%. Early post-operative complications were observed in a considerable number of patients during the study with over 50% of them having developed one or a combination of complications. The most common early post-operative complication encountered was wound infection of the residual stump regardless of the indication followed by phantom limb sensation and flap necrosis (fig 3). This may be due to the degree of wound contamination or ascending infection which could not be assessed prior to or during surgery. This trend was also the finding in some cetres.[6,11] The development of phantom limb is a consequence of the procedure and not related to the indication for amputation.[28] Our finding is similar to the 55% of British veteran amputees who developed phantom limb following amputation of a major limb.[28] It was also found to be most frequent in patients with DM Foot gangrene than in patients who had trauma to the limb.

Mortality rate was 5.7% (n=3). Several workers have found similar mortality rates ranging from 5% - 7.2% which are all consistent with the findings in this study.[11]

None were fitted with prosthesis due to financial constraints, wound infection, residual ulcers and the relatively difficulty (i.e. cost and availability) in procuring prosthetic limb in our centre. Prosthetic use before surgery was 16% in Lagos probably due to the presence of a functional prosthetics and orthotic department.[10] Prosthetic use after discharge was found to be 1.8% and 7.5% in Maiduguri and Sagamu respectively.[3,19]

Conclusion

Trauma is the most common indication for major limb amputations and predominantly in young active males. Below knee amputation is the commonest procedure and predominantly on the right. Wound infection and phantom limb were the main early post-operative complication encountered.

Frequent public enlightenment campaigns on road safety, maintainance of vehicles, safety in the workplace, the dangers of intervention by traditional bone setters and adequate control of blood glucose in diabetics is important if unwarranted limb loss is to be reduced.

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