

## ORIGINAL ARTICLE

## Amputation of the limbs: 10years' experience at Enugu State University Teaching Hospital

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Received: January 16<sup>th</sup>, 2015  
Accepted: May 15<sup>th</sup>, 2015

DISCLOSURES: NONE

## INTRODUCTION

Recent advances in sciences and technology have made it that emphasis is now being laid on limb salvage in developed countries.<sup>1,2</sup> This means that limbs that could have otherwise been amputated are now being saved due to early presentation and accurate diagnosis. The paucity of diagnostic facilities and delayed presentation in developing countries like Nigeria make amputation the commonly available treatment option.<sup>3</sup>It is

usually a bitter pill for the patient to swallow and a difficult inevitable option for the surgeon. Amputation, however, can be a life-saving/ life changing surgery depending on the indication.<sup>4,5</sup>

The loss of a limb always has profound economic, social and psychological effects on the patient and the family.<sup>7</sup> The traumatic experience is often accompanied by psychological and psychiatric disabilities that

**ABSTRACT**

**Background:** Limb amputation is a veritable means of saving lives in the West African sub-region where patients present late to hospitals with severe injuries; often in the presence of previously undiagnosed comorbidities. In this region, many amputees are left permanently without prosthetic fittings for variable reasons, and without adequate occupational rehabilitation this impacts on the life of the amputee; especially in the productive age group.

**Objective:** Aim of this study is to determine the pattern of limb amputations, identify the common indications, incidence, problems and complications of the procedure at ESUTH, Enugu.

**Methodology:** A 10-year retrospective study of all amputations done in the hospital (January 2003 to December 2012) was carried out. Data collected from the case notes and operation registers included demography, indication for amputation, levels of amputation, affected limb, prosthetic fitting and complications.

**Results:** There were 94 amputations involving 86 patients. The most common indication for amputation was gangrene from diabetes mellitus. Male to female ratio was 1.2 to 1; age range was 5 to 88years with mean age 45.4years. Peak age incidence was in the 6<sup>th</sup> decade. Below knee amputation was the most common operation, and delayed wound healing, the commonest postoperative complication. Thirty amputees procured prosthesis within three months of discharge from hospital.

**Conclusion:** Diabetic foot gangrene is the commonest indication for limb amputation in our series. The incidence is higher among elderly people. Compliance with prosthetic fitting among amputees is very low.

**Keywords:** Compliance, complications, indications, pattern, prosthetic fitting, rehabilitation

may lead to a negative self-esteem. These psychological disabilities could be moderated by indices like age, marital status, gender, family and social support, unemployment and level of amputation.<sup>5</sup>Worse still, in Nigeria, the dearth of rehabilitation facilities and ignorance heighten the incidence of these psychological and psychiatric disabilities, because in good number of cases amputation is conceived as a treatment failure.<sup>8,9</sup>

The indication for amputation varies from place to place. In Nigeria, most studies reported trauma as the most common cause of limb amputation, while in Europe and USA 85-89% and 82% of amputations, respectively, are as a result of dysvascular causes.<sup>11,12,13</sup> Thanni and Tade reported 34% of amputations in Nigeria to be due to trauma, whereas workers in other centres reported 60% and above.<sup>10,14,15,16</sup> The impact of traditional bone setters' intervention as factors in amputation had been demonstrated by studies in eastern and northern Nigeria.<sup>12,17</sup>

Dysvascular amputation encompasses severe inter-related clinical pathway including ischaemic, infective and diabetes mellitus in 71% of cases.<sup>13</sup> Diabetes has been reported as the most common cause of non-traumatic amputation in Nigeria.<sup>11,15</sup> Other common indications for amputation include malignant neoplasm, uncontrolled extensive acute or chronic infections, congenital anomalies and burns.

This work aims at identifying the indications for amputation, complications associated with it and the post-amputation adaptation of patients, with a view to proffering solutions to the problems.

#### METHODOLOGY

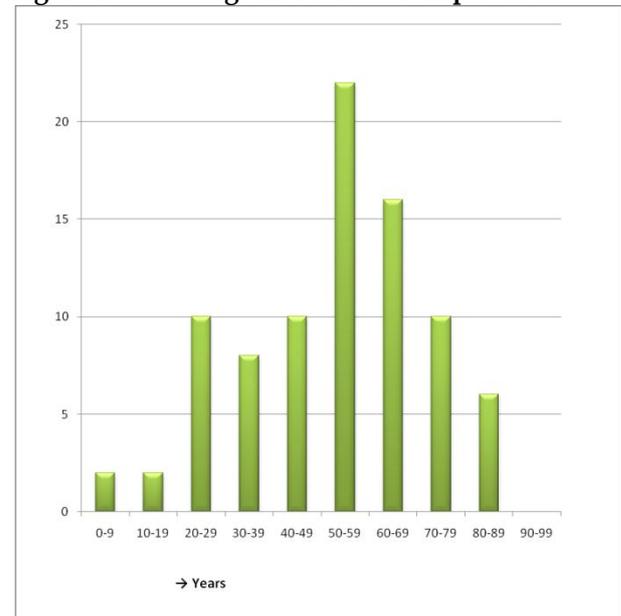
This is a retrospective study covering a 10-year period (January 2003 - December 2012), a period when the hospital transformed from a Specialist Hospital to a Teaching Hospital. There were 94 patients who had amputations, but, only 86 case notes were available for review. All those whose case notes were available and complete were included in the

study, and those with incomplete records were excluded.

#### RESULTS

Amputations were done in 86 patients, involving both the upper and lower limbs. The lower limb accounted for 76 cases (88.4%) and upper limb 10 cases (11.6%). Ten patients, 13.1%, who had lower limb amputation had re-amputation, 6 were due to diabetic gangrene and 4 due to vascular gangrene. Mean age was 45.4 years, range 5-88 years. The peak age incidence was in the 6<sup>th</sup> decade followed by the 7<sup>th</sup> decade, 48 (55.8%) were males and 38 (44.2%) were females giving a male:female ratio of 1.2:1, see Figure 1.

**Figure 1. Age incidence of amputation**



**Table 1. Sex distribution for various indications**

	Males	Females	Total	%age
Diabetic gangrene	28	18	46	53.5
Vascular gangrene	6	10	16	18.6
Trauma	12	2	14	16.3
Malignant diseases	2	8	10	11.6
<b>Total</b>	<b>48</b>	<b>38</b>	<b>86</b>	<b>100</b>

The most common indication for amputation was diabetic foot gangrene 46 (53.5%), as shown in Table 1. This was followed by vascular gangrene 16 (18.6%), trauma 14 (16.3%), while malignant diseases accounted for 10 (11.6%). Of the 14 cases of amputation indicated by trauma, 12 resulted from road traffic accident with mangled extremities,

while 2 resulted from high velocity gunshot injury with femoral artery transection. Among those whose amputations were of vascular origin, 12 were due to vascular insufficiency from calcified femoral vessels, one case was iatrogenic following an attempt by a general practitioner to extract bullet pellets, another followed intramuscular injection in the thigh by a patent medicine dealer, while other causes accounted for the remaining 2 cases. All amputations in the 9<sup>th</sup> decade were due to vascular compromise.

**Table 2. Amputation levels**

	No of amputation	Percentage
Below Knee	32	37.2
Above Knee	28	32.6
Ray amputation	14	16.3
Fore foot	6	7.0
Above Elbow	4	4.7
Below Elbow	2	2.3
<b>Total</b>	<b>86</b>	<b>100.0%</b>

The most common level of amputation is below-knee 32 (37.2%), while above-knee amputation is 28 (32.6%), as in Table 2. Above-elbow accounted for 4 (4.7%) and below-elbow 2(2.3%). Re-amputation was done in 10 patients, 6 of whom had diabetic gangrene and the other 4 were cases of vascular gangrene. Diabetic gangrene cases had provisional amputation initially and stump re-fashioning after infection was controlled. Fifty patients were compliant with out-patient follow-up for one year, and of these, 30 procured prosthesis within 12weeks of out-patient clinic follow-up. The other 36 patients were lost to follow-up after 3months.

## DISCUSSION

Limb amputation is a veritable means of treating some late stage diseases in order to save life; especially in the West African sub-region where patients present late after interacting with charlatans and quacks.<sup>20</sup> The incidence of amputation in the sub-region is high, mainly predicated on the foregoing and high incidence of road traffic accident-associated injuries, and the increasing incidence of diabetes mellitus and vascular

diseases in the presence of lack of facilities for limb salvage.

In this study, there was a male preponderance which agreed with findings of most authors across Nigeria and the West African sub-region.<sup>10,21,22,23</sup> The males are the bread winners of most families, therefore, they engage in more physical exertions, with increased exposure to risks of injuries that may necessitate ablative surgery.

The peak age group incidence is 50 to 59years; closely followed by the 60-69year age group. This peak incidence is at variance with studies that reported trauma as the most common indication for amputation, but, is in keeping with studies that reported diabetes mellitus and peripheral vascular diseases as the most common.<sup>11,15,22,24,25,26</sup> Our study showed diabetes mellitus (53.5%) and vascular gangrene (18.6%) as the most common indications for amputation at the study centre. Gangrene secondary to diabetes mellitus and peripheral vascular diseases constituted dysvascular causes for amputation which in our series made up 72.1%. Timothy, *et al*, reported that 82% of limb losses in USA were due to dysvascular causes.<sup>13</sup> The 72.1% reported in our series appears to be the highest in Nigeria and seem to support the changing pattern noted by Dada, *et al*, Akiode, *et al* and Naaeder.<sup>15,23,26</sup>

The explanation for this high figure of dysvascular causes may be found in the fact that ESUTH is the youngest of the three tertiary health institutions in Enugu and, therefore, relatively unknown as a trauma centre, when compared to the other tertiary institutions. These other hospitals are located along the major inter-state highways and therefore, easily accessible to trauma patients. The rather central location of ESUTH makes it disproportionately it more accessible to other classes of cold patients. The drift in the dietary habits of Nigerians towards "junk foods" may be responsible for the observed increase in the incidence of diabetes mellitus and peripheral vascular diseases.

Evaluated separately, diabetic foot gangrene (53.5%) was the most common indication for amputation in our study. This agrees with results obtained by Ogunlade, Dada and Naaederin where the most common indications were due to complications arising from diabetes mellitus.<sup>11,23,56</sup> Our result, however, disagreed with some studies in some parts of Nigeria, Nwankwo and Katchy, Kidmas, Obalum, and Unegbu, *et al*; who recorded the most common indication for amputations as trauma.<sup>21,22,24,25</sup> High rate of amputation due to complications of diabetes mellitus in the study centre as compared to other centres may be attributed to poor compliance by diabetics who are misguided by the adverts of herbalists that they have the permanent cure for diabetes mellitus. Allowing the herbalists to advertise unsubstantiated cure for many diseases has, unfortunately, put the largely ignorant populace at risk of complications; more so with the burden of diabetes and its complications reported as getting worse in the tropics.<sup>11</sup>

The second most common indication for amputation in our centre is vascular gangrene 18.3%. Of these, 75% were in their 8<sup>th</sup> and 9<sup>th</sup> decades of life, and presented when the extremities were shriveled and mummified. Adotey, *et al*, in Port Harcourt and Nwankwo, *et al* in Enugu had reported 8.3% and 27%, respectively as the prevalence of amputation due to vascular complications.<sup>21,27</sup> Our figure of 18.3% falls in between these two extremes.

Trauma was the 3<sup>rd</sup> most common cause of amputation in this study, and as was pointed out earlier, this does not agree with other previous local studies.<sup>8,21,28</sup> It may be explained by the fact that our centre is relatively new and located away from the highways, and therefore, relatively unknown as a trauma centre.

Malignant diseases in our study were responsible for 11.6% of amputations. This compares well with Nwankwo's report from Enugu, the same city as ours where malignancies accounted for 15%.<sup>21</sup> In our study, most of the malignancies were

osteosarcoma involving the tibia while a fifth was due to squamous cell carcinoma of the legs. Amputation in these patients was basically to reduce the burden of disease as distant metastasis had occurred by the time of presentation.

The most common level of amputation was below-knee, followed by above-knee, similar to other reports.<sup>21,29</sup> Below-knee amputation should be considered a better option than above-knee, whenever possible, because it preserves the knee with its proprioceptive function and reduces energy expenditure at ambulation.

Upper limb amputation was done in 7% of all cases, mostly involving the right upper limb which in those individuals, was the dominant hand, as had been reported.<sup>30,31</sup> Crushing and lacerations from machineries and road traffic accident were the common injuries. The only case of amputation in the 1<sup>st</sup> decade of life in our series was due to compartment syndrome following tight crepe bandaging in the presence of humeral fracture. Compartment syndrome with resultant gangrene is a common complication seen in patients treated by traditional bonesetters; usually due to tight splinting of fractures.<sup>32</sup>

The observed common problems associated with amputation surgeries in our series and environment included the inability and reluctance of the patients to accept surgical treatment even in the presence of overt threat to their survival. On account of cultural beliefs about re-incarnation and the stigmatization, some would rather die than accept amputation which usually is life-saving.

Another problem with amputation surgery in our environment is the low rate of procurement and use of prosthesis by the amputees.<sup>33</sup> The high cost of these prostheses may be responsible. Some amputees, also, use their situation to attract sympathy and therefore, make a trade of begging by exposing the amputation stumps.

The follow-up dropout rate amongst amputees is also high in our series, we had 41.9% follow-up dropout at 3months. Importantly too, the re-amputation rate of 11.6% in our series appears high, and this is probably attributable to the study population. Diabetics and patients with vascular problems heal wounds poorly and are prone to wound infections.<sup>34</sup> This probably accounts for delayed wound healing being the most common complication in our study. There were no recorded mortalities, nonetheless; which contrasts sharply with other reports where mortality was between 7-17%.<sup>21,23</sup> Use of physician anaesthetists in the surgeries may be part of the explanation.

### CONCLUSIONS

Amputation is one of the oldest surgical procedures and has been practised for punitive, ritual and therapeutic reasons. Lower extremity amputation is the most common amputation in Enugu, below-knee being less common than above-knee and diabetic gangrene is the most common indication in our centre. Early diagnosis and optimal blood sugar control may likely reduce the amputation rate, and so, health education will make a significant impact in reducing the incidence.

### RECOMMENDATIONS

Advertisement of unproven remedies should be restricted, and health education intensified.

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