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## Major limb amputation in Ibadan

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### Summary

A prospective study of patients who had major limb amputation at the University College Hospital Ibadan over a 5-year period is presented. One hundred and one major limb amputations were performed within this period (71 Males, 30 Females, M:F = 2.3:1). Trauma accounted for 48% of the cases followed by diabetes in 26%, soft tissue infection in 13% and tumours also in 13%. The major post-op complication was wound infection. In accordance with the findings in other centers, a higher proportion of the amputations (69%) were carried out in the lower limbs. Patient's refusal to accept amputation resulted in a delay in amputation in 49 patients. This delay (before surgery) ranged from 1 day to 150 days, with a mean of 15.49 (SD 9.5). From this study, we found that a reduction in vehicular accidents and increasing emphasis on efficient foot care (and glycaemic control) in the diabetic may significantly reduce the rate of amputations in our environment.

**Keywords:** Amputation, trauma and diabetes

### Résumé

Une étude prospective est effectuée pour plus de 5 ans sur les patients ayant eu des amputations de membres inférieurs à l'hôpital universitaire (UCH), Ibadan, Nigeria. Au cours de cette période, cent une amputations ont été effectuées (71 garçons et 30 filles; G:F: 2.3:1). Le traumatisme représentait 48% des cas suivis de diabète à 26%. L'infection des tissus à 13% et des tumeurs à 13%. La complication post-opératoire majeure était l'infection de la blessure. En fonction des données dans d'autres centres, une grande proportion d'amputations 69% était faite sur les membres inférieurs. Le refus du patient d'accepter l'amputation retardait l'amputation à 49% des patients. Ce retard avant la chirurgie variait de 1-150 jours avec une moyenne de 15.49 jours (SD : 9.5). De cette étude, nous avons trouvé une réduction d'accidents routiers et une attention accrue des soins des pieds chez les diabétiques peut significativement réduire le taux d'amputations dans notre environnement.

### Introduction

Prior to the era of modern surgery, amputations were limited to cases of gangrene in which death was inevitable if nothing was done. In those medieval days, the amputations were carried out through 'apparently' healthy tissues and the amputation stumps were dipped in hot oil to stop bleeding. However, with improvement in the control of hemorrhage, amputations are now done through healthy connective tissues in cases like trauma and tumours thereby broadening the indications for amputation [1].

There is an increase in the number of amputations being performed for peripheral vascular disease in the developed nations. This is often attributed to an aging population, a high incidence of diabetes and tobacco smoking [2]. In Nigeria as is seen in most developing countries, there is dearth of information on limb amputation [4]. Therefore this study is aimed at unveiling the pattern of major limb amputation in the largest

teaching hospital located in the South Western part of Nigeria with a view to identifying the indications for amputation and examining the factors that could lead to reduction in the number of amputations in our environment.

Every effort to prevent a major limb amputation is extremely valuable, since any amputee has to face functional, cosmetic and psychological problems regardless of the level of amputation. Prosthetic replacement may minimize or even 'solve' some problems associated with amputation nonetheless, this procedure has not been able to represent anything more than an extremely poor imitation of a masterpiece of nature - the human limb [3].

### Materials and method

This prospective study evaluated all the patients referred to the orthopaedic and trauma unit of the department of Surgery, University College Hospital (UCH), Ibadan that underwent amputation between January 1996 and December 2000. The University College Hospital is a referral center that serves a population of approximately 15 million people mainly in the South Western part of the country. The sources of referral of patients were mainly from General hospitals in five states of the federation while others were brought into the Accident and Emergency Department of the Hospital following road traffic accidents.

The information obtained included; age, sex, occupation, the factors or incidents necessitating amputation, the level of amputation, the delay in amputation (and the reason for these delays) as well as the complications encountered. The decision to amputate was often taken by two independent consultant surgeons.

### Results

The non-parametric equivalents of t-test (Mann-Whitney U Statistics) and ANOVA (Kruskal-Wallis) were used for non-normally distributed data. All statistical tests were two-tailed and

**Table 1:** Sex distribution of the patient's demographic characteristics

Demographic variables	Male (%)		Sex		Total (%)	X <sup>2</sup>	P-value
	n		n				
<i>Age (yrs)</i>							
<20	7	9.9	4	13.3	11	10.9	
20-44	36	50.7	16	53.3	52	51.5	
45-59	13	18.3	4	13.3	17	16.8	0.59
60+	15	21.1	6	20.8	21	20.8	
Total	71	70.3	30	29.7	101	100	
<i>Occupation</i>							
Trading	11	15.5	12	40.0	23	22.8	
Students	8	11.3	4	13.3	13	11.9	
Artisan	19	26.8	0	0.00	18	18.8	
Farming	5	7.0	0	0.00	5	5.0	
Civil servants	4	5.6	1	3.33	6	5.9	28.18
Unskilled							
Workers	5	8.5	0	0.00	7	6.5	
Retired	6	8.5	1	3.3	2	3.0	
Housewife	0	0.0	1	10.0	21	20.8	
Not stated	12	16.9	9	30.0			

were carried out at 5% level of significance. A total of one hundred and one amputated patients (101) were studied, over a period of 5-year giving an average of 20 amputations per year. Table 1 shows the distribution of the patients' demographic variables by sex. The majority of the patients (51.5%) were aged 20 – 44 years, whilst 21% of patients were aged 60 years and above. The majority of the patients who had amputation, 70.3% were males while only 29.7% were females. The second panel of the table shows the occupational distributions of the patients by sex. Majority (22.8%) of the patients were traders, 18.8% were artisans and 11.9% were students.

Table 2 shows the indications and types of amputation. Below knee amputation was carried out in 49 (48.5%) patients, above knee in 20.2%, above elbow in 12% while the least reported type of amputation was below elbow (6.0%).

Trauma was the commonest indication for amputation, accounting for 48% of all amputations, followed by diabetes (26%), while soft tissue infections and tumours accounted for an equal number of patients (13.0%).

Of the six patients with below elbow amputation 4 (67%) were due to trauma and the same pattern was found in the patients who had above elbow amputation. The distribution

**Table 2:** Indications and types of amputations

Type of amputation	Indications for amputations								X2	P-value
	Diabetes		Infections		Trauma		Tumours			
	*Freq	%	*Freq	%	*Freq	%	*Freq	%	*Freq	%
Above knee	2	7.7	4	30.4	13	27.1	3	23.1	22	21.8
Below knee	19	73.3	6	46.2	17	35.4	7	53.8	49	48.5
Below elbow	1	3.8	0	0.0	4	8.3	1	7.7	6	5.9
Above elbow	0	0.0	1	7.7	10	20.8	1	7.7	12	11.9
Others	4	15.4	2	15.4	4	8.3	1	7.7	11	10.9
Total	26	100	13	100	48	100	13	100	101	100

\*Freq. = Frequency

**Table 3:** Distribution of the multiple post-operative complication by type of amputation

Type of amputation Complications	Above knee (n = 22)		Below knee (n = 49)		Above elbow (n = 6)		Below elbow (n = 12)		Others (n = 11)		Total (n = 100)	
	*Freq.	%	*Freq.	%	*Freq.	%	*Freq.	%	*Freq.	%	*Freq.	%
Hemorrhage	1	4.6	1	2.0	0	0.0	1	8.3	0	0.0	3	3.0
Infection	4	18.2	11	22.5	1	16.7	7	58.3	1	2.1	24	24.0
Necrosis	1	4.6	2	4.1	0	0.0	0	0.0	0	0.0	3	3.0
Phantom Sensation	0	0.0	2	4.1	1	16.7	0	0.0	0	0.0	3	3.0
Death	0	0.0	2	4.1	0	0.0	1	9.1	1	9.1	3	3.0
Others	0	0.0	0	0.0	1	16.7	1	9.1	1	9.1	2	2.0

\*Freq. - Frequency

**Table 4:** Distribution of patients' type of amputation age, sex, and side of amputation

Variables	Type of Amputation										X2	P-value
	Above knee		Below knee		Below elbow		Above elbow		Others			
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%		
Age (yrs)												
>20	4	82	1	91	2	33.3	2	25.0	1	19.1		
20 - 44	12	54.5	25	51.0	7	58.3	8	58.3	5	45.5	14.37	0.28
45 - 59	13	13.6	11	22.4	1	8.3	1	8.3	1	8.3		
60 +	3	13.6	12	4.5	1	8.3	1	8.3	1	8.3		
Sex												
Male	20	90.9	13	63.3	4	83.3	8	66.7	8	54.4	7.46	0.11
Female	2	9.1	18	36.7	1	36.7	4	33.3	4	33.3		
Side of amputation												
Right	11	54.5	29	59.2	2	33.3	9	75.0	9	81.8		
Left	8	36.4	19	38.8	3	66.7	3	25.0	1	9.1	9.81	0.28
Not indicated	2	9.1	2	9.1	0	0.0	1	9.1	4	4.0		

of the multiple post-operative complications by type of amputation is shown in Table 3. Infection of the amputation stump was the most frequent complication encountered (24%). Hemorrhage, necrosis of flap stump, phantom sensations and death each accounted for 3% of the complications observed. Infection of the stump was commoner in patients with above elbow amputation 58.3%.

**Table 5:** Summary statistics of patients' length of delay by age, sex, type of amputation and indication for amputation

Variables	Type of amputation				Test Size	P-value
	Means	S.D	Median	Range		
Age (yrs)						
>20	19.33	21.7	15.5	2.0-60.0	6	
20-24	15.24	33.4	4.0	1.0-150.0	25	
45-59	9.9	9.2	9.0	1.0-21.0	10	3.14
60+	20.38	6.5	6.5	3.0120.0	8	0.37
Sex						
Male	16.64	33.1	45	1.0-150	36	
Female	12.31	15.8	7.0	1.0-60.0	13	0.25
Type of amputation						
Above knee	18.79	25.7	9.0	2.0-90.0	14	
Below knee	11.96	31.1	15.5	1.0-150.0	22	9.91
Below elbow	13.00	9.3	13.5	4.0-21.0	4	0.04
Above elbow	3.17	2.1	2.5	1.0-7.0	6	
Others	21.00	0.0	21.0	21.0-21.0	2	
Indication for amputation						
Diabetes	14.14	30.69	6.0	1.0-20.0	14	
Infections	9.60	10.41	2.0	2.0-21.0	5	8.21
Trauma	10.04	18.30	4.0	1.0-90.0	24	0.04
Tumours	45.33	54.51	20.5	7.0-150.0	6	
All patients	15.49	29.4	6.0	1.0-150.0	49	

This study also shows that there was a longer delay to operation in patients who had amputation for neoplastic conditions (a median of 20.5 days) compared with patients with diabetic feet even though pre-operative counselling was done in all the cases prior to surgery.

### Discussion

Amputation is a salvage procedure embarked upon usually when reconstructive or restorative procedures are not achievable. The functional, cosmetic and psychological problems encountered by amputees particularly in the developing countries is enormous and this is why efforts at limiting preventable causes of limb ischaemia takes center stage in our society [3,5].

In this study, majority of the patients who had one form of amputation or another were below the 5<sup>th</sup> decade with a male preponderance. This finding compares with data from Northern Nigeria and other developing country like Kenya where higher number of amputees were below the sixth decade [6,7,8]. On the other hand, in developed countries, most amputees are above the 6<sup>th</sup> decade and this may be due to the higher incidence of peripheral vascular diseases [7] which incidentally is the commonest indication for below knee amputation in these countries [4].

It is also important to note that complications from diabetes (diabetic foot) were an indication for amputation in 26% of these patients. There is therefore a need for improvements in the care of these patients with emphasis on foot skin care and efficient glycaemic control [7]. Also, the commonest

indication for amputation in the upper limb in our study was trauma and this is in keeping with the findings of studies from other centers [4,5,6,7,8].

The relatively higher incidence of above knee amputation in trauma cases is due to the severity of the trauma as most cases of vehicular origin with mangled limb usually involves the knee joint. However, the preservation of the nature knee joint in any lower limb ablation is of paramount importance to the degree of mobility that can be expected from the limb after fitting a prosthesis [2,4]. A further consideration in the preservation of the natural knee joint in those who suffer the loss of a leg as a result of complication of diabetes or peripheral vascular disease is the ever present possibility that the condition causing the first amputation may well, in time, demand the ablation of the contralateral limb [2].

A high proportion of the patients in the study were traders and artisans who travel often in pursuit of their vocation to earn a living and they are therefore mostly involved in vehicular accidents [10]. This has profound economic and social implications for the families of such traders who are often times the breadwinners.

Infection was the commonest complication following amputation in this study and was commoner in patients who had below knee amputation. The high rate of infection may be due to the proximity of the amputation level to the pathology especially in the diabetics as deliberate effort were made to conserve the knee. Three patients with flap necrosis had refashioning of the amputation stumps with satisfactory result.

The delay to consenting to amputation in patients who had tumours is partly due to the fact that relations are usually consulted for approval, prior to consenting to amputation. In our culture, there are significant family links and since patient care is solely the responsibility of the patients and their relations, the advice given by the relations cannot be ignored [11]. It is mandatory for the patients and their relations to be adequately counselled prior to the operation and this preferably by a dedicated nurse [11].

### Conclusions

Trauma and diabetes are the most common indications for amputation in our environment. Preventive measures that limit trauma (particularly vehicular accidents) and efforts to deliver proper care to the diabetic patient may lead to reduction in the number of amputations carried out in our environment.

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