

Primary and Revision Amputation Surgery in a Tertiary Institution in South West Nigeria**O. Esan¹, T. O. Adeyemi¹, E.A. Orimolade¹, O.T. Esan²**¹Address: Department of Orthopaedic Surgery and Traumatology, Faculty of Clinical Sciences, Obafemi Awolowo University, Ile Ife, Nigeria.²Department of Community Health, Obafemi Awolowo University Teaching Hospitals Complex, Ile Ife, Nigeria.**Correspondence to:** Dr Oluwadare Esan, Email: seunkayo@yahoo.com

Background: Amputation is a common elective or emergency surgical procedure. We set out to study the cases undergoing amputation surgery with special interest of determining the prevalence rate of revision amputation surgery; its indication and trend among patients who had amputation surgery at a tertiary health facility.

Method: Study was cross sectional in design and retrospective in nature, conducted in a tertiary health facility selected purposively in a state, South West, Nigeria. Data collection was by reviewing the records of amputation surgery done at a tertiary health facility over a 15-year period (1996- 2010). Data collected were analyzed using the SPSS version 17, and statistical inferences made at p -value ≤ 0.05 .

Results: A total of 124 amputations were done with 9 cases of revision amputation giving a prevalence rate of 7.25%. The commonest indication found for amputation surgery was trauma while it was ascending gangrene for revision amputation. Among those who had revision amputation done, 75% were diabetic while 22% had earlier refused consent for amputation at an appropriate site. An increasing trend in the prevalence of revision amputation was found. There was a statistically significant association between diabetic amputees and their having a revision amputation done with $p=0.002$.

Conclusion: Diabetic amputees are at a higher risk of a revision amputation. Counseling and appropriate diagnostic procedures is essential for prevention.

Introduction

Amputation surgery, one of the oldest surgical procedures still remains relevant in present modern surgical practice. Various indications include peripheral vascular diseases and diabetes mellitus with resulting gangrene and crush injury among others. Most of the cases of amputation are however due to trauma in the young patients. Rehabilitation following amputation is as important as the procedure itself and it involves the preparation of the stump for prosthesis and at the same time the fitting of the prosthesis and the training of the patient to use the prosthesis.

Sometimes, revision amputation may be necessary for treatment of ascending infection, management of pain caused by neuroma, stump overgrowth or to prepare the stump for prosthetic fitting. Ideally, rehabilitation should be taken into account during the initial amputation, and the level of amputation that will be ideal for good prosthetic fitting chosen. However, this may be difficult to achieve as some factors such as availability of diagnostic equipments which will help the surgeon determine the appropriate level of amputation are not available or accessible. Patient's consent is also important and may otherwise determine the eventual level of amputation. Literature on this subject of revision amputation surgery is however still sparse¹.

This study was embarked upon to find the prevalence of revision amputation surgery in our practice, its indication, outcome and trend over the years.

Patients and Method

Study was cross sectional in design and retrospective in nature, conducted in a tertiary health facility situated in Osun State, South Western region of Nigeria. Surgical amputation procedures were done by

Orthopaedic Surgeons and their Senior Residents in the department following the standardized protocols for amputation surgery. Data collection was by reviewing the records of all the cases of amputation done at the Orthopaedic Surgery and Trauma Department of this tertiary health facility over a 15-year period (1996-2010). Information obtained included the socio-demographic characteristics of the patients such as their age and sex, indications for the first amputation, level of the first amputation, total number of revision amputations done in consecutive 5-year period within the 15-year period under review, indications for the revisions, level of revisions and the outcome.

Data collected were analyzed using the SPSS version 17. Univariate analysis done included frequency distribution, charts, summary statistics like mean and standard deviation. Cross tabulation was done and associations between variables were tested using chi square statistical method. Statistical significance was inferred at $p < 0.05$.

Results

A total of 124 amputations were done over the 15 years under review in the orthopaedic unit of the institution. The mean ages of patients who had amputation surgery done were 39.7 ± 22.5 SD with a median of 40 and an inter-quartile range of 19.5. A higher proportion of them were males (78.2%). The commonest indication for the amputation to be done was trauma with 59 (47.6%) followed by diabetic gangrene in 36 (29%) patients (Figure 1).

The lower limbs were the commonest part of the body affected with 76 (61.3%) cases. There was no difference in the side amputated as there were equal number of both right and left side affected with gangrene and subsequently had amputation. The commonest amputation procedure done was 'below knee' amputation with a total of 39 (31.5%) cases. The prevalence of revision amputation done among the 124 amputation surgical procedures reviewed was 7.25% in the 15- year period. The mean age for the patients who had revision amputation done was 53.3 ± 17.0 , with a median of 55 and an inter-quartile range of 11.5. Sixty-seven percent of them were also males. This rate was however higher among the diabetics (19.4%) compared with other non diabetic population (2.3%). Ascending gangrene of the stump was the commonest indication for revision amputation. Other indications are as shown in Table 1.

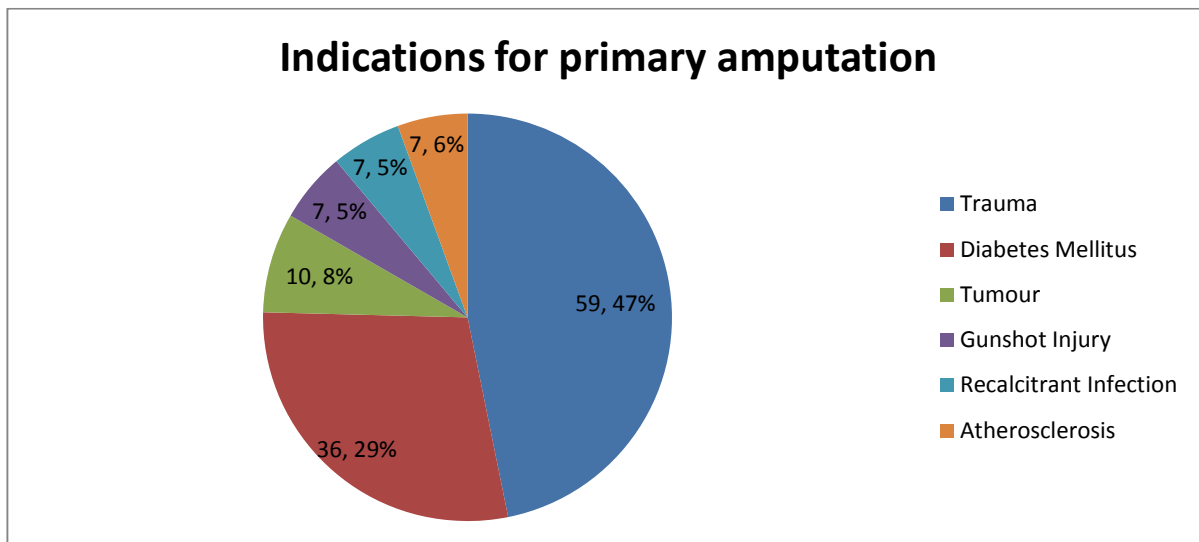


Figure 1. Indications for Primary Amputation.

Table 1. Indications for revision amputation

Indication	Frequency	Percentage (%)
Ascending gangrene	4	44.4
Wound dehiscence	2	22.2
Redundant flap	1	11.1
Infection with haemorrhage	1	11.1
Chronic Osteomyelitis	1	11.1
Total	9	100.0

Table 2. Revision procedures done

Revision done	Frequency	Percentage (%)
Stump Refashioning	4	44.4
Above knee Amputation	2	22.2
Below knee Amputation	2	22.2
Sequestrectomy	1	11.1
Total	9	100.0

Table 3. Comparison of Diabetic with non diabetic Population.

Diabetic Status	Had Revision Amputation	No Revision Amputation	Total
	Frequency (%)	Frequency (%)	Frequency (%)
Diabetic	7 (19.4%)	29 (80.6%)	36
Non Diabetic	2 (2.3%)	86 (97.7%)	88

P = 0.002, Odd Ratio = 10.4.

Refashioning of the stump was the commonest surgical procedure done 4 (44.4%) for the revision amputation. Other types of surgical procedures done for the revision amputation are as shown in Table 2. Among those who had revision amputation done, 77.8% were diabetic. There was a statistically significant association between diabetic amputees and having a revision amputation done with $p = 0.002$. This is shown in Table 3.

In describing the outcome of the revision amputation surgeries done, 1 (11.1%) of the patients had a complication evident as a phantom limb. This phantom limb later resolved. The other 8 (88.9%) had satisfactory outcomes which was defined as being ready for their prosthetic fittings. Two patients were offered a higher level of amputation (below knee amputation) following clinical examination and result of investigations, but declined and requested for a lower level of amputation (ray amputation). These patients subsequently had ascending gangrene and had revision amputation surgery (below knee amputation) done after eleven days. Two other patients also had ascending gangrene of the stump and had their amputation revised to a higher level. One of them eventually developed renal impairment and subsequently died giving a mortality rate of 11.1%.

There were 3 (33.3%) cases of revision amputation in the first five years of the study period (1996-2000) out of the 59 cases of primary amputation surgeries done at the time giving a period prevalence 5.1%. There were no cases of revision amputation recorded in the second 5-year period, (2001-2005). However, there were 6 (66.7%) cases of revision amputation among the 38 cases of primary amputation procedures done in the last 5-year period (2006-2010) giving a period prevalence of 15.8%. This shows an increasing trend in the cases of revision amputation despite advancement in the practice of Medicine in these later years.

Discussion

The median ages of those who had primary amputation surgery and revision amputation done were 40 years and 55 years respectively. This showed that the working or independent population are those affected and this may likely have an effect on the socio-economic development of the nation. A higher proportion of males were affected. This also has an implication on the provision of subsistence for the family because of the role of men as heads of the family. Trauma was the commonest reason for amputation in our series, and it is commoner in the younger age group. This group of population will usually have less co-morbidity; hence they are expected to have fewer problems with recovery¹.

This study revealed the prevalence of revision amputation to be 7.25% in the 15-year period under review. This finding is lower than the 25% obtained by Wood et al² in their series. This observation may be due to lesser number of diabetics in our series compared with theirs. It was observed from this study that diabetics who have had amputation surgery done are ten times at risk of having a revision amputation done (OR=10.4) compared with non diabetics. This finding was statistically significant ($p=0.002$). Findings by Kanade et al³ also agreed with the fact that revision amputation is commoner among patients with diabetes (46%) compared with trauma where he recorded lower rate (30%). Factors such as vasculopathy, infection and refusal to consent for appropriate level of amputation may be part of the reasons why revision was commoner among diabetic group.

Stump gangrene was the commonest indication for revision amputation in our series. This finding is in contrast with the result obtained by Loro et al⁴ who found that of the cases with stump defects responsible as indication for their revision amputation surgeries, 15% of these stump defects were due to stump gangrene unlike in 35% of cases which were due to infection in their series. A good proportion of our patients were not able to afford the various investigations required to determine the level of viability of the limb and their primary surgery were based on clinical ground only. Hence, it is possible that appropriate level of amputation was not correctly identified from outset hence the stump gangrene.

It is interesting to know from this study that there appears to be an increase in the number of revision amputations in recent times and prevalence of revision in last 5 years of the study was 16.22% as against 3.45% revision rate recorded in the first 10 years of the study. This trend may be due to the rise in prevalence of diabetics in our country from 2.2% in 1997 to 4.04% in 2011^{5,6}. Various reasons have been adduced for this trend, among which is the fact that diabetics now live longer because of improved level of care. There is also increase in obesity and sedentary lifestyle⁷. Refusal to consent to proposed level of amputation may be another reason, since consenting to such ablative procedures is a difficult choice to make, and when they are made, patients will usually opt for a lower level. This finding underscores the importance of effective communication with patients being prepared for amputation so that they can make better and informed choice. All the patients however had good outcome and were ready for fixation to prosthesis.

Conclusion

Patients with diabetes are at higher risk of having revision amputation. All patients should be thoroughly counseled prior to primary amputation so that they can take decisions that will likely reduce the risk of revision amputation.

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