Current Trends in Indications and Epidemiological Characteristics of Amputations in Nigeria

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Abstract

Background: Recently, we have witnessed a surge in the population of Diabetics and of course in the cases of Diabetic Foot Syndrome (DFS) requiring amputation. However, accepting amputation is difficult for patients and this has become a family or community decision to undergo amputation despite being a life-saving procedure in most cases. Some patients have preferred to die with their gangrenous limbs in the face of ascending severe foot infection and septicemia rather than have an amputation.

Aim: This study seeks to identify the current indications for amputation and its epidemiological characteristics in our hospital and by extension, our local community. Perhaps, this can be extrapolated and communicated as a Public Health warning and strategy to control the incidence, prevalence, and devastating effects of Amputation in our community.

Methods: It was a descriptive, quantitative, and prospective study of the indications and epidemiological characteristics of Amputations in Uyo, Niger Delta region of Nigeria. This was done between the periods of January 2018 to December 2019 amongst patients who underwent Amputation at the University of Uyo Teaching Hospital, Uyo, Nigeria.

Results: We did a total of 44 unilateral amputations of both upper and lower extremities. The age range was 19 to 71 years. The average age was 48.5 years they were 21 males and 23 females giving a Male: Female ratio of 1:1.1. The 4th to 6th decades of life had the highest number of amputations with a peak in the 5th decade. Diabetic Foot Gangrene (DFG) contributed the majority of 25 amputations (56.8%), most of which were in the 4th to 6th Decades, 23 (52.3%). They were 14 females (31.8%) and 11 males (25.0%) with DFG. Trauma contributed 14 amputations (31.8%), and most were in the 2nd to 4th decades of life but more were males 10 (22.7%) while females were 4 (9.1%). Fracture-Traditional BoneSetter-Gangrene (F-TBS-G) and Peripheral Arterial Disease each contributed 2 amputations (4.5%).

Conclusion: The commonest indication for amputation was Diabetic Foot Gangrene (DFG) affecting patients in the 4th to 6th decades of life while Trauma, the 2nd commonest, affected patients in the 2nd to 4th decades of life. Therefore, in the face of the increasing prevalence of Diabetes in our society, Public Health measures aimed at early diagnosis and management of Diabetes as well as prevention of Trauma will reduce the rate of amputations, its attendant morbidity, and negative economic implications in our society.
Keywords: Amputations; Current trends indications; Epidermiology

Introduction

Amputation is the removal of a whole or part of a limb by cutting through bone or joint [1]. Cutting through the joint will be more specifically referred to as disarticulation. Contemporary orthopaedic practice in our environment is associated with amputations as the reason for limb loss. Amputations, on the other hand, are not viewed as a life-saving measure in the face of serious threats to life from ascending severe limb infections or a measure to remove a dead or useless limb in crush limb injuries.

Our society views amputations as a failure of contemporary orthopedics practice rather than the failure of traditional bone setting even in cases in which these patients were treated by a Traditional Bone Setter (TBS) before developing gangrene. They would hardly associate limb loss following amputation with the severity of injuries or other pathologies.

It is increasingly difficult to convince patients to have amputations as a life-saving procedure as this decision is now a family or community decision in some cases. Some patients prefer to die with their gangrenous or severely infected or crush injury limbs rather than have amputations and live.

In developing countries, it is said that the advance impact of Major Lower Extremity Amputations (MLEA) is increased because of limited resources and increased prevalence of diabetic related foot complications [2]. The advanced social implications and the effects on life and self-image are devastating [2]. Many workers agree that the magnitude of this problem is anticipated to increase with the aging global population and increased prevalence of diabetes [2, 3, 4, 5]. More so, diabetes has become an epidemic health problem with a 32% increase globally over the past decade [2, 6]. The incidence of DFS globally is 2% in most developed countries [2, 7, 8, 9] and in Nigeria, the prevalence is reported to be 11-32% amongst hospitalized patients [10]. In the last two decades, Nigeria has witnessed a more than 100% increase in the prevalence of diabetes from 2.2% in 1997 to nearly 6% in 2015 [10, 11]. It is said that Nigeria, the most populous country in Africa has the greatest burden of diabetes within the sub-Saharan sub-continent [10, 12]. Ugwu et al concluded that the burden of diabetic foot ulcer in Nigeria is very high, reiterating the major gaps to include low foot care knowledge among diabetic patients, overdependence on self-medication and unorthodox medication following the development of foot ulceration, late hospital presentation, and high amputation and mortality rates [10]. At the moment, more than 150,000 Major Lower Extremity Amputation (MLEA) procedures are performed annually worldwide [2, 13].

As amputation has become a common term among our locals, it is important to know the current indications for amputation as well as the epidemiological background of patients who undergo amputation. Perhaps, this will form the basis for a public health strategy aimed at reducing the rate of amputations, its attendant morbidity, and negative economic implications in our society.

In developed countries, peripheral vascular disease is said to be the commonest indication for amputation [1, 2]. However, the most common indication for amputation as defined by the 9th edition of the International Classification of diseases, was Diabetic Foot Syndrome (DFS) (72.9%), followed by lower limb ischaemia (27.1%) [2]. In Nigeria, Trauma and Traditional Bone Setter Gangrene (TBSG) are said to be the leading indications for amputations [1, 14, 15, 16, 17].

We set out to find the current trends in indications for amputation in Nigeria and its epidemiological background. University of Uyo Teaching Hospital is located in Uyo, the capital city of Akwa Ibom State in the Niger Delta region of Nigeria where about 6.5 million people reside. It is a referral center that provides specialist medical services to this population and more, in this region of Nigeria.

We carried out a 2-year prospective and descriptive study to identify the indications for amputation as well as the epidemiological characteristics which have shown a new trend in Nigeria.

Patients and Methods

A prospective and descriptive study was done for 2 years from January 2018 to December 2019 which included all patients who had any form of amputation. Data collected included age, gender, occupation, monthly or estimated monthly income, indications for amputation, level of amputation, complications of amputation, type of injury sustained before amputation, and treatment by traditional bone setters before amputation. Data were analyzed using Microsoft Excel.

Results

We carried out 44 unilateral amputations (including both upper and lower limb amputations). The age range was 19 to 71 years. The 4th to 6th decades of life had the highest number of amputations 29 (65.9%). The peak age group for amputation was the 5th decade 13 (29.5%) (Figure. 1). The average age was 48.5 years. Twenty-one males (47.7%) and 23 females (52.3%) were amputated giving a male to female ratio of 1:1.1 (Figure. 2). DFG contributed the majority of 25 (56.8%) amputations out of which 14 (31.8%) were females and 11 (25.0%) were males. Trauma contributed 14 (31.8%) amputations coming second to DFG and most were in the 2nd to 4th decades of life (10), (22.7%). Trauma had more males (10), (22.7%) than females (4), (9.1%). Fractures/ gangrene caused by traditional bone setter (#-TBS-G) and Peripheral Arterial Disease (PAD) each contributed 2 amputations (4.5%) while tumour contributed just 1 (2.3%) amputation (Figure. 3).

The commonest level of amputation was Below Knee Amputation (BKA) 31, (70.5%) and DFG contributed 24, (54.5%) of this number. This was followed by Above Knee Amputation (AKA) 5 (11.4%) and above elbow amputation 3 (6.8 %). The majority were lower limb amputations 39 (88.6%) while upper limb amputations were 5 (11.4 %). It is worth noting that upper limb amputations were indicated by trauma or #-TBS-G (Table 1).
Figure 6: Postsurgical photograpgh showing wide excision of mass located in retromolar área.

Discussion

These type of tumours are very rare they comprise only 5% of neoplasms and are seen in 0.4-2.6 for every 100,000 cases around the world, the mucoepidermoid tumour affects parotid and minor salivary glans in adults and is mostly seen in women and young adults, most to of the cases arise in the parotid gland with this case accounting for only 2-4% of the cases because it was seen in the submandibular gland, this patient is currently under treatment he was performed two surgeries for removal of ganglions locanated in neck and in the submandbullary gland, highes prevalence for this type of tumour is around the fifth decade of life and they can be asymptomatic like in this case with the patient having few to no symptoms. It has a puripotent cell origin and as we mention can be classidief into three stages [3].

References

### Table 1: Level of Amputation

<table>
<thead>
<tr>
<th>Level of Amputation</th>
<th>Female</th>
<th>Male</th>
<th>Total (R)</th>
<th>Total (L)</th>
<th>Grand Total</th>
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<td></td>
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</tr>
<tr>
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<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
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<td>3</td>
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<td></td>
</tr>
<tr>
<td>BKA</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
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<td>1</td>
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<tr>
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<td>1</td>
<td>1</td>
<td>1</td>
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</tr>
<tr>
<td>Toe/Amp</td>
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<td>1</td>
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</tbody>
</table>

**KEY: LEVEL OF AMPUTATION**

- A/E: Above Elbow Amputation
- Knee/Dis: Knee Disarticulation
- BKA: Below Knee Amputation
- Symes/Amp: Symes Amputation

### Discussion

The age range of 19 to 71 years is comparable to the result obtained by Berhe et al [18] in Ethiopia (3-95 years). Most of the young patients (22.7%), had amputations due to trauma while the older patients (54.5%), were indicated mainly by DFG as found by other workers in Nigeria [1, 14, 15, 16, 19].

Our average age of 48.5 years is similar to the study of Berhe et al [18] at Ayder Referral Hospital in Ethiopia (40.6 years) but at variance with studies done in other developing countries of Jordan (62.9 years) [2], India [20], Tanzania [21] whose average age for amputation was higher. The explanations for this lower average age in our series are because most of our amputees were diabetics who developed gangrene in their fourth decade of life. They were either case of early unset diabetes or those with late unset diabetes who never had any form of hospital care or sugar control. They, therefore, presented for the first time to a hospital with diabetic complications of the foot requiring amputation. Additionally, the ban in the use of motorcycles for commercial transportation within the Uyo metropolis and the multispecialty nature of our hospital as suggested by Ajibade et al [1] has ensured that we now have more amputations indicated by DFG than trauma. This finding is at variance with that of other authors in Nigeria [1, 2, 14, 15, 16, 22, 23, 24].

In our study, we found more females (52.3%) undergoing amputations than males (47.7%) giving us a male to female ratio of 1:1.1. This is at variance with findings of other Nigerian authors [1,17,22,25] and that of Berhe et al in Ethiopia [18] 3.6:1, (78.2% males), and Chalya et al [21] in Tanzania 66.7%. Qusai et al in Jordan (61.4% males) and several other authors the world over also
found more males [6, 26, 27, 28, 29], than females. However, a study done in 2010 in Germany found that more amputations were done in females than males [30]. Majority 14, (31.8%) of these females in our series had amputations due to DFG. We also had more females than males having amputation indicated by peripheral arterial disease (2 females, no male), #—TBS-G (2 females, no male), and tumour (1 female, no male). Women are more religious and are more likely to have poorer earning power than males. This predisposes them to stick more to religious, traditional, or other unorthodox means of care than hospital care. Control of diabetes is, therefore, poorer amongst women and late presentation in the case of PAD, crush injury of the limbs or severe trauma, and treatment by traditional bone setters are some of those factors responsible for a higher number of these indications for amputation amongst females. Again, decision making in our community is done by any other individual but not the females. Therefore, when they suffer limb-threatening ailments, the decision to seek medical care is taken by someone else. Where there is poor economic power amongst the females, there is a corresponding increase in religious inclination which is compounded by unfavorable decision-making process which in turn makes hospital or medical care the last port of call. In our community, health insurance is at its lowest ebb in terms of availability and access. Medicare is therefore on a cash-and-carry basis.

We observed a bimodal distribution pattern (Fig. 1) with two peak age groups. The early peak of amputations in the 2nd to 4th decades of life was indicated by trauma 10 (22.7%) which is reported by most Nigerian authors [1, 14, 15, 16, 23]. Younger patients are more active and travel more by road. They are more likely to be involved in several legitimate (economic) and illegitimate (risky) behaviors that expose them to trauma. The second peak of amputations in the 5th decade was due mainly to DFG 11 (25%) as reported by Qusai et al [2].

DFG contributed the majority of 25 (56.8%) of amputations in our series. This is at variance with or much higher than several Nigerian studies [1, 14, 15, 16, 19, 22, 23] which reported 14.1% - 29.3% between 2001 and 2005 where trauma was a leading indication for amputation. It also varies with reports by other authors in Africa where trauma is also a leading indication for amputation [18, 21] and the developed countries where PAD is the commonest indication for amputation [2, 28, 31, 32, 33]. It, however, agrees with reports from studies in South Korea [34], Jordan [2], and other developing countries [20, 21, 24, 35, 36].

Diabetes, as already mentioned, has become an epidemic health problem with a 32% increase in incidence [2, 6] and prevalence rate globally [2, 3, 4, 5]. In Nigeria, the prevalence is reported to be between 11 - 32% amongst hospitalized patients [10]. In the last two decades, Nigeria is said to have witnessed more than 100% increase in the prevalence of diabetes from 2.2% in 1997 to nearly 6% in 2015 [10, 11] and as the most populous country in Africa, it has the greatest burden of diabetes within the sub-Saharan sub-continent [10, 12]. This heavy burden is compounded by the poor control of diabetes in our communities as patients characteristically present late to hospitals for the first time with foot complications including gangrene. Refusal to attend a hospital for diagnosis and control of diabetes is related to our cultural and religious beliefs. Our people prefer to attend traditional healing homes, spiritual houses, and other unorthodox centers for treatment rather than come to our hospitals.

Our cultural and religious beliefs have contributed in no small measure to poor control of diabetes in Nigeria. Patients, therefore, make their first presentations to our hospital as diabetics with foot gangrene after attempts at traditional medical treatment, spiritual treatment, or other measures. Qusai et al [2], in their work, opined that DFG has distinct crural vessel involvement and a rapidly progressive clinical course which might explain the high proportion of Below Knee Amputations in DFG in this series. Additionally, with the ban in the use of motorcycles in our metropolis for commercial transportation in 2012, there has been a marked reduction in crush injuries to the lower limbs. Therefore, the contributions of trauma and F—TBS-G to amputations have also correspondingly reduced in our community.

The multispecialty nature of our hospital as suggested by Ajibade et al [1], where there is a higher pool of diabetic patients, has added to the higher number of amputations indicated by DFG than trauma unlike other studies from Nigeria [1, 14, 15, 16, 22, 23]. However, reports from other Nigerian multispecialty centers in 2001 [19], 2004 [14], and 2005 [22] where there is also a higher pool of diabetics treated by endocrinologists showed lower contributions by DFG (14.1 – 29.3%) to amputations. This gives much understanding to the reason trauma 14 (31.8%) and #—TBS-G 2 (4.5%) have come a distant second and third commonest indications for amputation in our series which varies from other studies in Nigeria where trauma was the commonest indication for amputation [1, 14, 15, 16, 22].

In a review of Nigerian data on amputation published over a 15-year period in 2007, it was concluded that trauma was the commonest indication in Southern Nigeria (South-West and South-South regions) whereas complications of TBS intervention was the leading indication in Northern and Southeastern Nigeria [1,23]. These studies have however added greater use of motor vehicles [23] or a high volume of trauma patients in their study center which is a trauma center [1] as the reason for trauma being the commonest indication for amputation. Most of our patients who had amputations from trauma were in the second to fourth decades of life, 14 (31.8%), and most were males, 10 (22.7%) compared to 4 females (9.1%). Ajibade et al[1] found similar results in his study in the year 2010 in which his peak age of 30 - 39 years for amputations were mainly trauma patients, most of whom were males. He [1] opined that young males are more involved in trauma because they travel more frequently and are more likely to be involved in risky behaviors than females. He further lamented the less optimum contributions to a developing economy like Nigeria of this productive age group with the attendant physical and psychosocial disability associated with amputation [1]. This could be made worse by limited resources, reduced capacity to work, quality of life, poor self-image, and poor availability and accessibility of Prosthetic technology [2].

Fracture-Traditional Bone Setter-Gangrene, as we prefer to call it, are gangrenes in patients with or without extremity trauma (irrespective of the severity of the trauma) who were initially
treated by traditional bone setters. This is to underline the significance of traditional bone setters in the management of limb ailments particularly fractures, in our community. It should be noted that most of the patients who had prior treatment by traditional bone setters before developing gangrene had fractures while a small category of these patients may not have had fractures or any form of trauma. Some authors in Nigeria [1, 14, 15, 16] include both crush injuries (which would, in any case, have resulted in gangrene and amputation irrespective of who treated the patients) and gangrene resulting from poor management of extremity trauma or other ailments by traditional bone setters as we did in our series. This may lead to over-estimation of the cases of Traditional Bone Setter Gangrene (TBSG) leading to amputation [1] or under-estimation if this category of indication is included under trauma stating only the proportion of patients that had traditional bone setters intervention [1].

In our study, however, all patients who were returnees of traditional bone setters treatment were included as #-TBS-G because it was difficult to separate those who had severe crush injury (that would have been amputated from gangrene in any case) from those who developed gangrene due to poor management by traditional bone setters of any limb ailment. Despite this, #-TBS-G came a distant third with 2 (4.5%) cases only as an indication for amputation in our series. This finding is different from that of other authors with significant contributions of traditional bone setters gangrene to amputation [1, 14, 15, 16]. As already mentioned, with an increase of DFG, a relative reduction in patients with extremity trauma requiring amputations following the ban in the use of motorcycles for commercial transportation in our community and possibly better contributions and outcome of orthodox orthopedic care in our local community, contributions of traditional bone setters to orthopedic care, gangrene and amputations may well be on the decline.

Peripheral artery disease 2(4.5%) and tumours 1(2.3%), were uncommon in our study. This varies with studies from developed countries where peripheral artery disease is rather the commonest indication for amputation [2, 28, 31, 32, 33]. Frostbite and Atherosclerosis which are common ailments in the developed climes are rare or uncommon in developing countries like Nigeria with a tropical climate and a diet of fresh foods and vegetables. The commonest level of amputation in our series is below knee amputation 32 (72.7 %), followed a distant second and third by above knee amputation 4 (9.1%) and above elbow amputation 3 (6.8%) respectively. This agrees with findings by other authors [1,2,14,15,16,18,19,20,21,22,23,24]. Also, the majority were lower limb amputations 39 (88.6%) while upper limb amputations were 5 (11.4%). Again, this agrees with findings by other authors [1, 2, 14, 15, 16, 18]. It is noteworthy that upper limb amputations were indicated mainly by trauma and #-TBS-G.

Conclusion

This study has shown that DFG is now the commonest indication for amputation in our community contributed mostly by females in their 4th to 6th decades of life.

It is important, therefore, to step up our Public Health strategy to increase awareness of diabetes and expand the same strategy to include hospital treatment of hyperglycemia and other complications of diabetes particularly DFS.

Blood testing for sugar should be routinely done for all patients who are thirty years and above as some of our patients already had DFG in their 4th decade of life. A multidisciplinary approach to the control of diabetes must, therefore, be in place. Much more than banning the use of motorcycles for commercial transportation in our cities, proper placement of road signs, lighting at night, and proper design of our highways are some of the measures to prevent road traffic crashes, crush limb injuries and Amputations.

Compliance with ethical standard:

All ethical standards were duly complied with in conducting this research.

Disclosure of conflict of interest:

The authors declare that they do not have any conflict of interest

References


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