

Pattern of Amputations at the Rivers State University Teaching Hospital, Port Harcourt, Nigeria

Friday Enwumelu Aaron¹, Rex Friday Ogoronte Alderton Ijah^{2*} and Tonye Obene³

¹Associate Professor, Rivers State University (RSU), & Consultant Orthopedic and Trauma Surgeon, Department of Surgery, Rivers State University Teaching Hospital (RSUTH), Port Harcourt, Nigeria

²Senior Lecturer, Rivers State University (RSU), & Honorary Consultant General Surgeon, Department of Surgery, Rivers State University Teaching Hospital (RSUTH), Port Harcourt, Nigeria

³Senior Lecturer, Rivers State University (RSU), & Consultant Orthopedic and Trauma Surgeon, Department of Surgery, Rivers State University Teaching Hospital (RSUTH), Port Harcourt, Nigeria

*Corresponding author: Ijah RFOA, Senior Lecturer, Rivers State University (RSU), & Honorary Consultant General Surgeon, Department of Surgery, Rivers State University Teaching Hospital (RSUTH), Port Harcourt, Nigeria, Tel: +2348033953290; E-mail: rexijah@gmail.com

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Abstract

Background: Surgical amputation has come to stay as a means of eliminating life-threatening disease conditions in a part of the limb and constitutes significant health burden to both the healthcare givers and users. However, its acceptance and rate vary from one part of the world to another. The aim of this study was to evaluate the pattern of limb amputations carried out at the operating theatre of the Rivers State University Teaching Hospital from January 2017 to December 2022.

Materials and Methods: A retrospective observational study at the orthopaedic theatre of a tertiary hospital using registers to extract data on limb amputations carried out over a 6-year period.

Results: The results of surgical limb amputation carried out over a six-year study period revealed that most of the patients (n=172, 90.5%) were within 40 to 79 years of age (mean age was), and the male to female ratio was 1.07: 1. Diabetic foot gangrene was the most common (n=152, 67.25%) indication for limb amputation, followed by trauma (n=33, 14.6%), and the most common type of amputation performed was below-knee amputation (n=122, 53.98%), followed by above knee amputation (n=49, 21.67%).

Conclusion: Diabetic foot gangrene was the most common indication for surgical limb amputation, and a relatively higher age of between 40 to 79 years of age was found among the amputees.

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1. Introduction

Surgical amputation has come to stay as a means of eliminating life-threatening disease conditions in a part of the limb and constitutes significant health burden to both the healthcare givers and users [1,2]. However, its acceptance and rate vary from one part of the world to another. The amputation rate in England was reported to be 5.1 per 100,000 population [3], 22.9 per 100,000 (average age-adjusted) in Canada [4], 2.8 per 100 000 per year in Madrid, Spain [5], and 1.6 per 100,000 in Nigeria [6,7]. In the United States a decrease in lower extremity amputation rate of 7,258 per 100,000 to 5,790 per 100,000 was observed from year 2000 to 2008 [8]. A report from Sri Lanka reveals that most patients who had surgical amputation were in their 7th and 8th decades of life, male to female ratio was 1.7:1, and diabetes mellitus was the most common indication followed by peripheral vascular disease [9]. Similar experience is seen in the United States of America and England where chronic ischemia among diabetics is the common reason for limb amputation [3,10].

The experience in Africa is a little different. Although the most common indication for lower limb amputation in South Africa was diabetes mellitus (followed by atherosclerosis) as seen in a study reported in 2020 [11], trauma is reported to be the most common followed by diabetic foot disease in Nigeria, Ghana, and Senegal [12-14]. Similar findings of trauma predominance were reported in other Nigerian studies [15-17]. In Cote d'Ivoire, trauma also accounted for the burden of surgical limb amputations [14].

However, some changing patterns have been reported [18-21]. The culture or belief system of a people is known to impact in some way on their healthcare, partly accounting for some regional variations in healthcare indices [22,23]. Similar experiences have been encountered and reported on acceptance and conduct of amputation in some settings [24,25]. This impact varies from delay in seeking for the right medical care for medical conditions, to delay in accepting offer of limb amputation when necessary, resulting in higher level of amputation or eventual loss of life for the unfortunate ones. Delay in accepting ablative surgery was reported among diabetic patients with foot disease in Port Harcourt in a study conducted from 1999 to 2003 [26].

Surgical limb amputation is an often-unwelcome solution to a medical problem which most developed societies appear to easily adapt to when necessary. This is rather not the case in our subregion where a combination of ignorance and traditional beliefs deter even the enlightened patient from accepting the offer of therapeutic limb amputation. Disease pattern in different parts of the world shape the common indications for amputation in the local areas of practice. Report of a study carried out in Port Harcourt in a private setting some 19 years ago shows that trauma accounted for 70.5% of limb amputations with a 2.1:1 male dominance, and below knee amputation was the commonest procedure performed [27]. There is need to ascertain this observation in our environment to direct efforts towards prevention, especially as changing patterns have been reported in other parts of Nigeria. This study therefore aims to evaluate the pattern of limb amputations carried out at the operating theatre of the Rivers State University Teaching Hospital from January 2017 to December 2022.

2. Materials and Methods

2.1 Study area

The study was conducted in Port Harcourt, the capital city of Rivers State, Nigeria.

2.2 Study sites

The orthopedic theatre of the Rivers State University Teaching Hospital was the study site.

2.3 Research design

A retrospective observational study.

2.4 Study population

All patients who underwent elective and emergency surgical amputations at the orthopedic theatre of the Rivers State University Teaching Hospital from year 2017 to 2022 were the study population.

2.5 Sample size determination

Total population of patients was used for the study.

2.6 Study instrument

A proforma was developed to capture data from the operating theatre register of amputations carried out for emergency and elective orthopaedic cases.

2.7 Study variables

Demographic characteristics of orthopaedic amputations, prevalent disease condition requiring amputations, and level of amputations.

2.8 Data analysis

Data was entered in an Excel spread sheet, formed into tables, and expressed as percentages of mean \pm standard deviation.

2.9 Validity/Reliability of instrument

The study instrument was scrutinized by all authors before use.

3. Results

The results of surgical limb amputation carried out over a six-year study period are presented.

TABLE 1 shows the age distribution of patients. Most of the patients (n=172, 90.5%) who had amputation were within 40 to 79 years of age. and the mean age was

TABLE 2 shows the sex distribution of patients who had amputation. The male to female ratio was 1.07: 1.

TABLE 3 shows the indications for limb amputation among the patients. Diabetic foot disease was the most common (n=152, 67.25%) indication for limb amputation, followed by trauma resulting from road traffic accident or gunshot (n=33, 14.6%).

The level of limb amputation (Type of Surgery) is shown in TABLE 4. The most common type of amputation performed was below knee (trans-tibial) amputation (n=122, 53.98%), followed by above knee (trans-femoral) amputation (n=49, 21.67%).

TABLE 1. Demographic Data - Age Distribution (n=226).

S/N	Age Range (Years)	Total	Percentage (%)
1	0 - 9	2	0.88
2	10 - 19	11	4.86
3	20 - 29	14	6.19
4	30 - 39	18	7.96
5	40 - 49	38	16.81
6	50 - 59	38	16.81
7	60 - 69	55	24.33
8	70 - 79	41	18.14
9	≥80	9	3.98
Total		226	100
Mean Age:			

TABLE 2. Demographic Data - Sex Distribution (n=226).

Sex	Number	Percentage (%)
Male	117	51.76
Female	109	48.23
Total	226	100
Male to Female Ratio=1.07:1		

TABLE 3. Indications for Amputation (n=226).

S/N	Pathologies	Total	Percentage (%)
1	Diabetic Foot	152	67.25
2	Trauma (Road Traffic Accident/Gunshot)	33	14.60
3	Infections (Sepsis)	20	8.84
4	Tumour (Malignancy)	11	4.86
5	Vascular Disease	7	3.10
6	Congenital (Polydactyly)	2	0.88
7	Others	1	0.44
Total		226	100

TABLE 4. Level of Limb Amputation / Type of Surgery (n=226).

S/N	Level of Amputation	Total	Percentage (%)
1	Phalanges (Finger)	13	5.75
2	Metacarpals	-	-
3	Carpal (Hand)	-	-
4	Below Elbow (Trans-radial) Amputation	3	1.37
5	Above Elbow (Trans-humeral) Amputation	8	3.54
6	Arm	-	-
7	Shoulder	-	-
8	Hip	-	-
9	Above Knee (Trans-femoral) Amputation	49	21.67
10	Trans Knee TKA	1	0.44
11	Below Knee (Trans-tibial) Amputation	122	53.98
12	Ankle	-	-
13	Tarsal (Foot)	11	4.85
14	Tarso-Metatarsal (Ray Amputation)	15	6.63
15	Metatarsal	-	-
16	Phalanges (Toe)	4	1.77
Total		226	100

4. Discussion

Trauma was often reported as the most common indication for limb amputation in most African countries including Nigeria [12-17]. However, some changing patterns have been reported, that appear to be similar to what is observed in western countries [18-21]. The findings of our study appear to be in the direction of changing patterns, as the majority (84.05%) of patients who had limb amputations were within 30 and 79 years of age. Unlike an earlier Port Harcourt study where majority of the cases

were between second and fourth decades [27], and a similar study in Lagos Nigeria (reported in year 2009) where peak age was among younger population [15], 76.09% of amputation cases in this study were between the 4th and 7th decades. However, the earlier Port Harcourt study was conducted among patients in private specialist center before the ban on use of commercial motorcycles in the city and environs while our study was done in a public (government-administered) tertiary health facility with variety of referrals from wider socio-economic strata within the society after the ban on commercial motorcycles in the city. There were relatively more male than female patients (ratio 1.07: 1) who had limb amputations. Male preponderance among the study population is however, a common finding in most studies [15,27].

Our study shows that diabetic foot gangrene was the most common indication (67.25%) for limb amputation, followed by trauma - 14.6%. This also suggests a change in pattern, as an earlier study done in a private specialist health facility in Port Harcourt in year 2003 [27], and another in Lagos Nigeria published in 2009 [15], had reported predominance of trauma as the most common indication for extremity amputation. Another study carried out in south-western Nigeria also revealed higher diabetic amputation occurrence [28]. This latter study was published in the year 2022.

Although, there are still some recent African reports where trauma dominated as reason for amputation [8], yet some other recent African studies reported in favor of diabetes mellitus as the most common indication for limb amputation [29-31], higher risk of trauma being the indication for amputation in patients younger than 65 years was reported (in Togo), while diabetes mellitus was a more prevalent indication in older age group [32]. Women in another report were involved in diabetes-related amputations than males [33]. Our finding of diabetic foot gangrene as being the commonest indication for limb amputation is similar to findings from studies in Sri Lanka [9], and the United States of America where complications of diabetes mellitus predominate [10].

Below knee amputation was carried out among 53.98% of the patients, hence being the most commonly done amputation. This was followed by above knee amputation carried out among 21.67% of patients in the study. Our finding differs from a similar study done in Kano Nigeria where above knee amputation was more common [7]. Another study reported in 2004 in Jos Nigeria also had above knee amputation as the commonest [17]. However, our study share similarity with the findings of a Makurdi Nigeria research where changing patterns were reported with below knee amputation being common [18]. Similar findings were seen in South-Eastern Nigeria [21], North-Western Nigeria [34], some other parts of Nigeria [35], and in some other African reports [14,20,36]. Generally, the most common causes leading to amputation are diabetes mellitus, peripheral vascular disease, neuropathy, and trauma. The foot and legs, among others, being farthest from the heart and therefore potentially likely to have less blood flow in disease states, are the more common targets of likely complication from these disease conditions. This may partly explain why below knee amputation is commoner in these patients.

5. Study Limitations

This is a single-center study with data (secondary) obtained retrospectively from hospital records. These may constitute limitations of this study.

6. Conclusion

The retrospective study of surgical limb amputation carried out over a six-year study period shows a change in pattern of age distribution and the most common reason for amputations. Diabetic foot gangrene was the most common indication, and the majority of the patients were between 40 to 79 years of age. Male preponderance was found, and below-knee amputation was the commonest amputation carried out in our center.

7. Recommendation

There is need to intensify early diagnosis and care of diabetic foot disease to forestall the morbidity of this disease condition, especially as a rising pattern has been observed. Rehabilitative measures should be put in place to improve the quality of life of these amputees. This may encourage others for whom amputation may be recommended not to decline such offers.

8. Acknowledgement

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9. Ethical Statement

The approval of the Research Ethics Committee of the Rivers State University Teaching Hospital was obtained before commencement of study.

10. Study Funding

The study was self-funded by the researchers.

REFERENCES

1. Sahu A, Sagar R, Sarkar S, et al. Psychological effects of amputation: A review of studies from India. *Ind Psychiatry J.* 2016;25(1):4.
2. Cavanagh SR, Shin LM, Karamouz N, et al. Psychiatric and emotional sequelae of surgical amputation. *Psychosomatics.* 2006;47(6):459-64.
3. Moxey PW, Hofman D, Hinchliffe R, et al. Epidemiological study of lower limb amputation in England between 2003 and 2008. *J Br Surg.* 2010;97(9):1348-53.
4. Imam B, Miller WC, Finlayson HC, et al. Incidence of lower limb amputation in Canada. *Can J Public Health.* 2017;108(4):374-80.
5. Unwin N. Epidemiology of lower extremity amputation in centres in Europe, North America and East Asia. *J Br Surg.* 2000;87(3):328-37.
6. Thanni L, Tade A. Extremity amputation in Nigeria - a review of indications and mortality. *Surgeon.* 2007;5(4):213-7.

7. Bello B, Abdullahi N. Influence of amputation type on activity limitation, participation restriction and quality of life among amputees in Kano, Nigeria. *Arch Physiother Glob Res.* 2018;22(3).
8. Jones WS, Patel MR, Dai D, et al. Temporal trends and geographic variation of lower-extremity amputation in patients with peripheral artery disease: results from US Medicare 2000-2008. *JAAC.* 2012;60(21):2230-6.
9. Ubayawansa D, Abeysekera W, Kumara M. Major lower limb amputations: experience of a tertiary care hospital in Sri Lanka. *J Coll Physicians Surg Pak.* 2016;26(7):620-2.
10. Kalbaugh CA, Strassle PD, Paul NJ, et al. Trends in surgical indications for major lower limb amputation in the USA from 2000 to 2016. *Eur J Vasc Endovasc Surg.* 2020;60(1):88-96.
11. Khan MZ, Smith MT, Bruce JL, et al. Evolving indications for lower limb amputations in South Africa offer opportunities for health system improvement. *World J Surg.* 2020;44(5):1436-43.
12. Nwosu C, Babalola MO, Ibrahim MH, et al. Major limb amputations in a tertiary hospital in North Western Nigeria. *Afr Health Sci.* 2017;17(2):508-12.
13. Kuubiere C, Alhassan A, Amalba A. Indications and Complications of Limb Amputation in Tamale, Ghana. *J Life Sci Res.* 2015;2(4):81-5.
14. Sié Essoh JB, Kodo M, Djè Bi Djè V, et al. Limb amputations in adults in an Ivorian teaching hospital. *Niger J Clin Pract.* 2009;12(3):245-7.
15. Obalum D, Okeke G. Lower limb amputations at a Nigerian private tertiary hospital. *West Afr J Med.* 2009;28(1):24-7.
16. Ogundele O, Ifesanya A, Oyewole O, et al. Major limb amputations at a teaching hospital in the sub-Saharan Africa: Any change in trend? *East Central Afr J Surg.* 2015;20(1):140-5.
17. Kidmas A, Nwadiaro C, Igun G. Lower limb amputation in Jos, Nigeria. *East Afr Med J.* 2004;81(8):427-9.
18. Onyemaechi N, Oche I, Popoola S, et al. Aetiological Factors in Limb Amputation: The Changing Pattern! *Niger J Orthop Trauma.* 2012;11(2):79-83.
19. Akhator A. Pattern Of Lower Limb Amputations In Eku. *Ebonyi Med J.* 2007;6(1):18-20.
20. Weyhee JK, Abubakar MK, Muvunandinda E, et al. Pattern of limb amputations in Liberia. *Ann Afr Med.* 2019;18(4):196-9.
21. Ndukwu C, Muoneme C. Prevalence and pattern of major extremity amputation in a tertiary Hospital in Nnewi, South East Nigeria. *Trop J Med Res.* 2015;18(2):104.
22. Congress EP, Lyons BP. Cultural differences in health beliefs: Implications for social work practice in health care settings. *Soc Work Health Care.* 1992;17(3):81-96.
23. Skinner J. Causes and consequences of regional variations in health care. In: Pauly MV, McGuire TG, Barros PP, editors. *Handbook of health economics.* Amsterdam: Elsevier, Netherlands; 2011. 45-93 pp.
24. Aaron FE, Ijah RFOA, Obene T. The orthopedic patient and limb amputation: impact of traditional beliefs on acceptance in Port Harcourt, Nigeria. *Int Surg J.* 2021;8(3):789-94.
25. Udosen AM, Ngim N, Etokidem A, et al. Attitude and perception of patients towards amputation as a form of surgical treatment in the University of Calabar teaching hospital, Nigeria. *Afr Health Sci.* 2009;9(4):254-7.
26. Ekere A, Bob-Yellowe E, Dodiya-Manuel A. Pattern and management approach of diabetic foot disease in a developing country. *Niger J Med.* 2005;14(3):272-5.

27. Ekere A. The scope of extremity amputations in a private hospital in the south-south region of Nigeria. *Niger J Med.* 2003;12(4):225-8.
28. Adedire A, Olarewaju S, Yusuf A, et al. Profile of limb amputations in UNIOSUN Teaching Hospital, South-Western, Nigeria. *Res J Health Sci.* 2022;10(4):338-42.
29. Tamfu NS, Gustave TJ, Ngeh EN, et al. Indications and complications of lower extremity amputations in two tertiary hospitals in the North West Region of Cameroon. *The Pan African Medical Journal.* 2023;44:196.
30. Boateng D, Ayellah BB, Adjei DN, et al. Contribution of diabetes to amputations in sub-Saharan Africa: A systematic review and meta-analysis. *Prim Care Diabetes.* 2022;16(3):341-9.
31. Yempabe T, Salisu WJ, Buunaaim AD, et al. Epidemiology of surgical amputations in tamale teaching hospital, Ghana. *J Med Biomed Sci.* 2021;8(1):34-43.
32. Kouevi-Koko T, Amouzou K, Sogan A, et al. Lower extremity amputations (LEAs) in a tertiary hospital in Togo: a retrospective analysis of clinical, biological, radiological, and therapeutic aspects. *J Orthop Surg Res.* 2023;18:155.
33. Grudziak J. Etiology of major limb amputations at a tertiary care centre in Malawi. *Malawi Med J.* 2019;31(4):244-8.
34. Abbas A, Musa A. Changing pattern for extremity amputations in University of Maiduguri Teaching Hospital, Nigeria. *Niger J Med.* 2007;16(4):330-3.
35. Edomwonyi E, Onuminya J. An update on major lower limb amputation in Nigeria. *J Dent Med Sci.* 2014;13(10):90-6.
36. Hagan R, Kadzi J, Rahman G, et al. Patterns and indications of amputation in cape coast teaching hospital: a four year retrospective review. *J West Afr Coll Surg.* 2018;8(3):45-58.