

Reducing the Menace of Major Lower Limb Amputations in Diabetic Foot Syndrome

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Background: Major lower limb amputations are the commonest form of amputation performed worldwide. Until recently, diabetic foot syndrome is one of the major causes, second only to trauma in the developing countries but in the last few years it has taken the lead. The incidence of major lower limb amputation has been very high in this region of the world compared to developed countries, where most of the amputations due to diabetic foot syndrome had been minor ones. This is due to early presentation and aggressive wound management by the plastic surgeons. We reviewed our protocol so as to elucidate the role of plastic surgery service in reducing the menace of major amputations in patients with diabetic foot syndrome.

Methods: This is a retrospective study comparing the incidence of major lower limb amputations due to diabetic foot syndrome in the 5 years before the availability of plastic surgery service (PSS) and the first 5 years of this service in Irrua Specialist Teaching Hospital, Irrua. All the data were retrieved from the patients' case-notes from the Medical Records Department.

Results: The hospital admission of patients with Wagner's Grade 2 to 5 diabetic foot syndrome has increase significantly from 85 before the plastic surgery service to 167 during the period reviewed. The male to female ratio has reduced from about 3.5:1 to 2.2:1 which indicated that there is increase in female presentation and admission. The number of major lower limb amputations before plastic surgery services was 45, accounting for 53% of all in-patients while it was 40 thereafter accounting for 24%.

Conclusion: The availability of plastic surgery service in the hospital and development of protocol that all patients with diabetic foot ulcers should be co-managed primarily by endocrinologist and plastic surgeon, while the Orthopaedic surgeon is only involved in patients with established osteomyelitis or when all attempts to salvage the limb had failed. This resulted in significant reduction in major lower limb amputation and encouraged hospital presentation of patients.

Keywords: Plastic Surgery, Reduction, Major lower limb amputation, Diabetic foot syndrome.

Introduction

Amputation is one of the ancient surgical procedures that have evolved over time. Historically, the earliest amputations were primarily performed as a form of punishment in many societies and are still being practice today in some primitive cultures¹⁻³. It is hardly surprising therefore that the procedure is looked on by laymen as primitive. Rural people view amputation even worse with a lot of fantasies, helplessness, and mutilation, loss of control, body-image distortion, rejection and death. These all together create anxiety⁴. A major amputation is one that is performed proximal to the ankle or wrist⁵.

The person who has lost a limb must confront not only the physical reality of mutilation but also body-image changes associated with it and the personal meanings they carry and societal acceptance. They are considered as handicapped in most of the developing countries which affected their psyche ⁶.

In Nigeria the traditional beliefs of reincarnation with a missing part or living after death with deformity make it increasing difficult for them to easily accept amputation as a modality for treatment unless they perceive an obvious threat to life. In fact, majority will prefer to die than to have amputation which had made presentation at the hospital very low ^{2,6}.

Diabetes foot syndrome is on the increase worldwide because of globalization and change in the diet of the people of the developing countries to that of the western world leading to upsurge on the incidence of diabetes mellitus. Diabetic foot gangrene has been the leading cause of non-traumatic lower limb amputations, only second to trauma overall, in most of the articles from the developing countries but recently has overtaken trauma ^{2,7-9}. Due to this upsurge in the incidence of diabetic foot syndrome and the associated low rate of consent for amputation surgery, it is very important to change our way of managing these patients in such a way that limb salvage will be the core of the management than major lower limb amputations.

Provision of prosthetics is usually not readily available to these patients in this part of the world, whether due to in-availability of the service for those who can afford it or as a result of abject poverty. Plastic surgery service as the main stay of management in conjunction with the service of an endocrinologist will most likely reduce significantly the need for major amputation in these patients because of the management options available to the plastic surgeons. The options include serial mechanical or chemical debridement, use of appropriate topical agents to control wound infection, skin grafting and flaps.

These options have limited major amputations to the utmost last choice, when all other options have been exhausted. We believe in a protocol in which the management of these patients is primarily under the care of endocrinologist and plastic surgeons, and the inclusion of an Orthopaedic surgeon only when there is osteomyelitis or need for amputation. This protocol has led to significant increase in patients' presentation in our hospital with low incidence of major amputations. This made the management acceptable to most of our patient.

The need to reduce the incidence of major lower limb amputations and improve hospital presentation will improve outcome of diabetic foot syndrome in the developing countries. This will invariably close the gap between us and the developed countries.

Patients and Methods

All patients that were admitted for diabetic foot syndrome in Irrua Specialist Teaching Hospital, Irrua Edo State of Nigeria from October 2004 to September 2009 were reviewed and compared with all patients admitted in the same facility from October 2009 to September 2014. The hospital has well developed Orthopedic, Endocrinology and Plastic surgery units. These units receive referrals from within and outside the State. It is one of the few Teaching Hospitals in Nigeria located in the rural area of the Country. It is located along the busy Benin-Lokoja-Abuja Expressway. Data were retrieved from the patients' case-files from the Medical Records Department which include the demographic indices, grading, treatment modality, and outcome. Data were analyzed comparing the 5 years before availability of plastic surgery services (PSS) and 5 years thereafter, and valid deductions made.

Results

There were 85 patients that entered into the study over 5 years (October 2004 and September 2009) period before the availability of the plastic surgery services in the facility and 167 patients in 5 years period between October 2009 and September 2014. This is about twice increase in hospital presentation of these patients which a significant improvement in their presentation. There were 66 males and 19 females with male to female ratio of 3.5:1.0 in the period before, and there are one 115 males and 52 females in the period thereafter with male: female ratio of 2.2:1.0. as shown in Table 1.

Table 1. Sex Distribution Before and after Plastic Surgery Services (PSS).

Sex	Number of Patients Before PSS	Percentage	Number of Patients after PSS	Percentage
Male	66	77.6	115	68.9
Female	19	22.4	52	31.1
Total	85	100	167	100

Table 2. Age Distribution Before and After Plastic Surgery Service (PSS).

Age (yrs.)	No of Patients Before PSS	Percentage	No of Patients After PSS	Percentage
30-40	-	0	2	1.2
41-50	21	24.7	48	28.7
51-60	33	38.8	72	43.1
61-70	16	18.8	20	12.0
71-80	10	11.8	17	10.2
81-90	5	5.9	8	4.8
Total	85	100	167	100

The age distribution also changes with the introduction of plastic surgery services in our facility. Most of the patients were in the fifth and sixth decade of life. The patient presenting in the middle age were the majority in both period considered. The middle-aged accounted for 54 (63.5%), before plastic surgery services and 120 (71.8%) thereafter. As indicated in the Table 2.

The duration of the diabetes mellitus before presentation at our facility ranges between 2 weeks and 30 years, with a mean of 10 years before and ranges between 1 week and 25 years with a mean of 7 years thereafter. Though there are those who did not know that they have diabetes mellitus until they presented to our facility with the foot lesion. The interval between the occurrence of foot syndrome and presentation to the hospital ranged from 5 days to 2 years (mean of 8 weeks) before and ranged from 5 days to 1year (mean of 5 weeks) thereafter. The Wagner's grading of the diabetic foot syndrome of the patients is as stated below in table 3. Most of the patients present with either grade 3 or grade 4 foot lesions in both periods under study, though the number of patients with grade 5 has significantly reduced following availability of plastic surgery services. Figure 1-4 shows few of the cases. Trauma is the leading predisposing factor in both period being compared, with 57% before PSS and 55% thereafter.

The mode of treatment varied in both study, there are more options with the involvement of plastic surgeons in the management of this patients. More patients who would have had major amputation were offered wound debridement and minor amputation or wound debridement and flap cover, this significantly reduce the need for major amputations. Table 4 shows the different modalities of treatment. The major lower limb amputations done before the PSS were 45 (53%) while those done following the availability of PSS were 40 (24%).

The overall mortality has also dropped from 15.3% to 9%.

Table 3. Wagner's Grading of Patients at Presentation

Grading	No of patients before PSS	Percentage	No of patients after PSS	Percentage
Grade 0	-	-	-	-
Grade 1	-	-	-	-
Grade 2	10	11.8	45	26.9
Grade 3	16	18.8	50	29.9
Grade 4	37	43.5	57	34.2
Grade 5	22	25.9	15	9.0
Total	85	100	167	100



Figure 1



Figure 2



Figure 3



Figure 4

Table 4. Modality of treatment

Treatment modality	No of patient before PSS	Percentage	No of patient after PSS	Percentage
Wound debridement only	18	33.0	46	27.5
Wound debridement + skin grafting	-	-	10	6
Wound debridement +minor amputation	12	14.1	65	38.9
Wound debridement +flap cover	-	-	6	3.6
Major amputation	45	52.9	40	24
Total	85	100	167	100

Discussion

Diabetic foot syndrome is a term use to describe the often severe foot complication of diabetes mellitus as a result of combined effect of peripheral neuropathy, vasculopathy and lazy leucocyte syndrome usually precipitated by trauma in most cases. It often leads to limb amputation and its attendant negative effects. In this study the males are more in both periods compared though there is significant increase in female presentation following availability of PSS in our facility, which is also being involved in the main management of the patients replacing the Orthopaedic surgeon except when major amputation is inevitable. The male preponderance is consistent with findings in most of other studies ^{10,11}. This may be due to the fact that males are most of the time breadwinner of the family and take preference in treatment with respect to family finances. It may also be that they are more involved in manual labours that make them more predisposed to trauma on the foot.

The age range is almost the same in both studies and the middle aged taking the bulk, of the total patients (63.5% before PSS and 71.8% after PSS).The majority of patients presenting with diabetic foot syndrome have Type 2 diabetes mellitus which usually have onset in the fifth decade of life. This may explain the reason why most of patient in the fifth and sixth decade of life. The two patients that presented in the fourth decade had Type 1 diabetes mellitus. There is need to diagnose diabetes mellitus and also foot at risk early, so that these patients can present early. The need to educate the diabetic patient about foot care is very important which supposed to be an integral part of the endocrinologist clinic.

About one quarter of our patient in the period before plastic surgery service had foot gangrene (Wagner's grade 5) and then reduced significantly to about a tenth in the period of plastic surgery. This is less than those found in other studies ^{12,13}. The average interval between the occurrence of the foot lesions and presentation in the hospital was about 7 weeks, the longest being 2 years. This late presentation is due mainly to presentation to a private hospital, alternative medical care provider or self-medication. In similar studies in Trinidad and Tobago, and also Calabar, Nigeria, trauma accounted for 51% and 53% respectively comparable with the figure of average of 55% in this study ^{12, 13, 14}.

Major lower limb amputation has reduced greatly from 53% to 13% following the Plastic surgery services. This is due to other options available to plastic surgeons which are not readily within armamentarium of the Orthopaedic surgeons, who used to be the main unit managing these patients. Most of the patients who could have most likely had major amputation were salvaged with adequate wound debridement, skin grafting or flap cover.

It was also noticed that with the use of some recent dressing materials and agent, the usual progression of the foot lesion was arrested in many of the patients managed by the plastic surgeon. We actually moved away from the usual use of EUSOL to more effective agent like povidone iodine, intrasite gel and honey, either singly or in combination.

Conclusion

We observed that our management protocol has improved the outcome of our patients and increased hospital presentation of patients with diabetic foot syndrome because of the significant reduction in major amputation which is one of the main reasons why these patients shy away from the hospital and preferably present to the alternative medical care providers. We also want to recommend this protocol to other resource poor institutions for possible reduction in major amputation due to diabetic foot problems. Though there is still delay in presentation we believe that as awareness that presentation in the hospital is not synonymous to amputation begins to increase, patients will begin to present earlier.

We want to plead with authority at different levels, if they can reduce cost of management especially in patient with early presentation so as to encourage them and also reduce the burden of amputation in our communities.

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