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Original Research Article

Lower limb amputations: Our experience single centre study

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Abstract

Background and objectives: Major limb amputation is reported to be a major but preventable public health problem that is associated with profound economic, social and psychological effects on the patient and family especially in developing countries where the prosthetic services are poor. Amputation has implications on both mobility and functionality. The purpose of this study was to outline the patterns, indications and short term complications of major limb amputations and to compare our experience with that of other published data.

Material and methods: This was a cross-sectional descriptive study involving all patients who underwent major lower limb amputations at Bowring and Lady Curzon Hospital between March 2008 and February 2016. All patients who underwent major limb amputation were, after informed consent for the study, enrolled into the study Amputation was performed by the attending surgeon who also prescribed the postoperative care of the patient. Patients were followed up till discharge or death.

Results: A total of 162 patients were entered into the study. Their ages ranged between 21–80 years. The most common indication for major limb amputation was diabetic foot complications in 87.6% followed by chronic non healing ulcer and peripheral vascular disease. Above knee amputation was the most common procedure performed in 88.8%.

Conclusion: Complications of diabetic foot ulcers and chronic non healing ulcer were the most common indications for major limb amputation in our environment. The majority of these amputations are preventable by provision of health education, early presentation and appropriate management of the common indications.

Keywords: Above knee amputation, below knee amputation, diabetic foot, peripheral vascular disease, flap necrosis, infection, wound haematoma.

1. Introduction

Limb amputation is one of the most ancient of all surgical procedures with a history of more than 2500 years dating back to the time of Hippocrates .Amputation has been practiced for punitive, ritual and therapeutic reasons including trauma, peripheral vascular disease, tumor, infection and congenital anomalies [1-3]. Amputation is a procedure leading to rehabilitation and return to productivity for the patient disabled by an infected, ulcerated, dangerous or intractably painful limb. The incidences of different pathologies leading to limb amputation have been reported to vary from one place to the other. In developed countries peripheral vascular disease ranks first as cause for amputation whereas trauma, infections, uncontrolled diabetes mellitus and malignancies are the leading cause for amputation in developing countries[4,5]. As societies age, the incidence of diabetes and peripheral artery disease (PAD) increases, along with an increase in patients with risk factors for atherosclerosis.

Despite advancements in the diagnosis and treatment of diabetic foot and peripheral vascular diseases, major lower extremity amputations are still performed at high rates with non-negligible economic burdens.[2]

Per operative morbidity and mortality is high for patients who receive an above-knee amputation (AKA) n relation to below-knee amputation (BKA). Majority of these are at Trans-femoral level (mid-thigh), with the majority of people being over the age of 50 and having existing co-morbidities. Unfortunately, most often patients in developing countries presents late when limb salvage is not a viable option.

The purpose of this study was to outline the patterns, indications and short term complications of major limb amputations and to compare our experience with that of other published data.

2. Methods

2.1 Study design

This was a cross-sectional descriptive study involving all patients who underwent major lower limb amputations at Bowring and Lady Curzon Hospital between March 2008 and February 2016 under unit 1 of the department of General Surgery.

2.2 Study setting

The study was conducted in the surgical wards of Bowring and Lady Curzon Hospital, which is situated in Bangalore city in southern India. It is also a teaching hospital for Bangalore Medical College and Research Centre. It provides services to patients from neighboring towns in Tamilnadu and Andhra Pradesh and those referred from peripheral hospitals.

2.3 Study population

The study population included all patients of all age group and gender who underwent major limb amputations at Bowring and Lady Curzon Hospital within the period of study.

2.4 Selection criteria

Patients of all age group and gender who underwent major lower limb amputation who consented for the study were included in the study. Patients who declined consent and those who were previously operated in other institutions, but required stump revision were excluded from the study.

2.5 Recruitment of patients

Recruitment of patients was conducted after the decision to amputate the limb was made by the attending surgeon. The decision to amputate the limb, indications and levels of amputation was determined by the attending surgeon based on clinical evaluation, radiological investigations (e.g. plain x-rays of the affected limb, Doppler studies etc.) and histopathological investigations. Patients were screened for inclusion criteria and those who met the inclusion criteria were offered explanations about the study and requested to consent before being enrolled into the study. Amputation was performed by the attending surgeon who also prescribed the postoperative care of the patient. Major limb amputation was defined as any amputation at or proximal to wrist and ankle. In case where conversion to a higher level was required, the amputation level was recorded as the new revised level. Patients were followed up till discharge or death. Patients who developed complications were managed appropriately.

2.6 Data collection and analysis

Data were collected using a pre-tested, coded questionnaire. Data included in the questionnaire were: demographic data (e.g. age, gender, education level and occupation status) and clinical data (e.g. indications, level of amputation, post-operative complications, Length of hospital stay mortality etc.). Data collected were analyzed.

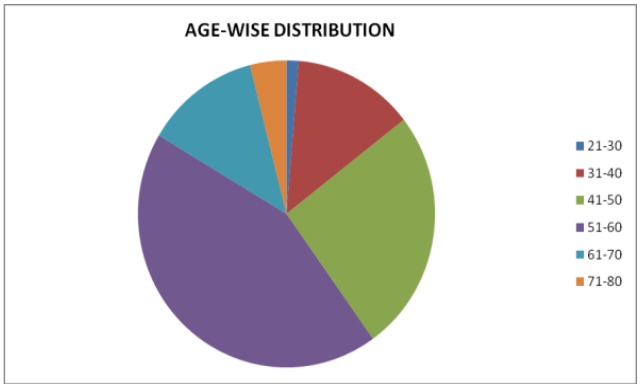
2.7 Ethical consideration

The study was carried out after the approval by the department of surgery and BMC/CUHAS Ethics review board. All patients who met the inclusion criteria were requested to sign a written informed consent for the study.

3. Results

A total of 162 patients underwent major limb amputations during the study period. The patients were aged 21–80 years. The modal age group was 51 to 60.

Figure 1: Distribution of Disease



2. The most common indication for major limb amputation was diabetic foot complications in 87.6% followed by chronic non healing ulcer and peripheral vascular disease.

Figure 2: Major indications of lower limb amputations

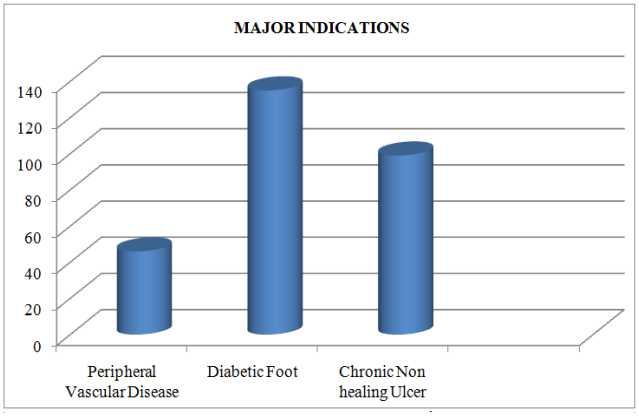
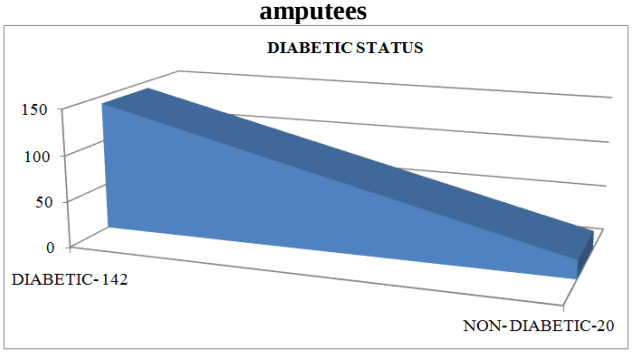


Figure 3: Prevalence of diabetes mellitus type 2 in amputees



3. In the lower limb, the ratio of below knee amputation to above knee amputation was 1:8.

Figure 4: Comorbidities among amputees

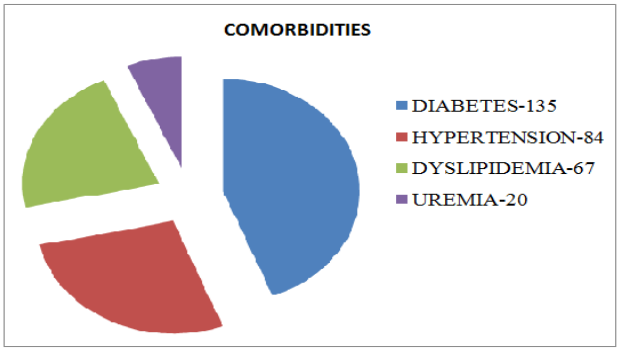
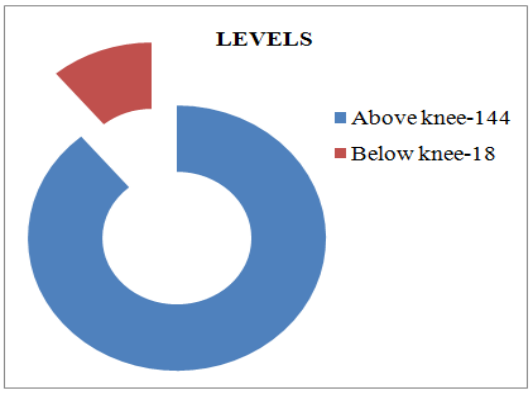


Figure 5: Levels of amputation



4. Surgical site infection (SSI) was the most common post-operative complication accounting for 20.98% of cases. There were a total of 8 deaths giving a mortality rate of 0.05%. The main causes of deaths were complications of diabetes in 62.5% of cases, wound sepsis in 25%, cardiovascular causes 12.5%.

Table 1: Post operative complications

Complications	Frequency	Percentage
Surgical site infection	34	20.98
Revision amputation	2	1.23
Phantom pain	9	5.55
Wound hematoma	7	4.32
Wound dehiscence	5	3.08
Stump gangrene	3	1.85

Table 2: Mortality causes

Cause	Number	Percentage
DM Related	5	62.5
Sepsis	2	25
Cardiovascular	1	12.5
Renal Failure	0	0
Fall and others	0	0

5. Discussion

Since it was first described by Hippocrates in 460–377 BC, limb amputation has been a common surgical procedure performed by orthopedic, general, vascular and trauma surgeons for therapeutic reasons to serve patient's life. However, it is often associated with profound economic, social and psychological effects on patient and their family As amputation indications and patterns vary between hospitals in a country and between countries, this study was undertaken to describe our experiences on major limb amputations in a larger tertiary care teaching hospital and compare the findings with similar studies conducted in other parts of the world with a view to highlighting the variations in the pattern and indications for amputations. This would enable meaningful preventive measures to be proffered.

Prior work has shown that more men than women undergo lower extremity amputation [6], but that women are more likely than men to undergo above-knee as compared with below-knee amputation [7].

Limb amputation is considered the last resort when limb salvage is impossible or when the limb is dead or dying, viable but nonfunctional or endangering the patient's life The loss of a limb by any individual, especially in developing countries where the prosthetic services are poor often has profound economic, social and psychological effects on the patient and their family. Major limb amputations are essentially disfiguring operations that carry a fairly high perioperative mortality and morbidity and persons who have undergone amputations are often viewed as incomplete individuals

Prior studies have evaluated subpopulations of patients, such as studies of outcomes in diabetics only[8,9] and populations that include vascular as well as oncologic and trauma patients[10]. Prior single-institution series that used chart review and included the rates of subsequent amputations range in size from 87 to 277 patients undergoing major lower extremity amputation [11-15].

Limb loss is one of the most physically and psychologically devastating events that can happen to a person. Not only does lower limb amputation cause major disfigurement, it renders people less mobile and at risk for loss of independence. "Major" limb loss is defined as

amputation above the elbow, below the elbow, above the knee, below the knee, or the foot.

Amputation does not mean failure of treatment. A Multidisciplinary approach provides great help towards the post-operative management of an amputee. However, Lower limb amputees typically have reduced mobility which affects their ability to perform daily tasks and to successfully reintegrate into community life. Hence, decision making for an above knee amputation is largely subjective and based on the quality of life for the amputee.

Amputation results from medical, surgical, or psychiatric causes. Each can be devastating and difficult to manage. Psychiatric conditions (involving substance abuse, character disorders, or disorders of thought or mood that predispose to suicide attempts with limb injuries) leading to amputation may be particularly challenging in primary care.

Medical causes of amputation include DM, osteomyelitis, peripheral embolization (from septic, fat, amniotic, or paradoxical emboli), PVD, thromboses (from disseminated intravascular coagulation), thrombocytosis (in hematologic malignancy), necrotizing soft tissue infections (such as necrotizing fasciitis and clostridial "gas gangrene"), and iatrogenic events (as from heparin-induced thrombocytopenia with thromboses). Malignancies, such as malignant sarcomas, may also require amputation.

Surgical causes can be divided into accidental trauma and intentional or combat-related amputations. Accidental trauma is associated with subway and train accidents, work-related construction and factory mishaps, falls, high-voltage electrical burns, and motor vehicle collisions. Combat-related trauma often involves the explosion of landmines and other sources of shrapnel. Traumatic amputations are often linked with intense fear, horror, images of others being injured, and startling sounds that resurface during rehabilitation (even in the absence of full criteria for PTSD)

Mortality following a lower limb amputation is quite high among those whose amputations are of a dysvascular or diabetic etiology. Thirty-day mortality rates range from 6.3 to 42.3 percent [16-18]. One study reported that 25.5 percent of patients with lower limb amputations in Finland died within 2 months of the amputation and nearly 40 percent within 1 year [19]. Studies in the United States show one year survival following lower limb amputation to range from 50-80% depending on the amputation level [16,19-21. Survival rates at 2 to 5 years are also poor, with over 50 percent of patients dying at 2 years and roughly 70 percent by 5 years [12,16-19,22]. Congestive heart failure, renal failure, and liver disease were significantly associated with mortality both in hospital, at 3 months, and at one year among veterans. Metastatic cancer was associated only at 3 months and 1 year [23].

Table 3: Conditions contributing to aetiology of lower limb amputation

Diagnostic description	ICD-9-CM Codes
Chronic Osteomyelitis: chronic osteomyelitis of pelvic region and thigh, lower leg, ankle, and foot	730.15-730.17
Congenital Deformity: transverse deficiency of lower limb, longitudinal deficiency of lower limb	755.31-755.39
Device Infection: vascular device, internal orthopedic device, tissue graft, joint prosthesis	996.1, 996.4, 996.52, 996.62, 996.66, 996.67, 996.69, 996.7, 996.74
Diabetes Mellitus: diabetes mellitus type I with and without manifestations, diabetes mellitus type II with and without manifestations	250-250.93
Local Significant Infection: gangrene, actinomycotic infections, cellulitis, pyogenic arthritis, infective myositis, necrotizing fasciitis	040.0, 395, 440.24, 681.10, 682.6-682.8, 711.06, 728.0, 728.86, 729.4, 785.4
Lower Extremity Cancer: malignant neoplasm of pelvic bones, sacrum, coccyx, long and short bones of lower limb, connective tissue of lower limb including hip, skin of lower limb including hip	170.6-170.8, 171.3, 172.7, 173.7
Previous Amputation Complication: infected amputation stump	997.62
Problems with Peripheral Circulation: atherosclerosis, aortic aneurysm, venous thrombosis, arterial stricture or stricture of graft, circulatory disease, venous insufficiency, organ or tissue replaced by blood vessel, gangrene, vascular complications of other vessels	440.0-441.9, 442.3, 443.1-443.9, 444.0, 444.81, 447.1, 453.8, 459.81-459.9, 557.1-557.9, 785.4, 997.79, 38.48 (procedure), 434 (procedure)
Skin Breakdown: ulcer or decubitus ulcer of lower extremity	440.23, 454.0, 454.2, 707.0, 707.10, 707.12-707.9
Systemic Sepsis: septicemia, gram negative septicemia, E.coli, other type of systemic sepsis, bacteremia	038.11, 038.40, 038.42, 038.8, 038.9, 790.7
Trauma: acute osteomyelitis, closed or open fractures to lower extremities, fracture of one or more phalanges of foot, trauma to AKA or BKA, open wound to lower limb, burns of lower limb, fracture of lower limb, open wound of lower limb, late effects of injuries, poisonings, toxic effects, and other external causes, crushing injury of lower limb	730.05-730.08; 820.8, 821.21, 821.23, 821.30, 823.82, 823.92, 824.1, 826.0, 837.0, 890.1-890.2, 891.1-891.2, 892.1-892.2, 893.1-893.2, 894.1-894.2, 897.0-897.2, 905.4, 928.0-928.8, 945.22, 945.25-945.26, 945.32-945.33, 959.6-959.7

6. Conclusion

Complications of diabetic foot ulcers and chronic non healing ulcer were the most common indications for major limb amputation in our environment. The majority of these amputations are preventable by provision of health education, early presentation and appropriate management of the common indications.

Preventable amputations associated with high-risk diseases are no longer decreasing despite continuing advances in care and education. Good diabetic control and early recognition and management of risk factors for foot complications, measures on prevention of road traffic crashes and community health education to encourage early presentation to hospital will reduce the number of patients undergoing major limb amputations in this region and subsequently reduce the number of amputee.

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