

## Original Research

# Current trends of major lower limb amputations at a tertiary care centre of Jammu, India

Maqsood Mehreen<sup>1</sup>, Ali Nadeem<sup>2</sup>, Bhat Abedullah<sup>2</sup>, Bangroo Firdous A<sup>2</sup>, Dhanda Manjit Singh<sup>2</sup>, Singh Rajinder<sup>3</sup>

<sup>1</sup>Department of Anaesthesiology, Government Medical College Jammu, Jammu & Kashmir, India, <sup>2</sup>Department of Orthopaedics, Shaheed Hasan Khan Mewati Government Medical College, Mewat, Haryana, India,

<sup>3</sup>Department of Orthopaedics, Government Medical College Jammu, Jammu & Kashmir, India

## ABSTRACT

**Aim:** The aim of this study is to look for the current and any changing trends in the major lower limb amputations (LLAs) in the developing countries. **Background:** Amputation is the last treatment option in limbs, which are not salvageable or when the diseased limb poses a threat to the life of the patient. Indications of LLA are many, but trauma is the leading cause of major LLA in the developing nations, while as peripheral vascular disease (PWD) and diabetes is the most common indication in developed nations. **Materials and Methods:** This prospective study was conducted from December 2012 to October 2013 in Government Medical College, Jammu, a tertiary care center of North India. Demographic profile of the patients along with indications, level of amputation, peri-operative complications and additional procedures required in the patients who had major LLAs during the study period were recorded. The date was analyzed by appropriate statistical tests. **Results:** There were 33 major LLAs performed at an average rate of 3 per month. Average age of patients was 43.5 years with 88.87% patients being males. 30.56% amputations were traumatic while as PWD and diabetes was the etiology in 19.44% and 16.67% amputations, respectively. Two patients expired in the post-operative period. Infection of the stump was the most common local complication in the post-operative period. **Conclusion:** Trauma still is the most common cause of LLAs in the developing nations, but amputations for complications of diabetes is on the rise and may be the leading etiology in future.

**Keywords:** Amputation, Buerger's disease, diabetes, peripheral vascular disease

## INTRODUCTION

Amputation of the extremity is one of the oldest surgical interventions that date back to the time of Hippocrates.<sup>1</sup> Amputation is not a failure of treatment rather it constitutes part of treatment when limb is not salvageable. It is indicated when the limb is not salvageable, it is dying or dead, it poses a threat to patients life, or it is viable but functionless.<sup>1,2</sup> Lower limbs have loco motor function and functionless lower limb will interfere with employment of the patient. Dismemberment of the lower extremity has considerable economical, social and psychological impact on the patient and his family, but at the same time is a rehabilitative measure to improve patients' quality of life.<sup>2,3</sup> Lower limb amputation (LLA) can be major or minor. Major LLA is the

one, which is performed at the level of the ankle or above.<sup>4</sup> The most common indication for LLA varies in different parts of the globe, however, trauma and peripheral vascular disease (PWD) including diabetic foot constitutes the major burden.<sup>5,6</sup>

## MATERIALS AND METHODS

This prospective study was done at a tertiary care center of North India from December 2012 to October 2013. Following parameters of all the patients who had major LLA during this period were recorded: Age, sex, occupation, any risk factors for PWD, indication for amputation, level of amputation, any additional procedures required and complications in the

### Corresponding Author:

Dr. Nadeem Ali, Department of Orthopaedics, Shaheed Hasan Khan Mewati Government Medical College, Mewat - 122 107, Nuh, Haryana, India. E-mail: drnadeem@gmail.com. Phone: +911942423211

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peri-operative period. The data collected were analyzed by appropriate statistical tests.

## RESULTS

Over a period of 11 months, 33 major LLAs were performed at an average of 3 per month. Age of the patients ranged from 17 to 70 years with an average age of 43.5 years. 87.88% of the amputees were males. Labor class and farmers constituted 39.4% of the patients (Table 1 and Figure 1).

Trauma was the most common indication for major LLA in our series. Road traffic accident (RTA) was the predominant mode of trauma (Figure 2). Besides there were isolated cases of rail road accident, machine injury, blast injury and heavy sharp injury. PVD and diabetes together was the largest indication group of major LLA. In the PVD group 4 patients were bidi smokers, 1 patient cigarette smoker, 1 patient tobacco chewer and 1 patient had no such history. Duration of consumption of different inhalational forms of tobacco before major LLA ranged from 25 to 35 years with mean duration of  $27 \pm 5.7$  years. Diabetes mellitus had been diagnosed 8-25 years prior to major LLA for diabetic foot with an average of  $15 \pm 7.8$  years. Tumors and infection were the other major indications (Table 2 and

Figure 3). Of the six cases with limb malignancy, in four amputation was the definitive modality of treatment and in

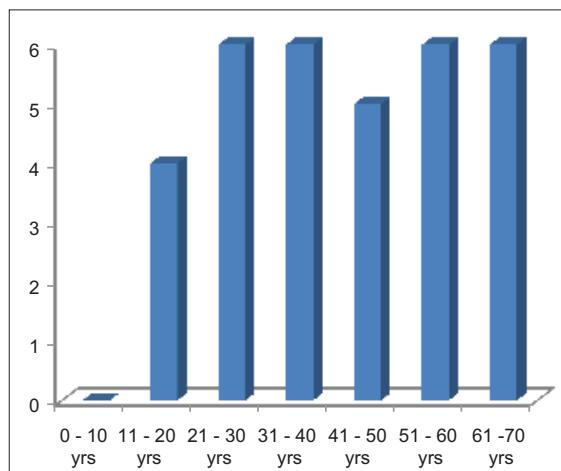
**Table 1: Patient demographics**

Mean age (years)	Total	43.5 $\pm$ 16.5
	Males	44.0 $\pm$ 16.6
	Females	39.7 $\pm$ 17.6
Sex ratio		29:4
Occupation (%)	Laborer	8 (24.24)
	Farmer	5 (15.15)
	Student	5 (15.15)
	Unemployed	3 (9.0)
	Others	12 (36.36)

**Table 2: Indications for major LLA**

Indication	Number of limbs (%)
PVD	
Non-diabetic	7 (19.44)
Diabetic	6 (16.67)
Traumatic	11 (30.56)
Tumor	6 (16.67)
Infection	5 (13.89)
Snake bite gangrene	1 (2.78)

PVD: Peripheral vascular disease; LLA: Lower limb amputations



**Figure 1:** Age wise prevalence of major lower limb amputations



**Figure 2:** Traumatic (road traffic accident) knee disarticulation patient at the time of arrival in the emergency department



**Figure 2:** Chondrosarcoma of foot that required transtibial amputation



**Figure 4:** Synovial sarcoma of knee with pulmonary metastasis (stars) managed by palliative transfemoral amputation

two cases who had pulmonary metastasis, amputation had only palliative role (Figure 4).

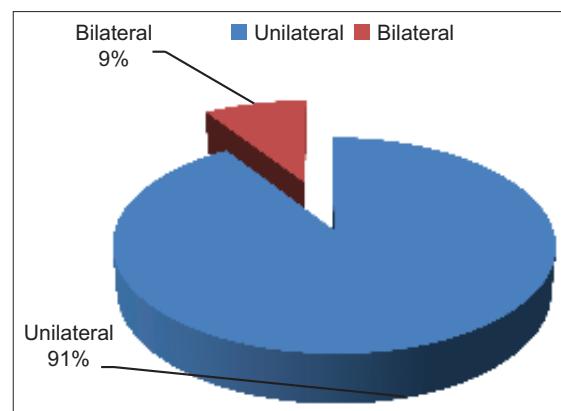
Three patients in our series had simultaneous bilateral major LLA (Figure 5). Two had a bilateral transtibial and one had a bilateral transfemoral amputation. In all of them trauma was the etiology. Besides these, one patient with transfemoral amputation done 1-year back had to undergo contralateral transtibial amputation for the diabetic foot. One patient of RTA required ipsilateral knee disarticulation and transthumeral amputation.

Transtibial amputation was the most common type, followed by transfemoral. All the cases of the the diabetic foot were managed by transtibial amputation (Table 3). However, in two cases revision at the transfemoral level and in one at high transtibial level was required.

Two patients died due to cardiac arrest and sepsis respectively in the post-operative period. Infection was the most common complication that involved four amputation stumps. All the infected stumps required revision amputation at a more proximal level except one that had eumycetoma of the foot managed by transtibial amputation and development of eumycetoma of the transtibial stump. Eumycetoma of the stump in this case was managed by long-term antifungal medication. One case of wound dehiscence was managed by secondary closure. There was one case of below knee stump gangrene that required revision at transfemoral level (Table 4).

## DISCUSSION

Limb amputation is a very common surgical procedure that can be performed by orthopedic, general, vascular or trauma surgeons.<sup>7</sup> However, at our center amputations are exclusively performed by orthopedic surgeons irrespective of the indication. The indications for LLA are many and the pattern varies from place to place.<sup>5,6</sup> The general trend usually is PVD being the leading cause in the developed countries because of increasing life expectancy and sedentary life style.<sup>4,5</sup> Rommers *et al.* in their review of LLA during 1991 and 1992 from 18 hospitals of North Netherlands concluded 90% of patients had vascular and only 3% had traumatic aetiology.<sup>8</sup> In 1997 only 12.2% had traumatic etiology, whereas 72% had diabetic and non-diabetic vascular etiology for LLA in Taiwan.<sup>9</sup> While as in developing nations with lack of proper safety measures, trauma is the predominant factor for LLA. Pooja and Sangeeta in their epidemiological report from January 2008 to January 2010 from Kolkata, India found 70.3% of the amputations were traumatic.<sup>5</sup> Paudel *et al.* in retrospective review from 1997 to 2004 found RTA leading cause accounting for 74.29% of LLA in adult population in a tertiary care hospital of Nepal.<sup>1</sup> In our series, only 30.56% limbs were amputated for trauma and 36.11% limbs for diabetic and non-diabetic vascular etiology. This discrepancy from other studies from developing countries can be explained by rise in diabetic population as well as PVD due to changing life style. A similar series in 2007 from a civil hospital of Karachi, Pakistan had 54.7% of major LLA



**Figure 5:** Pie chart showing percentage of unilateral and bilateral lower limb amputations

**Table 3: Level of amputation**

Level of amputation	Number of limbs (%)	Indications (number of limbs; number of patients)
Transtibial	24 (66.67)	Trauma (7;5) Diabetic PVD (6; 6) Non-diabetic PVD (3; 3) Tumor (2; 2) Infection (4; 4) Snake bite (1; 1)
Transfemoral	10 (27.78)	Trauma (3; 2) Non-diabetic PVD (3; 3) Tumor (3; 3) Infection (1; 1)
Knee disarticulation	1 (2.78)	Trauma (1; 1)
Syme's	1 (2.78)	Non-diabetic PVD (1;1)

PVD: Peripheral vascular disease

**Table 4: Complications in the post-operative period**

Complication	Number of patients (%)
Death	2 (6.06)
Infection of the stump	4 (12.12)
Wound dehiscence	1 (3.03)
Stump gangrene	1 (3.03)

attributed to complications of diabetes.<sup>2</sup> In future diabetes is likely to take over trauma as a predominant indication for LLA in the developing countries like India. Major cause of PVD in the developing countries, especially in South East Asia is consumption of poor quality locally made cigarettes, which contain raw tobacco (bidi).<sup>10</sup> Bidi smoking plays a more important role in development of thromboangiitis obliterans (Buerger's disease) than cigarette smoking.<sup>11</sup> Incidence of burger's disease has already decreased in western world and decreased incidence has also been reported in India and it is believed to be due to change in pattern of smoking.<sup>10</sup>

The age-wise distribution of the patients is uniform from 21 to 70 years in our series. While as a study by Pooja and Sangeeta from Kolkata had age group of 21-30 years, followed by group of 31-40 years as the most common

group that suffered amputations. This can be explained by the fact that 70.3% amputations were traumatic and it the young active mobile population, which is always at high risk of trauma.<sup>5</sup> However, in our series diabetes and non-diabetic PVD together have emerged as single large group (36.11%), followed by trauma (30.56%). Former group accounts for amputations in the elderly patients while as trauma in young active patients and thus a uniform distribution of age-related incidence of amputation in our series (Figure 1). This distribution again points diabetes is still in emerging phase as an etiology for LLA and in near future it may be leading cause of major LLA in the developing countries. Males are always at risk of trauma, especially in the developing countries where male population work outside and thus exposed to the accidental hazards, moreover, males are more prone to risk factors for PVD like cigarette smoking and tobacco chewing in countries of South East Asia than the females, who mostly take care of households and are indoors. This explains why 87.77% of our patients were males. A similar study from Karachi, Pakistan had 86.6% patients as males and 86% male patients in a study from Kolkata, India.<sup>2,5</sup> In a study from northern Netherland only 61% patients were males.<sup>8</sup>

Toe amputation is the most common type of LLA, but among major LLA transtibial is the most common level, followed by transfemoral.<sup>1,3,4,9</sup> Our two-third patients had below knee amputation and nearly one-third had above knee amputation.

Removal of the non-functional or dying or infected limb from the body may improve the quality of life of the patient and help in early ambulation.<sup>3</sup> However, patients with co-morbidities, especially diabetes increases the risk of mortality in the peri-operative period.<sup>6,12</sup> Mortality in the post-operative period in our series was 6%. One patient of PVD with a previous history of cerebrovascular accident died of cardiac arrest and other patient of diabetic foot died of sepsis in the post-operative period.

Wound infection is the most common complication in the post-operative period.<sup>6</sup> In our series, wound infection was the most common indication for revision of amputation at a higher level. Besides we had one case of gangrene of the stump, which required revision at a higher level. Local complications in the post-operative period are most common in PVD and diabetic foot because of poor vascularity, which impair wound healing, and increase risk of infection. Out of six limbs with local complications, three were diabetic and one had PVD.

## CONCLUSION

Trauma still is the leading cause of major LLA in the developing countries, but non-traumatic cases are on the rise. The reason for this change is a rise in the diabetic population in the developing nations. In near future diabetes probably may be the most common etiology for major LLA in developing nations. Patient education regarding lifestyle modification, proper control of diabetes, and foot care will play a pivotal role in prevention of such morbidity in diabetic patients.

## ACKNOWLEDGMENTS

None

## PEER REVIEW

Not commissioned. Externally peer reviewed.

## CONFLICTS OF INTEREST

We do not have any competing interests on financial or academic grounds in the publication of this research.

## FUNDING

Nil

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**How to cite this article:** Maqsood M, Ali N, Bhat A, Bangroo FA, Dhanda MS, Singh R. Current trends of major lower limb amputations at a tertiary care centre of Jammu, India. Inter J Medical Sci Res Prac 2015;2(2):77-80.

**Received:** 30 Jan 2015; **Accepted:** 09 May 2015; **Published:** 30 Jun 2015