



STUDY OF MORTALITY AND MORBIDITY IN BKA PATIENTS

Dr Amruth Gowda	Assistant Professor.
Dr Aprajita Bhandari	Junior Resident.
Dr Naga Suresh Bade	Junior Resident.
Dr Nadimpalli Naga Dharmini	Junior Resident.

KEYWORDS :

INTRODUCTION

The word "amputation" derives its meaning from the Latin word "Amputare" - to cut away. It is defined as the loss or removal of a body part by trauma, disease or surgery and is indicated when part of a limb is **dead, dead** or a **dead loss**.

- A **dead** limb is when arterial occlusive disease is severe, causing infarction of macroscopic tissue, i.e. gangrene.
- A limb is **deadly** when the putrefaction and infection of wet gangrene spreads to surrounding viable tissues leading to cellulitis and toxemia.
- A limb is a **dead loss** when there is relentless severe rest pain without gangrene, and reconstruction is not possible - when a contracture or paralysis makes the limb impossible to use or there is major unrecoverable traumatic damage.

Approximately 5million amputations per year happen in India with mortality rate of 35%-48% in 1st year. Trauma and malignancy are the predominant causes of amputation up to the age of 60 years [2] and the majority in India (70.3%) [3]. In the ageing populations, peripheral vascular disease (27.7%) and diabetic foot (32%) remain the leading cause for amputation [4].

The incidence of amputation is most notably impacted by comorbidities like PVD (atherosclerosis, thromboangiitis obliterans) and diabetes mellitus and these are identified as primary risk factors for lower limb amputations [1].

A lower limb amputation, brings about changes in body structure and influences both physical and psychosocial aspects of life. This is particularly pronounced in the productive age group, leading to challenges in employment, financial stability, and daily activities, thereby affecting quality of life. Late complications, such as depression, stump ulceration, and phantom limb issues, further contribute to increased morbidity.

Despite advancements in diagnostic procedures and peripheral vascular interventions, rates of amputation and subsequent survival have shown limited improvement over the past few decades [5]. This underscores the ongoing necessity for progress in this field, prompting the exploration of more effective methods to minimise the need for amputation and improve overall patient outcomes.

REVIEW OF LITERATURE:

The first recorded instance of amputation as a medical procedure is documented in the Hippocratic treatise. Before that, historical records indicate amputation being employed as a form of punishment in Babylonian practices.

The earliest amputations often resulted in death, and those surviving the operation itself died in the early post-operative period from shock caused by either blood loss or septicemia.

The early amputations were of the guillotine type. The modern concept

of cutting skin, muscle, bone at different levels was popularised by Benjamin Bell of Edinburgh.

Agrawal A. K, et. al conducted a retrospective study of 525 cases of lower limb amputees, from January 1976 to March 1978 and concluded that most cases were in the 30s, male and caused by trauma. [6]

A Meta-analysis of Long-term Mortality and Associated Risk Factors following Lower Extremity Amputation published in 2017 reviewed 365 records, 43 abstracts, 21 full articles, and 16 studies, concluding that overall mortality rates were 47.9%, 61.3%, 7 0.6%, and 62.2% at 1-, 2-, 3- and 5-year follow-ups, respectively. [7]

A systematic review published in The Journal of Foot and Ankle Surgery, examining the 5-year mortality following nontraumatic major amputations of the lower extremity, revealed similar outcomes. That is 40% to 82% mortality over 5 years. [8]

A 5-year retrospective study of factors influencing outcome of major lower limb amputations carried out in, Kempegowda Institute of Medical Sciences Hospital, Bangalore, found that most common indications for amputations were peripheral vascular disease and diabetes. The 1-year mortality rates following lower limb amputations were 14%. [9]

Rosen et al reported the 30 day and 1 year mortality rates following lower limb amputations as 16.7% and 44%, respectively [10]

A retrospective analysis of 26,669 patients, utilising the California Office of Statewide Health Planning and Development (OSHPD) database reported mortality rates at 30 days, 90 days, 1 year, and 5 years were 4.82%, 8.62%, 12.47%, and 18.11%, respectively.

AIM AND OBJECTIVE OF THE STUDY:

AIM:

To observe the mortality rates at various intervals following a below-knee amputation.

OBJECTIVE:

To evaluate long term postoperative outcomes on below knee amputees in terms of

1. Any subsequent hospital admissions
2. Use of prosthesis
3. Independent ability and mobility
4. Mortality and the factors affecting it

MATERIALS AND METHODS:

Source Of Data:

This study will follow up on patients who underwent Below Knee Amputation in the department of General Surgery at Rajarajeswari Medical College and Hospital.

Method Of Data Collection:

Study Design: Retrospective analytical study

Study Period: 5 years (2018 - 2022)

Study Centre: Rajarajeswari Medical College and Hospital

Subject Eligibility:

Inclusion Criteria

Patients above the age of 18 years, who underwent Below Knee Amputation for ischemic, infected or gangrenous lower limb, under the department of General Surgery in Rajarajeswari Medical College and Hospital, Bangalore

Exclusion Criteria

Patients who underwent Below Knee Amputation for trauma or tumours

METHODOLOGY

- The study was conducted on all patients who underwent below knee amputation from the year 2018 to 2022 in the department of General Surgery at Rajarajeswari Medical College and Hospital
- Patients will be excluded from the study based on the exclusion criteria.
- Written informed consent will be obtained from all the patients.
- Baseline demographic data of the patients will be noted according to proforma.
- Detailed history and follow up will be conducted according to proforma.
- The individual data will be documented

Study Assessments Of End Points

- Hospital re- admissions
- Walking or not
- Comfortable with use of prosthesis
- Mortality occurring within 5 years of index visit

RESULTS

After collection of the required data from past records of the patients meeting the inclusion criteria, they were followed up to assess the morbidity and mortality after their below knee amputation and the results were as follows.

A total of 95 patients underwent Below Knee Amputation (BKA) from the year 2018 to 2022 under the Department of General Surgery at RRMCH.

Of this, 65 were Males and 30 Females.

Table 1 AGE AND SEX DISTRIBUTION			
Age distribution	Males	females	Total
18-30	2	0	
31-40	8	4	
41-50	13	7	
51-60	19	2	
61-70	13	16	
71-80	9	1	
>80	1	0	
	65	30	95

A total of 78 had comorbid diabetes mellitus (DM), 25 had peripheral vascular disease (PVD), and 18 had both DM and PVD.

Table 2 Comorbid conditions			
	DIABETES	PVD	BOTH
MALE	38	5	10
FEMALE	22	2	8
TOTAL	60	7	18

Readmissions were seen maximum in the 1st month and 92% of which most were admitted for SSI with background of uncontrolled diabetes.

Table 3 Readmissions according to the time period post surgery	
30 days	13
6 months	1
1 st year	5
2 nd year	1
3 rd year	2
4 th year	0
5 th year	0

Mortality rates are as follows: 27% due to CVA, 32% due to heart disease, and 12% due to sepsis. Deaths from sepsis primarily occur within the first year post-surgery, while deaths from CVA and heart

disease were more in the fourth and fifth years.

30 day mortality was **7.368%**

6 months - **5.263%**

1 year - **9.474%**

2 year - **11.579%**

3 year - **13.68%**

4 year - **12.632%**

5 year - **14.74%**

Table 4 Deaths In Relation To Time Post Surgery	
Time period	No of deaths
30 DAYS	7
6 MONTHS	5
1 YEAR	9
2 YEARS	11
3 YEARS	13
4 YEARS	12
5 YEARS	14

DISCUSSION

In this study, the major proportion of amputees are between 40 - 70 years of age and the younger age groups (18 to 30 years) account for only 2.1%. This grouping is unlike that of Obalum and Okeke, who investigated lower limb amputees and reported that the peak age of amputation was the 21 to 30-year group [13].

It is observed that patients who ambulated and maintained glycemic control had higher survival rate at 3,4 and 5 year, indicating physical activity playing an important role in mortality and quality of life of these patients.

According to the guidelines and gazette notification issued by Ministry of Social Justice and Empowerment in 2001, Permanent Physical Impairment (PPI) for below-knee amputation, 70%. [15]

A paper by G.D. Pooja, L. Sangeeta evaluated activities, their body image perception, and their quality of life, which is significantly associated with mobility. The reduced ability to walk with a prosthesis is associated with lower activities of daily living scores and a lower level of social activity. [16]

A study by Johns Hopkins University and the Amputee Coalition found that individuals amputated due to diabetes or vascular issues were twice as likely to report retirement due to disability compared to those with traumatic amputations, regardless of age or time since amputation. [17]

In our study, the percentage of the amputation population affected by vascular diseases was 25%, and diabetes related were 78%, the majority belonging to the age group above 50 years of age. 23 patients survived up to the 5 year mark, of which 91% were walking with prosthesis. Causes of death included CVA (35.06%), Cardiac arrest (40.51%) and Sepsis (15.58%).

Limitations

It is a single center study and does not take into account the data from other hospitals in the state of Karnataka. In addition, a direct analysis of the amputees' functional competence could not be carried out as it was beyond the scope of this study.

CONCLUSION

Putting the results of this study together, statistics are similar to those from other Indian states as well as other developing countries. Many working-age amputees retired due to disability, reducing productivity and increasing the state's economic burden.

It is emphasized that control of comorbid conditions, addressing systemic manifestations, providing psychoeducation for mental adjustment post-amputation, and encouraging ambulation contribute to an improved quality of life. Ambulation, nutrition, good control of diabetes and regular healthcare checkups of the systemic diabetic manifestations are essential for long-term survival.

While initial emphasis is placed on controlling blood sugar and managing infection, it is equally important to address the systemic manifestations of underlying conditions. Comprehensive education for both the patient and their family is essential to promote an active lifestyle, which can significantly enhance survival rates.

REFERENCES

- [1] Risk factors for 30-day postoperative complications and mortality after below-knee amputation: a study of 2,911 patients from the national surgical quality improvement program. Belmont PJ Jr, Davey S, Orr JD, Ochoa LM, Bader JO, Schoenfeld AJ. *J Am Coll Surg*. 2011;213:370–378. [PubMed] [Google Scholar]
- [3] Swarnakar R, Yadav SL, Surendran D. Lower limb amputation rehabilitation status in India: A review. *World J Clin Cases* 2023; 11(30): 7261-7267 [PMID: 37969465 DOI: 10.12998/wjcc.v11.i30.7261]
- [4] Shankar P, Grewal VS, Agrawal S, Nair SV. A study on quality of life among lower limb amputees at a tertiary prosthetic rehabilitation centre. *Med J Armed Forces India*. 2020;76:89–94. [PMC free article] [PubMed] [Google Scholar]
- [5] Postoperative and late survival outcomes after major amputation: findings from the Department of Veterans Affairs National Surgical Quality Improvement Program. Feinglass J, Pearce WH, Martin GJ, et al. *Surgery*. 2001;130:21–29. [PubMed] [Google Scholar]
- [6] Agarwal, Ashok Kumar, Munish Goel, Raka Srivastava and Shweta Rastogi. “A clinical study of amputations of the lower limb.” *Prosthetics and Orthotics International* 4 (1980): 162 - 164.
- [7] Stern JR, Wong CK, Yerovinkina M, et al. A Meta-analysis of Long-term Mortality and Associated Risk Factors following Lower Extremity Amputation. *Annals of Vascular Surgery*. 2017 Jul;42:322-327. DOI: 10.1016/j.avsg.2016.12.015. PMID: 28389295.
- [8] horud JC, Plemmons B, Buckley CJ, Shibuya N, Jupiter DC. Mortality After Nontraumatic Major Amputation Among Patients With Diabetes and Peripheral Vascular Disease: A Systematic Review. *The Journal of Foot and Ankle Surgery : Official Publication of the American College of Foot and Ankle Surgeons*. 2016 May-Jun;55(3):591-599. DOI: 10.1053/j.jfas.2016.01.012. PMID: 26898398.
- [9] Marahanumaiyah S, Govindaiah S. A five year retrospective study of factors influencing outcome of major lower limb amputations. *Int Surg J* 2020;7:2553-6.
- [10] Rosen N, Gigi R, Haim A, Salai M, Chechik O. Mortality and Reoperations following Lower Limb Amputations. *IMAJ*. 2014;16:83-7.
- [11] Stern JR, Wong CK, Yerovinkina M, et al. A Meta-analysis of Long-term Mortality and Associated Risk Factors following Lower Extremity Amputation. *Annals of Vascular Surgery*. 2017 Jul;42:322-327. DOI: 10.1016/j.avsg.2016.12.015. PMID: 28389295.
- [12] Molina CS, Faulk JB. Lower Extremity Amputation. [Updated 2022 Aug 22]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK546594/>
- [13] Nwosu, C., Babalola, M. O., Ibrahim, M. H., & Suleiman, S. I. (2017). Major limb amputations in a tertiary hospital in North Western Nigeria. *African health sciences*, 17(2), 508–512. <https://doi.org/10.4314/ahs.v17i2.26>
- [14] Molina CS, Faulk JB. Lower Extremity Amputation. [Updated 2022 Aug 22]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK546594/>
- [15] https://www.mospi.gov.in/sites/default/files/publication_reports/Report_583_Final_0.pdf
- [16] Pooja, G.D. and Sangeeta, L. (2013) Prevalence and Etiology of Amputation in Kolkata, India: A Retrospective Analysis. *Hong Kong Physiotherapy Journal*, 31, 36-40. <https://doi.org/10.1016/j.hkpj.2012.12.002>
- [17] https://www.amputee-coalition.org/wp-content/uploads/2014/11/lsp_people-speak-out_120115-113243.pdf