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Original Article

Orthopaedics Section

Need of Revision of Lower Limb Amputations in a North Indian Tertiary Care Centre

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ABSTRACT

Inrtoduction: Amputation of the extremity is a big challenge to mankind. Revision rate of primary amputations stands high despite of maximum care at tertiary care centres. The purpose of this study was to establish cause for the revision, identify preventable cause and to assess outcome of revision amputation surgery.

Materials and Methods: We performed a retrospective study on lower limb revision amputations in Department of Physical Medicine and Rehabilitation and Department of Orthopaedic Surgery, King George Medical University between Jan 2012 to Jan 2015. All patients of any age group and gender admitted for revision amputation were included in the study population.

Results: A total of 32 patients who required revision amputation of lower limbs was included in the study, out of these 62.50 % were male and 37.50 % were female. Age of the patients ranged from 5 to 72 years with mean of 42 years. Most common level of initial amputation was below knee (56.25 %) followed by above knee amputation (31.25%). Most common indication for initial amputation was trauma (43.75%) followed by infection, vascular diseases, malignancy and leprosy. Poor stump formation was found to be most common indication for revision amputation (37.50%) followed by infection (25%), recurrent ulceration (18.75%), stitch abscess (6.25%), neuroma (6.25%), and necrosis (6.25%). All patients were treated successfully.

Conclusion: Revision amputation increases morbidity. Poor stump formation at the time of initial amputation and infection are the most common indication for revision surgery. These are the preventable causes and every effort should be made to alleviate these as well as other preventable causes.

Keywords: Amputation stumps, Morbidity, Rehabilitation

INTRODUCTION

Amputation is defined as surgical removal or loss of extremity or part of extremity due some underlying disease or trauma. Lower extremity amputation is one of the oldest surgical procedures in the history of medical science [1]. Carefully performed amputations with ideal stump may give incredibly good results where individuals may learn jumping and running depending upon level of amputation. On the other hand, bad stumps may delay prostheses fitting and rehabilitation or may confine patients to wheelchairs. Although prosthetic science advancement in last few years have made possible the prosthesis fitting even in sub-optimal stumps, still revisions of initially amputated limbs are needed very commonly which are carried out at a higher level than the initial amputation many of the times [2,3]. Sometimes patients with suboptimal stumps are transferred to rehabilitation unit for prosthesis fitting, from where they are referred to higher centre for possibility of revision amputation. This also affects the outcome because of delay in rehabilitation as well as put extra burden on resources [4].

If common problems associated with amputation stumps and causes for stump revisions are identified then surgeons performing initial amputations can be made aware and this will reduce sufferings to the patients, enhance rehabilitation and save resources. Training to the under-training surgeons can also reduce the presentation of this problem. The aim of this study was to establish the causes for revision amputations, identify preventable causes and to assess the outcome of revision amputation surgery and prosthetic rehabilitation.

MATERIALS AND METHODS

The present study was carried out in retrospective manner in the Department of Physical Medicine and rehabilitation and Department of Orthopaedic surgery, King George Medical University, Lucknow from January 2012 to January 2015. The objective of this study was to establish the causes for revision amputations, identify preventable causes and to asses prosthetic rehabilitation. The study population included male and female patients of all age group who required revision amputation of lower limbs. Prosthetic rehabilitation of all patients included in this study was done at Department of Physical Medicine and Rehabilitation. All revision surgeries were done by two surgeons in the same department. Revised stump was surgically reconstructed to optimize fitting of future prosthesis along with maintaining the muscle balance. In post operative period wound care, pain control, joint range of motion exercises and muscle strengthening exercises were performed. After suture removal physiotherapy was instituted for 4 to 6 weeks and after that stump was assessed for maturity of stump. Preparatory prosthesis was used in all cases for promoting stump maturation and gait training. Finally prosthesis was applied after consensus from treating surgeon. Patient's demographic profile, level and indication of primary amputation and revision amputation, outcome and complications were analysed.

RESULTS

Total 32 patients of lower limb amputation who required revision amputation were included in the study. Among these patients, 62.5% were males and rest 37.5% were females. Median age of these patients was 42 years with range of 5 to 72 years. Below knee amputation was the most common site of initial amputation (56.25%) followed by above knee amputation (31.25%) and rest of the patients were undergone symes amputation and knee disarticulation [Table/Fig-1]. The indications of initial amputation are summarized in [Table/Fig-2]. Trauma was found to be most

S. no	Level of amputation	Number of patients
1	Below knee	18
2	Above knee	10
3	Through knee	2
4	Symes	2

[Table/Fig-1]: Site of initial amputation

S. no	Indication	Number of patients
1	Trauma	14
2	Infection	9
3	Vascular diseases	4
4	Malignancy	3
5	Leprosy	2

[Table/Fig-2]: Indications of initial amputation

S. no	Indications	Number of patients
1	Poor stump	12
2	Infection	8
3	Recurrent ulceration	6
4	Stitch abcess	2
5	Neuroma	2
6	Necrosis	2

[Table/Fig-3]: Indications for revision surgery

common cause of initial amputation (43.75%) followed by infection (28.12%), peripheral vascular diseases (12.25), malignancy (9.37%) and leprosy (6.25%). Indications of revision amputation were analysed [Table/Fig-3]. Poor initial stump was most common indication for revision surgery (37.5%) followed by infection (25%) and recurrent ulceration over the stump (18.75%). Mean follow up period was 15 months. The majority of revision surgeries were done within 8 week of the initial amputation. All patients were treated successfully and only two patients required higher level of amputation during revision surgery (from below knee to above knee). Only 5 patients were able to wear prosthesis prior to the revision surgery while after revision amputation 30 patients were able to use prosthesis uneventfully. Those 5 patients who were able to wear prosthesis needed revision surgery because of recurrent ulceration while prolonged bearing of prosthesis due to suboptimal primary stump.

DISCUSSION

The ultimate goal of amputation is the early rehabilitation of the patient on suitable prosthesis. However, complications during or after primary amputation leads to high morbidity and delayed rehabilitation. Revision amputation is warranted in this situation. In this study we tried to evaluate common indications for revision amputation and found that most of these are preventable.

In our study we found that trauma was the most common cause of initial amputation (43.75%) followed by infection (28.12%), peripheral vascular diseases (12.25), malignancy (9.37%) and leprosy (6.25%). Increasing trend of road traffic accident in developing countries explains the situation. Our findings are supported by the similar study by Schwarz who found almost similar indications for primary amputation but in varying percentage [3]. However, he also found trauma as a most common cause for initial amputation. Evaluation of underlying cause for initial amputation is very important while performing revision surgery because it determines the final outcome and rate of rehabilitation. In one study, amputation following peripheral vascular disease achieved successful prosthetic ambulation in only 66% patients [5], whereas studies of amputation revisions following traumatic amputation report a 100% rate of successful prosthetic rehabilitation [6,7]. Among patients with infected stump or stitch abscess, 40% patients were suffering from diabetes mellitus. Other underlying immunocompromising medical conditions were not noted in the study population except malignant bone tumours. Three patients who were suffering from osteosarcoma of proximal tibia were primarily managed by above knee amputation.

We also noticed that most common indications for revision amputation are formation of bad stump and infection following initial amputation. Inadequate preoperative planning and poor knowledge about subsequent rehabilitation process and prosthesis are the probable reasons for poor stumps. Few studies has concluded that amputations performed by unsupervised trainee surgeons leads to a higher revision rate and a lower rate of successful rehabilitation [8,9]. Successful amputation and subsequent early rehabilitation is utmost important for the patients, their family members as well as our society. Hence amputation surgery should be given equal importance to other complex surgical procedures and preferably should be done or supervised by senior experts.

Bad stumps with poorly covered bone are especially problematic in above knee amputations because they require an end weight bearing prosthesis. Poorly covered bone leads to frequent ulcerations at pressure points. Hence, bone end should be properly covered and every effort should be put to avoid perioperative infection. Two cases required revision amputation due to formation of neuroma following initial amputation. Excision of neuroma was done and nerve was divided at more proximal level. Sharp division of major nerves at level proximal to the amputation are recommended to avoid this complication [2].

In our study two patients had to undergo revision amputation at a higher level from below knee to above knee to obtain a good stump. Following an above knee amputation, 87% more energy is required for ambulation in vascular patients and 33% more in traumatic amputees [4]. Elderly patients may not be able to put this extra energy due to decreased physiological reserve may not rehabilitated despite of good surgical outcome. In these situations revision amputation from low to high level further decreases chances of patient ambulation. Hence level of amputation for stump revision should be kept at the lowest possible level [2] however few studies are not in agreement to this philosophy [10].

A meticulously performed amputation with ideal stump may get necrosed due application of too tight cast in postoperative period. This is a preventable cause for revision surgery and may be avoided with little precaution while applying cast or bandage over stump. Similarly formation of flexion contractures should be prevented by patient education and physiotherapy to avoid any delay in prosthetic rehabilitation.

CONCLUSION

Revision amputation of lower limbs remains a challenge for both patient and treating surgeon. In our study, poorly formed stump is found to be the most common cause for the revision surgery. We emphasize that amputation should not be taken as undesirable surgery and preferably should be performed or supervised by well trained surgeons. Every effort should be made to form an ideal stump for better and rehabilitation of patients.

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