

Major Lower Limb Amputations

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Abstract

A retrospective study of major lower limb amputations carried out in the Orthopaedic Department of the General Hospital, Kuala Lumpur, during the period 1972-79, revealed that diabetes mellitus was the cause in 43 percent of all lower amputations, followed by tumours and trauma. Post-amputation complications due to wound sepsis and wound breakdown were highest in diabetic patients, because of poor selection of amputation level and inadequate attention during and after amputation. Below-knee amputations when carried out for gangrene of the extremities in diabetes mellitus have a high failure rate.

Key words – Limb amputations, diabetes mellitus. Post-amputation complications.

Introduction

Advances in the surgical technique of lower limb amputations, including accurate preoperative assessment, and in the prosthetic-fitting and rehabilitation of the amputee, have radically changed the outlook for amputation surgery. These have now made it possible for amputation surgery to be carefully planned and executed, with the best possible advantage to the amputee, with minimal residual disability and maximal patient acceptability.

Compromise made following requests by patients, leading to so-called conservative amputations not following conventional optimum levels of amputation, have led to poor results, necessitating revisional surgery, thereby delaying prosthetic-fitting and rehabilitation. This study was undertaken to establish the major causes for amputation of lower limbs in a General Hospital, and to evaluate post-operative complications and their possible causes, so that the results of amputation surgery may be improved.

Materials and Method

This is a retrospective study of major lower limb amputations carried out between the years 1972-79, in the Government and University (UKM) Orthopaedic Departments, General Hospital, Kuala Lumpur. During this period a total of 324 lower limb amputations were performed. However, only complete records on 132 patients were available, and this forms the basis of this study. Patients who had toe amputations have been excluded from this study. The patient records were analysed regarding age, sex and racial distributions, causes, levels of amputation, complications, revision surgery, duration of hospital stay, follow-up and rehabilitation.

Results

There were 90 males and 42 females. The right lower limb was operated in 82 and the left in 50 patients. There were 50 Malays, 54 Chinese, 27 Indians and one Orang Asli. Causes of amputations in the 132 patients can be classified into five groups: Diabetes mellitus, Vascular Diseases, Tumour, Trauma and Infection. Table I shows the age distribution of the patients.

Table I
Age Distribution of the Patients According to Causes

Age in Years	Diabetes Mellitus	Vascular Diseases	Tumour	Trauma	Infection
0 – 10	—	—	4	—	—
11 – 20	—	—	5	11	—
21 – 30	2	—	4	10	—
31 – 40	2	2	1	1	1
41 – 50	14	2	5	3	2
51 – 60	14	4	5	2	1
61 – 70	18	4	5	—	—
71 – 80	7	1	2	—	—
TOTAL	57	13	31	27	4

Indications for Amputation

Fifty-seven of the 132 amputations (43.2 percent) were carried out for diabetic gangrene. Tumours accounted for 31 cases (23.5 percent), including squamous cells carcinoma in eleven, osteosarcoma in one, and giant cell tumour and haemangioma in two patients each. Trauma accounted for twenty-seven cases (20.5 percent). The injuries were due to accidents on the road in seventeen and at work in ten. In the vascular group, Buerger's disease was the cause of gangrene in ten patients and atherosclerosis in three. Amputations for chronic infections were carried out in four patients; two for chronic osteomyelitis with non-union of fractures, and one each for yaws and leprosy. (Table II).

Table II
Indications for Major Lower Limb Amputations

Indications	Number of Primary Amputations	%
Diabetes mellitus	57	43.2
Peripheral vascular disease	13	9.8
Buerger's Disease	10	
Atherosclerosis	3	
Tumour	31	23.5
Trauma	27	20.5
Infection	4	3.0
TOTAL	132	

Level of Amputation

The majority, or sixty (45.6 percent), were below-knee amputations, while fifty-one (38.6 percent) were above-knee amputations. Eight were through-knee amputations and eight had Symes' amputation. (Table III).

Table III
Levels of Primary Amputations According to Indications

Level of amputation	Diabetes mellitus	Vascular diseases	Tumour	Trauma	Infection	Total	%
Hip Disarticulation	—	—	4	—	—	4	3
Above-knee	15	6	17	9	4	51	38.6
Through-knee	—	3	2	3	—	8	6
Below-knee	40	4	4	12	—	60	45.6
Syme	2	—	4	2	—	8	6
Mid-foot	—	—	—	1	—	1	0.8

Complications

There were seventy-four patients (56 percent) with post-operative wound sepsis of varying degrees, and stump wound breakdown. Of these, forty seven (63.5 percent) were diabetic patients and eighteen (24.3 percent) were in the trauma group. Three major types of post-amputation revision procedures had been carried out for these complications (Table IV). Twenty-one (16 percent) had re-amputation at a proximal level, the majority (two-thirds) being in diabetic patients. Eleven required secondary suturing of the stump wound, eight others had desloughing and skin grafting, or re-fashioning of the stump. The majority of the other complications had been managed conservatively, quite a few of them as out-patients. No secondary procedure was carried out for the one case of complication in the chronic infection group.

Table IV
Secondary procedures for post-operation complications

Procedure	Diabetes mellitus (57)	Vascular diseases (13)	Tumour (31)	Trauma (27)	Total (132)	%
Re-amputation to Proximal Level	14	0	2	5	21	15.9
Secondary Suture	9	0	0	2	11	8.3
De-slough } Skin Graft } Re-fashion }	4	2	0	2	8	6

Re-amputation

The incidence of wound sepsis and breakdown was extremely high (56 percent), and of these the majority were in diabetic patients. Twenty-one patients had re-amputation at a proximal level, and fourteen of them were diabetics. Fifteen (twenty-five percent) of the below-knee amputations had to be re-amputated at a higher level. (Table V).

Table V
Incidence of Re-amputation for Complications

Level of Primary Amputation	No. of Primary Amputation	Wound Sepsis & Breakdown	No. of Proximal Re-amputation	% Re-amputation
Above-knee	51	20	4	7.8
Through-knee	8	5	1	12.5
Below-knee	60	48	15	25.0
Syme	8	1	1	12.5
TOTAL	127	74	21	

Duration of Hospitalisation

Analysis of the duration of hospital stay of the 132 patients revealed that thirty-three (25 percent) had been hospitalised for less than thirty days. Twenty-two (16.7 percent) had stayed for more than three months, fourteen of them being diabetic patients. Many of these had various complications of diabetes, as well as requiring stabilisation of diabetes. Four died in the hospital, three due to cardiac related causes and one due to septicaemia with renal failure, all within two months of their hospitalisation. (Table VI)

Table VI
Duration of Hospitalisation

Duration (Months)	Diabetes mellitus (57)	Vascular diseases (13)	Tumour (31)	Trauma (27)	Infection (4)	Total (132)	%
Less than 1	7	5	6	11	4	33	25.0
1 – 2	17	6	18	7	–	48	36.4
2 – 3	14	1	4	4	–	23	17.4
More than 3	14	–	3	5	–	22	16.7
Died	3	1	–	–	–	4	3.0
Absconded	2	–	–	–	–	2	1.5

Follow-up and Rehabilitation

The follow-up of the 126 patients who were discharged from the hospital had been poor. Twenty of the 52 diabetic patients did not return to the orthopaedic follow-up clinic. Among those who had returned for follow-up, the clinic doctors had discharged from further follow-up 16 patients after their third visit. Notes on the method of ambulation of the amputees had been generally not entered in the patient records. Two patients in the vascular group and twelve of the 27 trauma patients had been fitted with prostheses. Those patients who had amputation for tumour had no records of prosthetic fitting.

Discussion

Diabetic patients with gangrene involving parts of the lower limb formed 43.2 percent of the total number of patients in this study. This is an indication of poor control of the diabetes, inadequate care of the limbs and delay in seeking definitive treatment. The major post-amputation complications also occurred in diabetic patients, accounting for two-thirds of all incidences of wound sepsis and breakdown. Forty-seven of the fifty-seven patients (82 percent) had varying degrees of wound sepsis and breakdown, requiring re-amputation at a proximal level in fourteen, and secondary suturing, skin grafting or re-fashioning of the stump in thirteen, the rest healing through conservative management. This indicates the need to carefully assess the vascular state of the gangrenous limb in diabetic patients, to determine the correct level of primary amputation and care during and after surgery of the amputation stump.

Amputations in the peripheral vascular disease group made up only 9.8 percent of the cases, of which only three had atherosclerosis, which suggests that these as a cause for amputation are not common in this hospital. In a comparable study carried in the University Hospital,¹ the incidence was similar (12 percent).

This study is in contrast to those from North America and Europe,¹ where vascular disease was the aetiology in 60 to 85 percent of primary amputations, with only 25 to 50 percent being for diabetic gangrene. This may be due to better care of the diabetic patients in those communities. Unlike the findings in the present and the University Hospital studies,² Mbindyo (1978)³ found tumour to be the major cause of limb amputations in the Kenyatta National Hospital in Kenya. The Symes' amputation, though generally not recommended for diabetic gangrene for the fore-foot and toes, had been successful in the two patients in this study.

Steen-Jensen et al (1982)⁴ recorded that the majority of wound healing complications occurred in below-knee amputations in those with peripheral vascular disease. In the present study only two below-knee amputations had been carried out for atherosclerosis, one of which had wound sepsis and breakdown, requiring an above-knee re-amputation. Burgess et al (1971)⁵ recorded a re-amputation rate of nearly eight percent and Jamieson & Ruckley (1983)⁶ had only four out of nineteen re-amputations in peripheral vascular disease patients.

Unfortunately the majority of patients in this study had been discharged from follow-up as early as three months from time of leaving the hospital. There were no records of prosthetic fitting and rehabilitation except in two patients in the vascular group and twelve of the 27 trauma patients, the high incidence of prosthetic fitting in the latter being probably influenced by the greater motivation in the younger patients.

Early rehabilitation of amputees is possible if prosthetic fitting is done before the patients are discharged home. It is also important that these patients should be followed-up regularly so that problems related to the stump or the prostheses can be detected and attended to early.

Conclusions

The major indication of amputations of lower limbs in this study is diabetic gangrene, which accounted for 43 percent of all major lower limb amputations. Post-operative complications were highest in diabetic patients, requiring proximal re-amputation, secondary, suturing, skin grafting and stump refashioning. Below knee amputations, when carried out for gangrene of the extremities in diabetes and peripheral vascular disease, have a high failure rate.

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