

## Amputations in a tertiary care hospital

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**Objective.** This study was conducted to highlight the pattern of amputations and their outcome in a tertiary care hospital over a period of 16 months. **Material and Methods.** This retrospective study of medical records was conducted at the Al-Noor Specialist Hospital, Makkah, Saudi Arabia from 04-03-2004 to 18-06-2005. The subjects' files were extracted by using ICD-10 codes for amputations from the medical records department by the authors of the Health Research Center. The files were reviewed for surgeons' clinical notes as well as nurses' notes. Operating theatre notes were also reviewed in detail. Certain variables were documented, including demography, clinical aspects and outcomes of amputations. **Results.** Of 50 study subjects males accounted for 72% and 84% were Saudis. Fifty percent were middle aged (range 45-64yrs). The range of stay was 3-48 days and 44% patients stayed for 3-7 days. There were 43 (86%) amputations due to diabetes with peripheral circulatory disorder. Forty two (84%) of patients improved and 12% were discharged against medical advice (DAMA) after amputation whereas 6% died. Forty-four percent of patients were admitted once, while 2% of patients were readmitted 9 times. The most amputations were at the level of the toes (54%), followed by 17 around the knee (34%). Nineteen (38%) patients underwent amputation under general anesthesia. The re-amputation rate was 10%. **Conclusion.** Diabetes with peripheral vascular disease and neuropathy was the main cause of amputations in our hospital.

**Key word:** Amputation, Diabetic, Traumatic, Peripheral circulatory disorder.

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### Introduction

Amputation is a global problem. It is a procedure by which the removal of a limb or other appendages or outgrowth of the body is performed e.g. below knee amputation. In one study in UK hospitals, approximately 5500 amputations are performed each year in England. The number increases as popula-

tion age increases. Seventy-five percent of patients are >60 years of age and 65% are men. Major limb amputations are rarely required, 3% of totals. The indications for amputations are usually vascular diseases, diabetes (85%), trauma (10%) and tumors (3%). Major upper limb amputations are rarely required (1).

The epidemiological impact of diabetes is evidenced by the growing morbidity and

mortality rates, and by the fact that it causes permanent disabilities such as blindness, diabetic retinopathy, end stage renal failure and lower extremity amputations. Among the risk factors in lower extremity amputation in diabetes mellitus patients are: long duration of the disease, prolonged hyperglycemia, dyslipidemia, smoking and drinking, neuropathy, peripheral vascular disease, and prior ulcers (2).

Although amputee limb salvage rates for patients with peripheral vascular diseases have improved substantially, amputation may be the only practiced treatment for a limb severely affected by trauma, infection, tumor, or the end stages of ischemia. Unfortunately, vascular surgeons have traditionally viewed amputations as manifestations of failure – failure to comprehend or control the disease process, failure of the referring physician or patient to seek help in a timely fashion, or failure of the vascular surgeon to perform successful revisualization. The immediate aims of amputations are 1) removal of diseased tissues; 2) relief of pain; 3) primary healing of the amputation at the level chosen; and 4) construction of a stump and provision of a prosthesis that will permit useful function (3).

In view of these facts, we undertook this study to discover the clinical profile audit of amputation at the Al-Noor Specialist Hospital, Makkah, Saudi Arabia.

## Material and Methods

This retrospective case series study was carried out over a period of 16 months from 4-3-2004 to 18-6-2005 at Al-Noor Specialist Hospital, Makkah, Saudi Arabia. The subjects' files were extracted by using ICD-10 codes (4) for amputations from the medical records department by the authors of the Health Research Center. The files were reviewed for surgeons' clinical notes as well as nurses' notes. Operating theatre notes were also reviewed in detail. Certain variables were documented, including demography, clinical aspects and outcomes of amputations.

The data were categorized into age groups, i.e. 1-14, 15-24, 25-44, 45-64, >65, gender, i.e. male and female; nationality, i.e. nationals and non-nationals; duration of stay, i.e. 3-7 days, 8-14 days & >15 days; frequency of admission, i.e. single, 2-3 times, >3 times; level of amputation, i.e. lower limb and upper limb, and anesthesia given, i.e. general and other type of anesthesia. The patients who were kept in different wards due to the shortage of beds in surgical wards or transferred to other wards due to changes to the patients' disease category or level of severity were also considered. The final outcome of patients was illustrated as improved, death and discharge against medical advice (DAMA).

Institutional review board of Alnoor Specialist Hospital granted permission to conduct this study.

Al-Noor Specialist Hospital is a 550-bedded referral teaching hospital providing tertiary care throughout the Makkah region of Saudi Arabia for more than 18 years.

The data were analyzed by the Statistical Programme for Social Sciences (SPSS) 16.0 version. Numerical data were subject to descriptive analysis that is mean+standard deviation (SD) and range. Categorical data were analyzed as frequency, percentage. Parametric data were analyzed by the Student T-Test. The two tailed p-value was considered significant if <0.05.

## Results

Fifty patients had amputations performed. These amputations were of part of either the upper or lower limbs. The male to female ratio was 2.5:1. Saudis were dominant, 42 (84%), while the majority of non-Saudis were Nigerians. Only 1 (2%) was from Mali. The age range was 1-84 years with a mean age of 53 years. The mean ages of diabetics and non-diabetics were 58.1 and 21.3 years, respectively (p <0.005). The peak incidence of amputations was observed in the 45-65 yrs age group. Personal history highlighted

that 5 (10%) were smokers. Two (4%) were students, 2 (4%) were government employees and for 32 (64%) their occupation was not documented (Table 1).

The duration of stay was between 3 to 48 days, with a mean stay of  $13.3 \pm 10.9$  days. Most of the patients, 41 (82%), were referred to the general surgery ward. Diabetic amputations 43 (86%) accounted for most cases. The readmission rate was 56%, which was mainly due to poor follow-up and home care 15 (55.6%), followed by poor compliance with medication 7 (25.9%). Remaining cases were readmitted due to other reasons, i.e. hypertension (HTN), ischemic heart disease (IHD) and chronic renal failure (CRF) (Table 2).

Table 1 Socio-demographic data of amputees

Variables	(n=50)	%		
Sex	Males	36	72	
	Females	14	28	
Nationality	Nationals	42	84	
	Non-nationals	8	16	
Age(years)	1-14	4	8	
	15-24	2	4	
	25-44	5	10	
	45-64	25	50	
	>65	14	28	
Personal history	Smoking	Smoker	5	10
		Non-smoker	7	14
		Ex-smoker	3	6
		Not documented	35	70

Table 2 Clinical Data of amputees

Variables	(n = 50)	%		
Duration of stay in hospital Range (3-48 days)	3-7	22	44	
	8-14	16	32	
	> 15	12	24	
Service units (Wards)	General surgical ward	41	82	
	Orthopedic ward	5	10	
	Male vascular surgical ward	1	2	
	Male Urology Plastic Vascular Ward	1	2	
	Female Medical ward	1	2	
	Female urology plastic surgery ward	1	2	
Associated illnesses	None	7	14	
	DM alone or with complication	28	56	
	DM + HTN* + IHD† + CRF††	15	30	
Final diagnoses	ICD-10 Codes	E14.5 Unspecified DM with peripheral circ. disorder	43	86
		S88.1 Traumatic amputation	6	12
		S 81 Open wound infection	1	2
Outcomes	Improved	42	84	
	DAMA (after amputation)	5	10	
	Death	3	6	
Admissions	Single admission	22	44	
	2-3 Times	21	42	
	> 3 Times	7	14	

\*HTN = Hypertension, †IHD = Ischemic heart disease, ††CRF = Chronic renal failure

Table 3 Amputations and anesthesia

Features regarding amputations			(n = 50)	%
Level of amputations	Lower limb	Toes	20	40
		Digits		
		Ray	7	14
		Syme	1	2
	Below Knee (transtibial)	13	26	
	Above Knee (transfemoral)	4	8	
	Upper limb	Fingers (digits)	4	8
		Elbow disarticulation	1	2
> One amputation			5	10
Anesthesia given	General Anesthesia		19	38
	Local Anesthesia		15	30
	Spinal anesthesia		7	14
	Lumber Nerve block		1	2
	Ankle block		4	8
	Not documented		4	8

There were 27 (54%) patients who underwent amputation at the level of the toes, followed by, 17 (34%) around the knee. We found that lower limb amputations were predominant 42 (97.7%) in diabetics while no difference was found among non-diabetics, i.e. upper limb 4 (57.1%) versus lower limb 3 (42.9). Only 5 (10%) cases had more than one amputation on the same limb. Nineteen (38%) patients underwent amputation under general anesthesia. Five (10%) patients underwent amputation more than once (Table 3).

## Discussion

Our study allowed us to list all the cases of amputations carried out in this tertiary care referral teaching hospital. Males were more dominant as compared to females, showing correlation to the studies done by Al-Turaiki (5), Trautner (6), Dangelser (7), Agarwal (8), Leung (9) and Mohamed (10), but contrary to Johannesson (11). Diabetes was the most common cause of amputation in our study and it correlated with the studies of Trautner (6) and Dangelser (7). Presently more than

two thirds of amputations on civilians in western society are performed for peripheral vascular diseases (12, 13, 14, 15), and performed for four main categories of vascular diseases (1) arteriosclerosis obliterans (2) arteriosclerosis obliterans with diabetes (3) thromboangiitis obliterans and (4) miscellaneous conditions such as embolic occlusion, peripheral aneurysm, vascular trauma, and venous obstruction (12). Diabetes is an etiological factor in one quarter of patients requiring lower limb amputation (12). Likewise; diabetes is the cause of up to 70% of all the non-traumatic amputations in the world. This can be explained by the fact that the number of persons with diabetes is increasing rapidly (16). The peak age for amputation was 45-65 years in our study contrary to the peak values at ages between 65-74 yrs in diabetics and 55-64 years in non-diabetics in the study by Nazim (17) and also the peak incidence of amputations was observed in the decade from 67 to 76 years in both age groups (18). The mean age of amputees was 64.7 years according to the studies by Trautner (6), Leung (10), Laaperi (13), Eskelinen (15), and Nazim (17). On the other hand,

our study showed a mean age of 53 years. Mohamed (10) and Ebskov (19) found the mean age less than in our study. Likewise 5-72 years was the range of ages of the amputees according to Mohamed (10), while ours had wider age range. AL-Turaiki (5), Agarwal (8), Mohamed (10), and Stinus (14) found more traumatic amputations than us. The risk of lower extremity amputation was 15 times higher in diabetics than in age matched non-diabetics (20) but AL-Turaiki (5) found more traumatic amputations. Regarding the level of amputations in our study, below knee amputations were more frequent than above knee, showing consistency with Mohamed, but contrary to the studies of both Laaperi (13) and Eskelinen (15). Similarly according to Hussein (16), 24% of diabetic amputations were of toes, 5.8% were mid-foot, 38% were below the knee, and 21.4% were above knee; the remaining 10% included other sites. We found a majority of lower limb amputations in diabetics. The most likely reason in such cases was peripheral sensory loss with the development of foot ulcers, as also mentioned by Birke (21).

Moreover, we found a readmission rate of about 56%, which was mainly due to poor follow up, poor home care and poor compliance with medication intake. The other reasons included complications of IHD, CRF and HTN.

## Conclusion

Diabetes was the major factor in amputations in this study. Most patients were between 45-65 years of age. Lower limb, especially foot amputations were predominant. Congenital, carcinoma or other diseases of bone were not noticed. Peripheral vascular disease and neuropathy were the main causes of amputations. Poor home care, follow up and compliance with medication were the main reasons among the readmitted patients which demonstrates the immense need for a multidisciplinary team approach with an

objective to reduce the amputation rate, especially in diabetics.

## Recommendations

1 – Special emphasis should be paid to foot care services as well as patient education.

2 – Prevention of complications, i.e. peripheral vascular disease and neuropathy would be warranted to prevent amputations and subsequent high disability.

3 – To reduce the re-amputations, surgeons should be more involved in long-term evaluation of functional outcome in such patients and modify their technique for future procedures.

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